ABB LTD
Form 20-F
March 28, 2019

UNITED STATES

SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM 20 F

REGISTRATION STATEMENT PURSUANT TO SECTION 12(b) OR (g) OF THE SECURITIES EXCHANGE ACT OF 1934
OR
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
OR
SHELL COMPANY REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
Commission file number: 001 16429

ABB Ltd

(Exact name of registrant as specified in its charter)

Switzerland

(Jurisdiction of incorporation or organization)

Affolternstrasse 44

CH 8050 Zurich, Switzerland

(Address of principal executive offices)

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CH 8050 Zurich, Switzerland

Telephone: +41 43 317 7111

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(Name, Telephone, E mail and/or Facsimile number and Address of Company Contact Person)

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

Title of each class	Name of each exchange on which registered
	New York Stock Exchange

American Depositary Shares, each representing one Registered Share	
Registered Shares, par value CHF 0.12	New York Stock Exchange*

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

Securities for which there is a reporting obligation pursuant to Section 15(d) of the Act: None.

Indicate the number of outstanding shares of each of the issuer's classes of capital or common stock as of the close of the period covered by the annual report: 2,131,962,406 Registered Shares

Indicate by check mark if the registrant is a well known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes No

If this report is an annual or transition report, indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934. Yes No

Note – Checking the box above will not relieve any registrant required to file reports pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934 from their obligations under those Sections.

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 whether the registrant is a large accelerated filer, an accelerated filer, a non accelerated filer, or an emerging growth company. See definition of "large accelerated filer," "accelerated filer," and "emerging growth company" in Rule 12b 2 of the Exchange Act.

Large accelerated filer Accelerated filer Non accelerated filer Emerging growth company

If an emerging growth company that prepares its financial statements in accordance with U.S. GAAP, 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.

† The term "new or revised financial accounting standard" refers to any update issued by the Financial Accounting Standards Board to its Accounting Standards Codification after April 5, 2012.

Indicate by check mark which basis of accounting the registrant has used to prepare the financial statements included in this filing:

U.S. GAAP International Financial Reporting Standards as issued by the International Accounting Standards Board Other

If "Other" has been checked in response to the previous question, indicate by check mark which financial statement item the registrant has elected to follow.

Item 17 Item 18

If this is an annual report, indicate by check mark whether the registrant is a shell company (as defined in Rule 12b 2 of the Exchange Act). Yes No

* Listed on the New York Stock Exchange not for trading or quotation purposes, but only in connection with the registration of American Depositary Shares pursuant to the requirements of the Securities and Exchange Commission.

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INTRODUCTION

ABB Ltd is a corporation organized under the laws of Switzerland. In this Annual Report on Form 20-F (Annual Report), "the ABB Group," "ABB," the "Company," "we," "our" and "us" refer to ABB Ltd and its consolidated subsidiaries (unless the context otherwise requires). We also use these terms to refer to ABB Asea Brown Boveri Ltd and its subsidiaries prior to the establishment of ABB Ltd as the holding company for the entire ABB Group in 1999, as described in this Annual Report under "Item 4. Information on the Company—Introduction—History of the ABB Group". Our American Depositary Shares (each representing one registered share of ABB Ltd) are referred to as "ADSs". The registered shares of ABB Ltd are referred to as "shares". Our principal corporate offices are located at Affolternstrasse 44, CH 8050 Zurich, Switzerland, telephone number +41 43 317 7111.

FINANCIAL AND OTHER INFORMATION

The Consolidated Financial Statements of ABB Ltd, including the notes thereto, as of December 31, 2018 and 2017, and for each of the years in the three year period ended December 31, 2018 (our Consolidated Financial Statements) have been prepared in accordance with United States generally accepted accounting principles (U.S. GAAP). ABB Ltd has separately prepared its statutory unconsolidated financial statements in accordance with the Swiss Code of Obligations.

In this Annual Report: (i) "$," "U.S. dollar" and "USD" refer to the lawful currency of the United States of America; (ii) "CHF" and "Swiss franc" refer to the lawful currency of Switzerland; (iii) "EUR" and "euro" refer to the lawful currency of the participating member states of the European Economic and Monetary Union (Eurozone); (iv) "SEK" and "Swedish krona" refer to the lawful currency of Sweden; (v) "Chinese renminbi" refers to the lawful currency of the People's Republic of China; (vi) "AED" refers to the lawful currency of the United Arab Emirates; (vii) "AUD" and "Australian dollar" refer to the lawful currency of Australia; and (viii) "INR" and "Indian Rupee" refer to the lawful currency of India.

Except as otherwise stated, all monetary amounts in this Annual Report are presented in U.S. dollars. Where specifically indicated, amounts in Swiss francs have been translated into U.S. dollars. These translations are provided for convenience only, and they are not representations that the Swiss franc could be converted into U.S. dollars at the rate indicated. These translations have been made using the twelve o'clock buying rate in the City of New York for cable transfers as certified for customs purposes by the Federal Reserve Bank of New York as of December 31, 2018, unless otherwise indicated. The twelve o'clock buying rate for Swiss francs on December 31, 2018, was $1.00 = CHF 0.9832. The twelve o'clock buying rate for Swiss francs on March 22, 2019, was $1.00 = CHF 0.9940.

FORWARD LOOKING STATEMENTS

This Annual Report includes forward looking statements within the meaning of the United States Private Securities Litigation Reform Act of 1995. We intend such forward-looking statements to be covered by the safe harbor provisions for forward-looking statements contained in Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended (Exchange Act). These forward looking statements can be identified by the use of forward looking terminology, including the terms "believes," "estimates," "anticipates," "expects," "intends," "may," "will," or "should" or, in each case, their negative, or other variations or comparable terminology. These forward looking statements include all matters that are not historical facts. They appear in a number of places throughout this Annual Report and include statements regarding our intentions, beliefs or current expectations concerning, among other things, our results of operations, financial condition, liquidity, prospects, growth, dispositions, strategies and the countries and industries in which we operate.

These forward looking statements include, but are not limited to, statements about our financial condition and performance, operating results, liquidity and our ability to fund our business operations and initiatives, capital expenditure and debt service obligations, plans regarding our capital structure, ability to take advantage of market opportunities and drive growth, our products and service offerings and their anticipated performance and impact across various industries and consumer segments, anticipated benefits to the shareholders (including in connection with our share buyback program), acquisitions and integration, including the acquisition of General Electric Company's Industrial Solutions business, and related synergies and other benefits, investment and risk management strategies, volatility in the credit markets, oil prices, foreign currency exchange rates and other market conditions, trends and opportunities, industry trends and expectations, including the Energy and Fourth Industrial Revolutions and changing consumer behavior and demands, our ability to respond to changing business and economic conditions, our comparative advantages, our commitments and contingencies, availability of raw materials, and other plans, goals, strategies, priorities and initiatives related to our business, including our brand management initiative, Next Level Strategy, and cost-saving measures, as well as, the following:

- statements in "Item 3. Key Information—Dividends and Dividend Policy" regarding our policy on future dividend payments,

- statements in "Item 3. Key Information—Risk Factors,"

- statements in "Item 5. Operating and Financial Review and Prospects" regarding our management objectives, including our outlook, as well as trends in results, prices, volumes, operations, margins and overall market trends, and

- statements in "Item 8. Financial Information—Legal Proceedings" regarding the outcome of certain legal and compliance matters.

By their nature, forward looking statements involve risks and uncertainties because they relate to events and depend on circumstances that may or may not occur in the future. We caution you that forward looking statements are not guarantees of future performance and that our actual results of operations, financial condition and liquidity, and the development of the countries and industries in which we operate, may differ materially from those described in or suggested by the forward looking statements contained in this Annual Report. In addition, even if our results of operations, financial condition and liquidity, and the development of the countries and industries in which we operate, are consistent with the forward looking statements contained in this Annual Report, those results or developments may not be indicative of results or developments in subsequent periods. Important factors that could cause actual results to differ materially from our expectations are contained in cautionary statements in this Annual Report and include, without limitation, the following:

- Our business is exposed to risks associated with the volatile global economic environment and political conditions.

- Illegal behavior by any of our employees or agents could have a material adverse impact on our consolidated operating results, cash flows, and financial position as well as on our reputation and our ability to do business.

- Our operations in emerging markets expose us to risks associated with conditions in those markets.

- Undertaking long term, technically complex projects or projects that are dependent upon factors not wholly within our control could adversely affect our profitability and future prospects.

- We operate in very competitive markets and could be adversely affected if we fail to keep pace with technological changes.

- Our multi-national operations expose us to the risk of fluctuations in currency exchange rates.

- Our hedging activities may not protect us against the consequences of significant fluctuations in exchange rates, interest rates or commodity prices on our earnings and cash flows.

- Increases in costs or limitation of supplies of raw materials may adversely affect our financial performance.

- An inability to protect our intellectual property rights could adversely affect our business.

- Industry consolidation could result in more powerful competitors and fewer customers.

- We are subject to environmental laws and regulations in the countries in which we operate. We incur costs to comply with such regulations, and our ongoing operations may expose us to environmental liabilities.

- We may be the subject of product liability claims.

- The uncertainties surrounding the United Kingdom's future relationship with the European Union may have a negative effect on global economic conditions, financial markets and our business.

- We may encounter difficulty in managing our business due to the global nature of our operations.

- If we are unable to obtain performance and other guarantees from financial institutions, we may be prevented from bidding on, or obtaining, some contracts, or our costs with respect to such contracts could be higher.

- Examinations by tax authorities and changes in tax regulations could result in lower earnings and cash flows.

- The recent comprehensive tax reform in the United States could adversely affect our financial condition and results of operations.

- If we are unable to attract and retain qualified management and personnel then our business may be adversely affected.

- Our business strategy may include making strategic divestitures. There can be no assurance that any divestitures will provide business benefit.

- Anticipated benefits of existing and potential future mergers, acquisitions, joint ventures or strategic alliances may not be realized.

- Increased information technology (IT) security threats and more sophisticated cyber attacks could pose a risk to our systems, networks, products, solutions and services.

- Failure to comply with evolving data privacy and data protection laws and regulations or to otherwise protect personal data, may adversely impact our business and financial results.

- We have identified a material weakness in our internal control over financial reporting that could, if not remediated, result in material inaccuracies in our consolidated financial statements and adversely affect our business and results of operations.

- There is no guarantee that our ongoing efforts to reduce costs will be successful.

- We could be affected by future laws or regulations enacted to address climate change concerns as well as the physical effects of climate change.

We urge you to read the other important factors set forth under sections of this Annual Report entitled “Item 3. Key Information—Risk Factors,” “Item 4. Information on the Company” and “Item 5. Operating and Financial Review and Prospects” for a more complete discussion of the important factors that could affect our future performance and the countries and industries in which we operate. In light of these risks, uncertainties and assumptions, the forward looking circumstances described in this Annual Report and the assumptions underlying them may not occur.

Except as required by law or applicable stock exchange rules or regulations, we undertake no obligation to update or revise publicly any forward looking statement, whether as a result of new information, future events or otherwise. All subsequent written and oral forward looking statements attributable to us or to persons acting on our behalf are expressly qualified in their entirety by the cautionary statements referred to above and contained elsewhere in this Annual Report.

PART I

Item 1. Identity of Directors, Senior Management and Advisers

Not applicable

Item 2. Offer Statistics and Expected Timetable

Not applicable

Item 3. Key Information

SELECTED FINANCIAL DATA

The following table presents our selected financial and operating information at the dates and for each of the periods indicated. We report our financial results in U.S. dollars. Due to our global operations, a significant amount of our revenues, expenses, assets and liabilities are denominated in other currencies. As a consequence, movements in exchange rates between currencies may affect our profitability, the comparability of our results between periods, as well as the reported carrying value of our assets and liabilities. You should read the following information together with the information contained in “Item 5. Operating and Financial Review and Prospects,” as well as our Consolidated Financial Statements and the Notes thereto, included elsewhere in this Annual Report.

Our selected financial data are presented in the following tables in accordance with U.S. GAAP and have been derived from our published Consolidated Financial Statements. Our Consolidated Financial Statements as of and for the year ended December 31, 2018, were audited by KPMG AG. Our Consolidated Financial Statements as of December 31, 2017, and for each of the years ended December 31, 2017 and 2016, were audited by Ernst & Young AG. Our Consolidated Financial Statements as of December 31, 2016, and as of and for the years ended December 31, 2015 and 2014, have not been audited following the reclassification in 2018 of certain businesses between continuing operations and discontinued operations. Financial information previously reported in 2017, 2016, 2015 and 2014 has been recast to reflect the reclassification.

INCOME STATEMENT DATA:

				unaudited	
($ in millions, except per share data in $)	**2018**	**2017**	**2016**	**2015**	**2014**
Total revenues	**27,662**	**25,196**	**24,929**	**26,459**	**31,175**
Total cost of sales(1)	**(19,118)**	**(17,350)**	**(17,396)**	**(18,429)**	**(22,082)**
Gross profit	**8,544**	**7,846**	**7,533**	**8,030**	**9,093**
Selling, general and administrative expenses[(1)]	(5,295)	(4,765)	(4,532)	(4,769)	(5,179)
Non-order related research and development expenses[(1)]	(1,147)	(1,013)	(967)	(1,041)	(1,136)
Other income (expense), net	124	162	(105)	(102)	544
Income from operations	**2,226**	**2,230**	**1,929**	**2,118**	**3,322**
Interest and dividend income	72	73	71	74	77
Interest and other finance expense	(262)	(234)	(201)	(240)	(311)
Non-operational pension (cost) credit[(1)]	83	33	(38)	(20)	(46)
Income from continuing operations before taxes	**2,119**	**2,102**	**1,761**	**1,932**	**3,042**
Provision for taxes	(544)	(583)	(526)	(566)	(1,031)
Income from continuing operations, net of tax	**1,575**	**1,519**	**1,235**	**1,366**	**2,011**
Income from discontinued operations, net of tax	723	846	799	689	707
Net income	**2,298**	**2,365**	**2,034**	**2,055**	**2,718**
Net income attributable to noncontrolling interests	(125)	(152)	(135)	(122)	(124)
Net income attributable to ABB	**2,173**	**2,213**	**1,899**	**1,933**	**2,594**
Amounts attributable to ABB shareholders:					
Income from continuing operations, net of tax	1,514	1,441	1,172	1,289	1,906
Income from discontinued operations, net of tax	659	772	727	644	688
Net income	2,173	2,213	1,899	1,933	2,594
Basic earnings per share attributable to ABB shareholders:					
Income from continuing operations, net of tax	0.71	0.67	0.54	0.58	0.83
Income from discontinued operations, net of tax	0.31	0.36	0.34	0.29	0.30
Net income	1.02	1.04	0.88	0.87	1.13
Diluted earnings per share attributable to ABB shareholders:					
Income from continuing operations, net of tax	0.71	0.67	0.54	0.58	0.83
Income from discontinued operations, net of tax	0.31	0.36	0.34	0.29	0.30
Net income	1.02	1.03	0.88	0.87	1.13
Weighted-average number of shares outstanding (in millions) used to compute:					
Basic earnings per share attributable to ABB shareholders	2,132	2,138	2,151	2,226	2,288
Diluted earnings per share attributable to ABB shareholders	2,139	2,148	2,154	2,230	2,295

BALANCE SHEET DATA:

				unaudited	
			December 31,		
($ in millions)	**2018**	**2017**	**2016**	**2015**	**2014**
Cash and equivalents	3,445	4,526	3,644	4,565	5,443
Marketable securities and short-term investments	712	1,083	1,953	1,625	1,318
Total assets[(2)]	44,441	43,458	39,391	41,313	44,855
Long-term debt (excluding current maturities of long-term debt)	6,587	6,682	5,785	5,421	6,770
Total debt[(3)]	8,618	7,408	6,783	7,408	7,630
Common stock	188	188	192	1,440	1,725
Total stockholders' equity (including noncontrolling interests)	14,534	15,349	13,897	14,988	16,815

CASH FLOW DATA:

				unaudited	
($ in millions)	**2018**	**2017**	**2016**	**2015**	**2014**
Operating activities:					
Net cash provided by operating activities - continuing operations	2,352	2,588	2,607	2,700	2,889
Net cash provided by operating activities - discontinued operations	572	1,211	1,236	1,118	956
Net cash provided by operating activities	2,924	3,799	3,843	3,818	3,845
Investing activities:					
Net cash used in investing activities - continuing operations	(2,908)	(1,118)	(1,108)	(801)	(845)
Net cash used in investing activities - discontinued operations	(177)	(332)	(197)	(173)	(276)
Net cash used in investing activities	(3,085)	(1,450)	(1,305)	(974)	(1,121)
Financing activities:					
Net cash used in financing activities - continuing operations	(741)	(1,688)	(3,308)	(3,348)	(3,007)
Net cash used in financing activities - discontinued operations	(48)	(47)	(47)	(32)	(17)
Net cash used in financing activities	(789)	(1,735)	(3,355)	(3,380)	(3,024)

(1) In January 2018, we adopted an accounting standard update which changes how employers that sponsor defined benefit pension plans and other postretirement plans present the net periodic benefit cost in the income statement. As a result, we have reclassified in prior periods certain net periodic pension and postretirement benefits costs/credits from Total cost of sales, Selling, general and administrative expenses and Non-order related research and development expenses to Non-operational pension (cost) credit. See "Note 2 Significant Accounting Policies - New accounting pronouncements" to our Consolidated Financial Statements.

(2) As of January 1, 2018, we adopted an accounting standard update in which certain advances from customers, previously reported as a reduction in Inventories, were reclassified to liabilities. As a result, total assets at December 31, 2017, 2016, 2015 and 2014, have been restated. See "Note 2 Significant Accounting Policies - New accounting pronouncements" to our Consolidated Financial Statements.

(3) Total debt is equal to the sum of short term debt (including current maturities of long term debt) and long term debt.

DIVIDENDS AND DIVIDEND POLICY

Payment of dividends is subject to general business conditions, ABB's current and expected financial condition and performance and other relevant factors including growth opportunities. ABB's current dividend policy is to pay a steadily rising, sustainable annual dividend over time.

The unconsolidated statutory financial statements of ABB Ltd are prepared in accordance with Swiss law. Based on these financial statements, dividends may be paid only if ABB Ltd has sufficient distributable profits from previous years or sufficient free reserves to allow the distribution

of a dividend. As a holding company, ABB Ltd's main sources of income are dividend and interest payments from its subsidiaries.

At December 31, 2018, the total unconsolidated stockholders' equity of ABB Ltd was CHF 8,511 million, including CHF 260 million representing share capital, CHF 9,045 million representing reserves and CHF 794 million representing a reduction of equity for own shares (treasury stock). Of the reserves, CHF 794 million relating to own shares and CHF 52 million representing 20 percent of share capital, are restricted and not available for distribution.

With respect to the year ended December 31, 2014, ABB Ltd distributed a total of CHF 0.72 per share to shareholders, which comprised a dividend of CHF 0.55 (USD 0.59) paid out of ABB Ltd's capital contribution reserves and a distribution of CHF 0.17 (USD 0.18) by way of a nominal value reduction (a reduction of CHF 0.17 in the par value of each share from CHF 1.03 to CHF 0.86). With respect to the year ended December 31, 2015, ABB Ltd distributed a total of CHF 0.74 (USD 0.75) per share to shareholders by way of a nominal value reduction (a reduction of CHF 0.74 in the par value of each share from CHF 0.86 to CHF 0.12). With respect to the years ended December 31, 2016 and 2017, ABB Ltd paid a dividend of CHF 0.76 (USD 0.76) per share and CHF 0.78 (USD 0.81) per share, respectively. The USD amounts for each of the foregoing dividend payments made in CHF have been translated using the average rates of the month in which the dividends were paid.

With respect to the year ended December 31, 2018, ABB Ltd's Board of Directors has proposed to pay a dividend of CHF 0.80 per share to shareholders. The distribution is subject to approval by shareholders at ABB Ltd's 2019 Annual General Meeting (AGM).

For further information on dividends and dividend policy see "Item 6. Directors, Senior Management and Employees—Shareholders—Shareholders' rights— Shareholders' dividend rights".

RISK FACTORS

You should carefully consider all of the information set forth in this Annual Report and the following description of risks and uncertainties that we currently believe may exist. Our business, financial condition or results of operations could be adversely affected by any of these risks. Additional risks of which we are unaware or that we currently deem immaterial may also impair our business operations. This Annual Report also contains forward looking statements that involve risks and uncertainties. Our results could differ materially from those anticipated in these forward looking statements as a result of certain factors, including those described below and elsewhere in this Annual Report. See "Forward Looking Statements".

Our business is exposed to risks associated with the volatile global economic environment and political conditions.

Adverse changes in economic or political conditions as well as concerns about global trade, global health pandemics, developments in energy prices, and terrorist activities, could have a material adverse effect on our business, financial condition, results of operations and liquidity and may adversely impact the demand for our products and services. These and other factors may prevent our customers and suppliers from obtaining the financing required to pursue their business activities as planned, which may force them to modify, delay or cancel plans to purchase or supply our products or services. In addition, if our customers do not generate sufficient revenue, or fail to timely obtain access to the capital markets, they may not be able to pay, or may delay payment of, the amounts they owe us. Customers with liquidity issues may lead to additional bad debt expense for us, which may adversely affect our results of operations and cash flows. We are also subject to the risk that the counterparties to our credit agreements and hedging transactions may go bankrupt if they suffer catastrophic demand on their liquidity that prevents them from fulfilling their contractual obligations to us.

Our business environment is influenced also by numerous other economic or political uncertainties which may affect the global economy and the international capital markets. In periods of slow economic growth or decline, our customers are more likely to buy less of our products and services, and as a result we are more likely to experience decreased revenues. Our divisions are affected by the level of investments in the markets that we serve, principally utilities, industry and transport & infrastructure. At various times during the last several years, we also have experienced, and may experience in the future, gross margin declines in certain businesses, reflecting the effect of factors such as competitive pricing pressures, inventory write downs, charges associated with the cancellation of planned expansion, increases in pension and postretirement benefit expenses, and increases in component and manufacturing costs resulting from higher labor and material costs borne by our manufacturers and suppliers that, as a result of competitive pricing pressures or other factors, we are unable to pass on to our customers. Economic downturns also may lead to restructuring actions and associated expenses. Uncertainty about future economic conditions makes it difficult for us to forecast operating results and to make decisions about future investments.

In addition, we are subject to the risks that our business operations in or with certain countries may be adversely affected by trade tariffs, trade or economic sanctions or other restrictions imposed on these countries. These could lead to increased costs for us or for our customers or limit our ability to do business in or with certain countries. In addition, actual or potential investors that object to certain of these business operations may adversely affect the price of our shares by disposing or deciding not to purchase our shares. These countries may from time to time include countries that are identified by the United States as state sponsors of terrorism. If any countries where or with whom we do business are subject to such sanctions or restrictions, our business, consolidated operating results, financial condition and the trading price of our shares may be adversely affected. In 2018, our total revenues from business with countries identified by the U.S. government as state sponsors of terrorism represented a very small percentage of our total revenues. Based on the amount of revenues and other relevant quantitative and qualitative factors, we have determined that our business in 2018 with countries identified by the U.S. government as state sponsors of terrorism was not material.

Illegal behavior by any of our employees or agents could have a material adverse impact on our consolidated operating results, cash flows, and financial position as well as on our reputation and our ability to do business.

Certain of our employees or agents have taken, and may in the future take, actions that violate or are alleged to violate the U.S. Foreign Corrupt Practices Act of 1977 (FCPA), legislation promulgated pursuant to the 1997 Organisation for Economic Co operation and Development (OECD) Convention on Combating Bribery of Foreign Public Officials in International Business Transactions, applicable antitrust laws and other applicable laws or regulations. For more information regarding investigations of past actions taken by certain of our employees, see “Item 8. Financial Information—Legal Proceedings”. Such actions have resulted, and in the future could result, in governmental investigations, enforcement actions, civil and criminal penalties, including monetary penalties and other sanctions, and civil litigation. It is possible that any governmental investigation or enforcement action arising from such matters could conclude that a violation of applicable law has occurred, and the consequences of any such investigation or enforcement action may have a material adverse impact on our consolidated operating results, cash flows and financial position. In addition, such actions, whether actual or alleged, could damage our reputation and ability to do business.

Further, detecting, investigating and resolving such actions could be expensive and could consume significant time and attention of our senior management. While we are committed to conducting business in a legal and ethical manner, our internal control systems at times have not been, and in the future may not be, completely effective to prevent and detect such improper activities by our employees and agents.

Our operations in emerging markets expose us to risks associated with conditions in those markets.

A significant amount of our operations is conducted in the emerging markets in South America, Asia, and the Middle East and Africa. In 2018, approximately 42 percent of our consolidated revenues were generated from these emerging markets. Operations in emerging markets can present risks that are not encountered in countries with well established economic and political systems, including:

- economic instability, which could make it difficult for us to anticipate future business conditions in these markets, cause delays in the placement of orders for projects that we have been awarded and subject us to volatile geographic markets,

- political or social instability, which could make our customers less willing to make cross border investments in such regions and could complicate our dealings with governments regarding permits or other regulatory matters, local businesses and workforces,

- boycotts and embargoes that may be imposed by the international community on countries in which we do business or where we seek to do business could adversely affect the ability of our operations in those countries to obtain the materials necessary to fulfill contracts and our ability to pursue business or establish operations in those countries,

- foreign state takeovers of our and our customers’ facilities,

- significant fluctuations in interest rates and currency exchange rates,
- the imposition of unexpected taxes or other payments on our revenues in these markets,
- our inability to obtain financing and/or insurance coverage from export credit agencies, and
- the introduction of exchange controls and other restrictions by foreign governments.

Additionally, political and social instability resulting from increased violence in certain countries in which we do business has raised concerns about the safety of our personnel. These concerns may hinder our ability to send personnel abroad and to hire and retain local personnel. Such concerns may require us to increase security for personnel traveling to and working in affected countries or to restrict or wind-down operations in such countries, which may negatively impact us and result in higher costs and inefficiencies.

Consequently, our exposure to the conditions in or affecting emerging markets may adversely affect our business, financial condition, results of operations and liquidity.

Undertaking long term, technically complex projects or projects that are dependent upon factors not wholly within our control could adversely affect our profitability and future prospects.

We derive a portion of our revenues from long term, fixed price and turnkey projects and from other technically complex projects that can take many months, or even years, to complete. Such contracts typically involve substantial risks, including the possibility that we may underbid and consequently have no means of recouping the actual costs incurred, and the assumption of a large portion of the risks associated with completing related projects, including the warranty obligations. Some projects involve technological risks, including in cases where we are required to modify our existing products and systems to satisfy the technical requirements of a project, integrate our products and systems into the existing infrastructure and systems at the installation site, or undertake ancillary activities such as civil works at the installation site. Our revenue, cost and gross profit realized on such contracts can vary, sometimes substantially, from our original projections for numerous reasons, including:

- unanticipated issues with the scope of supply, including modification or integration of supplied products and systems that may require us to incur incremental expenses to remedy such issues,
- the quality and efficacy of our products and services cannot be tested and proven in all situations and environments and may lead to premature failure or unplanned degradation of products,
- changes in the cost of components, materials or labor,
- difficulties in obtaining required governmental permits or approvals,
- delays caused by customers, force majeure or local weather and geological conditions, including natural disasters,
- shortages of construction equipment,
- changes in law or government policy,
- supply bottlenecks, especially of key components,
- suppliers’, subcontractors’ or consortium partners’ failure to perform or delay in performance,
- diversion of management focus due to responding to unforeseen issues, and
- loss of follow-on work.

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These risks are exacerbated if a project is delayed because the circumstances upon which we originally bid and quoted a price may have changed in a manner that increases our costs or other liabilities relating to the project. In addition, we sometimes bear the risk of delays caused by unexpected conditions or events. Our project contracts often subject us to penalties or damages if we cannot complete a project in accordance with the contract schedule. In certain cases, we may be required to pay back to a customer all or a portion of the contract price as well as potential damages (which may significantly exceed the contract price), if we fail to meet contractual obligations.

We operate in very competitive markets and could be adversely affected if we fail to keep pace with technological changes.

We operate in very competitive markets where we regularly need to innovate and develop products, systems, services and solutions that address the business challenges and needs of our customers. The nature of these challenges varies across the geographic markets and product areas that we serve. The markets for our products and services are characterized by evolving industry standards (particularly for our automation technology products and systems), which may require us to modify our products and systems. When power transmission and distribution providers are privatized, their need typically increases for timely power product and solution innovations that improve efficiency and allow them to compete in a deregulated environment. Additionally, the continual development of advanced technologies for new products and product enhancements is an important way in which we maintain acceptable pricing levels. If we fail to keep pace with technological changes in the industrial sectors that we serve, we may experience price erosion and lower margins.

Our primary competitors are sophisticated companies with significant resources that may develop products and services that are superior to our products and services or may adapt more quickly than we do to new technologies, industry changes or evolving customer requirements. We are also facing increased competition from low cost competitors in emerging markets, which may give rise to increased pressure to reduce our prices. Our failure to anticipate or respond quickly to technological developments or customer requirements could adversely affect our business, results of operations, financial condition and liquidity.

Our multi national operations expose us to the risk of fluctuations in currency exchange rates.

Currency exchange rate fluctuations have had, and could continue to have, a material impact on our operating results, the comparability of our results between periods, the value of assets or liabilities as recorded on our Consolidated Balance Sheet and the price of our securities. Volatility in exchange rates makes it harder to predict exchange rates and perform accurate financial planning. Changes in exchange rates can unpredictably and adversely affect our consolidated operating results and could result in exchange losses.

Currency Translation Risk. The results of operations and financial position of most of our non U.S. companies are initially recorded in the currency of the country in which each such company resides, which we call “local currency”. That financial information is then translated into U.S. dollars at the applicable exchange rates for inclusion in our Consolidated Financial Statements. The exchange rates between local currencies and the U.S. dollar can fluctuate substantially, which could have a significant translation effect on our reported consolidated results of operations and financial position.

Increases and decreases in the value of the U.S. dollar versus local currencies will affect the reported value of our local currency assets, liabilities, revenues and costs in our Consolidated Financial Statements, even if the value of these items has not changed in local currency terms. These translations could significantly and adversely affect our results of operations and financial position from period to period.

Currency Transaction Risk. Currency risk exposure also affects our operations when our sales are denominated in currencies that are different from those in which our manufacturing or sourcing costs are incurred. In this case, if, after the parties agree on a price, the value of the currency in which the price is to be paid were to weaken relative to the currency in which we incur manufacturing or sourcing costs, there would be a negative impact on the profit margin for any such transaction. This transaction risk may exist regardless of whether there is also a currency translation risk as described above.

Currency exchange rate fluctuations in those currencies in which we incur our principal manufacturing expenses or sourcing costs may adversely affect our ability to compete with companies whose costs are incurred in other currencies. If our principal expense currencies appreciate in value against such other currencies, our competitive position may be weakened.

Our hedging activities may not protect us against the consequences of significant fluctuations in exchange rates, interest rates or commodity prices on our earnings and cash flows.

Our policy is to hedge material currency exposures by entering into offsetting transactions with third party financial institutions. Given the effective horizons of our risk management activities and the anticipatory nature of the exposures intended to be hedged, there can be no assurance that our currency hedging activities will fully offset the adverse financial impact resulting from unfavorable movements in foreign exchange rates. In addition, the timing of the accounting for recognition of gains and losses related to a hedging instrument may not coincide with the timing of gains and losses related to the underlying economic exposures.

As a resource intensive operation, we are exposed to a variety of market and asset risks, including the effects of changes in commodity prices and interest rates. We monitor and manage these exposures as an integral part of our overall risk management program, which recognizes the unpredictability of markets and seeks to reduce the potentially adverse effects on our business. As part of our effort to manage these exposures, we may enter into commodity price and interest rate hedging arrangements. Nevertheless, changes in commodity prices and interest rates cannot always be predicted or hedged.

If we are unable to successfully manage the risk of changes in exchange rates, interest rates or commodity prices or if our hedging counterparties are unable to perform their obligations under our hedging agreements with them, then changes in these rates and prices could have an adverse effect on our financial condition and results of operations.

Increases in costs or limitation of supplies of raw materials may adversely affect our financial performance.

We purchase large amounts of commodity based raw materials, including steel, copper, aluminum and oil. Prevailing prices for such commodities are subject to fluctuations due to changes in supply and demand and a variety of additional factors beyond our control, such as global political and economic conditions. Historically, prices for some of these raw materials have been volatile and unpredictable, and such volatility is expected to continue. Therefore, commodity price changes may result in unexpected increases in raw material costs, and we may be unable to increase our prices to offset these increased costs without suffering reduced volumes, revenues or operating income. We do not fully hedge against changes in commodity prices and our hedging procedures may not work as planned.

We depend on third parties to supply raw materials and other components and may not be able to obtain sufficient quantities of these materials and components, which could limit our ability to manufacture products on a timely basis and could harm our profitability. For some raw materials and components, we rely on a single supplier or a small number of suppliers. If one of these suppliers were unable to provide us with a raw material or component we need, our ability to manufacture some of our products could be adversely affected until we are able to establish a new supply arrangement. We may be unable to find a sufficient alternative supply channel in a reasonable time period or on commercially reasonable terms, if at all. If our suppliers are unable to deliver sufficient quantities of materials on a timely basis, the manufacture and sale of our products may be disrupted, we may be required to assume liability under our agreements with customers and our sales and profitability could be materially adversely affected.

An inability to protect our intellectual property rights could adversely affect our business.

Our intellectual property rights are fundamental to all of our businesses. We generate, maintain, utilize and enforce a substantial portfolio of trademarks, trade dress, patents and other intellectual property rights globally. Intellectual property protection is subject to applicable laws in various local jurisdictions where interpretations and protections vary or can be unpredictable and costly to enforce. We use our intellectual property rights to protect the goodwill of our products, promote our product recognition, protect our proprietary technology and development activities, enhance our competitiveness and otherwise support our business goals and objectives. However, there can be no assurance that the steps we take to obtain, maintain and protect our intellectual property rights will be adequate. Our intellectual property rights may fail to provide us with significant competitive advantages, particularly in foreign jurisdictions that do not have, or do not enforce, strong intellectual property rights. The weakening of protection of our trademarks, trade dress, patents and other intellectual property rights could adversely affect our business.

Industry consolidation could result in more powerful competitors and fewer customers.

Competitors in the industries in which we operate are consolidating. In particular, the automation industry is undergoing consolidation that is reducing the number but increasing the size of companies that compete with us. As our competitors consolidate, they likely will increase their market share, gain economies of scale that enhance their ability to compete with us and/or acquire additional products and technologies that could displace our product offerings.

Our customer base also is undergoing consolidation. Consolidation within our customers' industries (such as the marine and cruise industry, the automotive, aluminum, steel, pulp and paper and pharmaceutical industries and the oil and gas industry) could affect our customers and their relationships with us. If one of our competitors' customers acquires any of our customers, we may lose that business. Additionally, as our customers become larger and more concentrated, they could exert pricing pressure on all suppliers, including us. For example, in an industry such as power transmission, which historically has consisted of large and concentrated customers such as utilities, price competition has become a factor in determining which products and services will be selected by a customer. If we were to lose market share or customers or face pricing pressure due to consolidation of our customers, our results of operations and financial condition could be adversely affected.

We are subject to environmental laws and regulations in the countries in which we operate. We incur costs to comply with such regulations, and our ongoing operations may expose us to environmental liabilities.

Our operations are subject to U.S., European and other laws and regulations governing the discharge of materials into the environment or otherwise relating to environmental protection. Our manufacturing facilities use and produce paint residues, solvents, metals, oils and related residues. We use petroleum based insulation in transformers, polyvinylchloride (PVC) resin to manufacture PVC cable and chloroparaffin as a flame retardant. We have manufactured and sold, and we are using in some of our factories, certain types of transformers and capacitors containing polychlorinated biphenyls (PCBs). These are considered to be hazardous substances in many jurisdictions in which we operate. We may be subject to substantial liabilities for environmental contamination arising from the use of such substances. All of our manufacturing operations are subject to ongoing compliance costs in respect of environmental matters and the associated capital expenditure requirements.

In addition, we may be subject to significant fines and penalties if we do not comply with environmental laws and regulations, including those referred to above. Some environmental laws provide for joint and several or strict liability for remediation of releases of hazardous substances, which could result in us incurring a liability for environmental damage without regard to our negligence or fault. Such laws and regulations could expose us to liability arising out of the conduct of operations or conditions caused by others, or for our acts which were in compliance with all applicable laws at the time the acts were performed. Additionally, we may be subject to claims alleging personal injury or property damage as a result of alleged exposure to hazardous substances. Changes in the environmental laws and regulations, or claims for damages to persons, property, natural resources or the environment, could result in substantial costs and liabilities to us.

We may be the subject of product liability claims.

We may be required to pay for losses or injuries purportedly caused by the design, manufacture or operation of our products and systems. Additionally, we may be subject to product liability claims for the improper installation of products and systems designed and manufactured by others.

Product liability claims brought against us may be based in tort or in contract, and typically involve claims seeking compensation for personal injury or property damage. Claims brought by commercial businesses are often made also for financial losses arising from interruption to operations. Depending on the nature and application of many of the products we manufacture, a defect or alleged defect in one of these products could have serious consequences. For example:

- If the products produced by our power technology divisions are defective, there is a risk of fire, explosions and power surges, and significant damage to electricity generating, transmission and distribution facilities as well as electrical shock causing injury or death.

- If the products produced by our automation technology divisions are defective, our customers could suffer significant damage to facilities and equipment that rely on these products and systems to properly monitor and control their manufacturing processes. Additionally, people could be exposed to electrical shock and/or other harm causing injury or death.

- If any of our products contain hazardous substances, then there is a risk that such products or substances could cause injury or death.

- If any of our protective products were to fail to function properly, there is a risk that such failure could cause injury or death.

If we were to incur a very large product liability claim, our insurance protection might not be adequate or sufficient to cover such a claim in terms of paying any awards or settlements, and/or paying for our defense costs. Further, some claims may be outside the scope of our insurance coverage. If a litigant were successful against us, a lack or insufficiency of insurance coverage could result in an adverse effect on our business, financial condition, results of operations and liquidity. Additionally, a well publicized actual or perceived issue relating to us or our products could adversely affect our market reputation, which could result in a decline in demand for our products and reduce the trading price of our shares. Furthermore, if we were required or we otherwise determined to make a product recall, the costs could be significant.

The uncertainties surrounding the United Kingdom's future relationship with the European Union may have a negative effect on global economic conditions, financial markets and our business.

The United Kingdom has formally initiated the process to withdraw from the European Union and continues to negotiate the terms of such departure. This has had and may continue to have a material effect on global economic conditions and the stability of global financial markets. Lack of clarity about future United Kingdom laws and regulations, potentially divergent national laws, the possibility of increased regulatory complexities, or future developments in the European Union could depress economic activity, reduce demand for our products and services, restrict our access to capital, and diminish or eliminate barrier free access between the United Kingdom and other European Union member states or among the European economic area overall. Furthermore, discussions between the United Kingdom and the European Union may influence discussions on open trade and political matters between Switzerland and the European Union. Any of these factors could have an adverse effect on our business, financial condition and results of operations.

We may encounter difficulty in managing our business due to the global nature of our operations.

We operate in approximately 100 countries around the world and, as of December 31, 2018, employed about 147,000 people, of which approximately 47 percent were located in the Europe region, approximately 29 percent in the Asia, Middle East and Africa region and approximately 24 percent in the Americas region. To manage our day to day operations, we must deal with cultural and language barriers and assimilate different business practices. Due to our global nature, we deal with a range of legal and regulatory systems some of which are less developed and less well enforced than others. This may impact our ability to protect our contractual, intellectual property and other legal rights. In addition, we are required to create compensation programs, employment policies and other administrative programs that comply with the laws of multiple countries. We also must communicate, monitor and uphold group wide standards and directives across our global network, including in relation to our suppliers, subcontractors and other relevant stakeholders. Our failure to manage successfully our geographically diverse operations could impair our ability to react quickly to changing business and market conditions and to enforce compliance with group wide standards and procedures.

If we are unable to obtain performance and other guarantees from financial institutions, we may be prevented from bidding on, or obtaining, some contracts, or our costs with respect to such contracts could be higher.

In the normal course of our business and in accordance with industry practice, we provide a number of guarantees including bid bonds, advance payment bonds or guarantees, performance bonds or guarantees and warranty bonds or guarantees, which guarantee our own performance. These guarantees may include guarantees that a project will be completed on time or that a project or particular equipment will achieve defined other performance criteria. If we fail to satisfy any defined criteria, we may be required to make payments in cash or in kind. Performance guarantees frequently are requested in relation to large projects in our power and automation businesses.

Some customers require that performance guarantees be issued by a financial institution. In considering whether to issue a guarantee on our behalf, financial institutions consider our credit ratings. In addition, the global financial crisis has made it more difficult and expensive to obtain these guarantees. If, in the future, we cannot obtain such a guarantee from a financial institution on commercially reasonable terms or at all, we could be prevented from bidding on, or obtaining, some contracts, or our costs with respect to such contracts could be higher, which would reduce the profitability of the contracts. If we cannot obtain guarantees on commercially reasonable terms or at all from financial institutions in the future, there could be a material impact on our business, financial condition, results of operations or liquidity.

Examinations by tax authorities and changes in tax regulations could result in lower earnings and cash flows.

We operate in approximately 100 countries and therefore are subject to different tax regulations. Changes in tax law could result in higher tax expense and payments. Furthermore, this could materially impact our tax receivables and liabilities as well as deferred tax assets and deferred tax liabilities. In addition, the uncertainty of tax environment in some regions could limit our ability to enforce our rights. As a globally operating organization, we conduct business in countries subject to complex tax rules, which may be interpreted in different ways. Future interpretations or developments of tax regimes may affect our tax liability, return on investments and business operations. We are regularly examined by tax authorities in various jurisdictions. An adverse decision by a tax authority could cause a material adverse effect on our business, financial condition and results of operations.

The recent comprehensive tax reform in the United States could adversely affect our financial condition and results of operations.

The United States enacted comprehensive tax legislation that includes significant changes to the taxation of business entities. These changes include, among others, (i) a permanent reduction to the corporate income tax rate, (ii) a partial limitation on the deductibility of business interest expense, (iii) a shift of the U.S. taxation of multinational corporations from a tax on worldwide income to a territorial system (along with certain rules designed to prevent erosion of the U.S. income tax base) and (iv) a one-time tax on accumulated offshore earnings held in cash and illiquid assets, with the latter taxed at a lower rate. We are in the process of finalizing our assessment of the overall impact of the comprehensive tax legislation on our business and financial condition and it is possible that our profitability and our business may be adversely affected as a result of the U.S. tax law changes made by this legislation.

If we are unable to attract and retain qualified management and personnel then our business may be adversely affected.

Our success depends in part on our continued ability to hire, assimilate and retain highly qualified personnel, particularly our senior management team and key employees. Competition for highly qualified management and technical personnel remains intense in the industries and regions in which we operate. If we are unable to attract and retain members of our senior management team and key employees, including in connection with our ongoing organizational transformation, this could have an adverse effect on our business.

Our business strategy may include making strategic divestitures. There can be no assurance that any divestitures will provide business benefit.

Our strategy includes divesting certain non core businesses. The divestiture of an existing business could reduce our future profits and operating cash flows and make our financial results more volatile. We may not find suitable purchasers for our non core businesses and may continue to pay operating costs associated with these businesses. Failed attempts to divest non core businesses may distract management's attention from other business activities, erode employee morale and customers' confidence, and harm our business. A divestiture could also cause a decline in the price of our shares and increased reliance on other elements of our core business operations. In December 2018 we announced the sale of our power grids business into a minority-owned joint venture. The transaction may not obtain all relevant approvals or may face other issues that could delay or prevent the closing of the transaction. If we do not successfully manage the risks associated with a divestiture, our business, financial condition, and results of operations could be adversely affected.

Anticipated benefits of existing and potential future mergers, acquisitions, joint ventures or strategic alliances may not be realized.

As part of our overall strategy, we may, from time to time, acquire businesses or interests in businesses, including noncontrolling interests, or form joint ventures or create strategic alliances. Whether we realize the anticipated benefits from these transactions, including our recent acquisition of General Electric Company's Industrial Solutions business, depends, in part, upon the integration between the businesses involved, the performance and development of the underlying products, capabilities or technologies, our correct assessment of assumed liabilities and the management of the operations in question. Accordingly, our financial results could be adversely affected by unanticipated performance and liability issues, transaction related charges, amortization related to intangibles, charges for impairment of long term assets and partner performance.

Increased information technology (IT) security threats and more sophisticated cyber attacks could pose a risk to our systems, networks, products, solutions and services.

We have observed a global increase in IT security threats and more sophisticated cyber attacks, both in general and against us, which pose a risk to the security of systems and networks and the confidentiality, availability and integrity of data stored and transmitted on those systems and networks. While we attempt to mitigate these risks through a number of measures, including employee training, comprehensive monitoring of our networks and systems, and maintenance of backup and protective systems such as firewalls and virus scanners, our systems, networks, products, solutions and services remain potentially vulnerable to attacks. Similarly, we have observed a continued increase in attacks generally against industrial control systems as well as against our customers and the systems we supplied to them, which pose a risk to the security of those systems and networks. Depending on their nature and scope, such attacks could potentially lead to the compromising of confidential information, improper use of our systems and networks or those we supplied to our customers, manipulation, corruption and destruction of data, defective products or services, production downtimes and supply shortages, any of which in turn could adversely affect our reputation, competitiveness and results of operations.

Failure to comply with evolving data privacy and data protection laws and regulations or to otherwise protect personal data, may adversely impact our business and financial results.

We are subject to many rapidly evolving privacy and data protection laws and regulations in Europe and around the world. This requires us to operate in a complex environment where there are significant constraints on how we can process personal data across our business. The European General Data Protection Regulation (the GDPR), which became effective in May 2018, has established stringent data protection requirements for companies doing business in or handling personal data of individuals in the European Union. The GDPR imposes obligations on data controllers and processors including the requirement to maintain a record of their data processing and to implement policies and procedures as part of their mandated privacy governance framework. Breaches of the GDPR could result in substantial fines, which in some cases could be up to four percent of our worldwide revenue. In addition, a breach of the GDPR or other data privacy or data protection laws or regulations could result in regulatory investigations, reputational damage, orders to cease/change our use of data, enforcement notices, as well potential civil claims including class action type litigation. We have invested, and continue to invest, human and technology resources in our data privacy and data protection compliance efforts. Despite such efforts, there is a risk that we may be subject to fines and penalties, litigation and reputational harm if we fail to properly process or protect the data or privacy of third parties or comply with the GDPR or other applicable data privacy and data protection regimes.

We have identified a material weakness in our internal control over financial reporting that could, if not remediated, result in material inaccuracies in our consolidated financial statements and adversely affect our business and results of operations.

As described in “Item 15. Controls and Procedures,” we have concluded that our internal control over financial reporting was ineffective as of December 31, 2018, due to a material weakness in information technology general controls (ITGC), which resulted from a failure to select, develop, and monitor control activities in ITGC, specifically the user access and segregation of duties controls in certain applications in North America as well as for select Group applications. We did not maintain sufficient controls over user access to applications including managing validity of access and segregation of duties. As a result of the deficiencies identified, the process level controls dependent on the effected applications, could not be relied upon.

We are currently working to remediate the material weakness. We cannot be certain that the measures we have taken, and expect to take, will be sufficient to address the deficiencies identified or ensure that our internal control over financial reporting is effective. Moreover, other material weaknesses or deficiencies may develop or be identified in the future. If we are not able to remediate the deficiencies identified and strengthen our internal control over financial reporting, or in the event of any future material weakness, then there may be material inaccuracies in our consolidated financial statements and our business and results of operations may be materially adversely affected.

There is no guarantee that our ongoing efforts to reduce costs will be successful.

We seek continued cost savings through operational excellence and supply chain management. We are also seeking cost savings in connection with our ongoing organizational transformation, including the elimination of our regional/country matrix structure. Lowering our cost base is important for our business and future competitiveness. However, there is no guarantee that we will achieve this goal. If we are unsuccessful and the shortfall is significant, there could be an adverse effect on our business, financial condition, and results of operations.

We could be affected by future laws or regulations enacted to address climate change concerns as well as the physical effects of climate change.

Existing or pending laws and regulations intended to address climate change concerns could materially affect us in the future. We have incurred, and may need to incur additional costs to comply with these laws and regulations. We could also be affected indirectly by increased prices for goods or services provided to us by companies that are directly affected by these laws and regulations and pass their increased costs through to their customers. At this time, we cannot estimate what impact such costs may have on our business, results of operations or financial condition. We could also be affected by the physical consequences of climate change itself, although we cannot estimate what impact those consequences might have on our business or operations.

Item 4. Information on the Company

INTRODUCTION

About ABB

ABB is a pioneering technology leader in power grids, electrification products, industrial automation and robotics and motion, serving customers in utilities, industry and transport & infrastructure globally. Continuing a history of innovation spanning more than 130 years, ABB today is writing the future of industrial digitalization with two clear value propositions: bringing electricity from any power plant to any plug and automating industries from natural resources to finished products. ABB has approximately 147,000 employees.

Our business is international in scope and we generate revenues in numerous currencies. We operate in approximately 100 countries across three regions: Europe, the Americas, and Asia, Middle East and Africa (AMEA). We are headquartered in Zurich, Switzerland.

We manage our business based on a divisional structure, comprising Electrification Products, Industrial Automation and Robotics and Motion. For a breakdown of our consolidated revenues (i) by operating division (ii) by geographic region (iii) by end-customer markets and (iv) by product type, see “Item 5. Operating and Financial Review and Prospects—Analysis of Results of Operations—Revenues”. We also operate our Power Grids business, which is reported as discontinued operations in the Consolidated Financial Statements (see “Discontinued operations” section below).

Our principal corporate offices are located at Affolternstrasse 44, CH 8050 Zurich, Switzerland, telephone number +41 43 317 7111. Our agent for U.S. federal securities law purposes is ABB Holdings Inc., located at 12040 Regency Parkway, Suite 200, Cary, North Carolina 27518. Our internet address is www.abb.com. The United States Securities and Exchange Commission (SEC) maintains a website at www.sec.gov which contains in electronic form each of the reports and other information that we have filed electronically with the SEC.

History of the ABB Group

The ABB Group was formed in 1988 through a merger between Asea AB and BBC Brown Boveri AG. Initially founded in 1883, Asea AB was a major participant in the introduction of electricity into Swedish homes and businesses and in the development of Sweden's railway network. In the 1940s and 1950s, Asea AB expanded into the power, mining and steel industries. Brown Boveri and Cie. (later renamed BBC Brown Boveri AG) was formed in Switzerland in 1891 and initially specialized in power generation and turbines. In the early to mid 1900s, it expanded its operations throughout Europe and broadened its business operations to include a wide range of electrical engineering activities.

In January 1988, Asea AB and BBC Brown Boveri AG each contributed almost all of their businesses to the newly formed ABB Asea Brown Boveri Ltd, of which they each owned 50 percent. In 1996, Asea AB was renamed ABB AB and BBC Brown Boveri AG was renamed ABB AG. In February 1999, the ABB Group announced a group reconfiguration designed to establish a single parent holding company and a single class of shares. ABB Ltd was incorporated on March 5, 1999, under the laws of Switzerland. In June 1999, ABB Ltd became the holding company for the entire ABB Group. This was accomplished by having ABB Ltd issue shares to the shareholders of ABB AG and ABB AB, the two companies that formerly owned the ABB Group. The ABB Ltd shares were exchanged for the shares of those two companies, which, as a result of the share exchange and certain related transactions, became wholly owned subsidiaries of ABB Ltd. ABB Ltd shares are currently listed on the SIX Swiss Exchange, the NASDAQ OMX Stockholm Exchange and the New York Stock Exchange (in the form of American Depositary Shares).

DIVISIONS

Our markets

As a pioneering technology leader serving the utilities, industry, and transport & infrastructure markets, ABB is at the heart of the Energy and Fourth Industrial Revolutions. The Energy Revolution encompasses a shift toward low carbon energy generation, including a dramatic increase in wind and solar generation capacity; a major shift toward distributed generation as opposed to centralized generation systems, whereby consumers also become producers, or prosumers, of energy; and finally the introduction of smart grids that will enable more efficient use of energy. The number of feed in points from solar and wind is expected to continue to multiply, and transmissions are increasingly covering longer distances. At the same time, electricity demand is anticipated to rise, due to the accelerating take up of electric vehicles (EVs) and significant increases in data storage needs. As a result, electrical systems are expected to require new equipment, technology and smart solutions to ensure that electricity supply remains reliable and secure.

In addition to the shifts in the energy market, digitalization is driving the Fourth Industrial Revolution and touches upon all our customer segments, creating sizeable new market opportunities. More than 55 percent of ABB products are already digitalized and offer connectivity. With the end markets ABB serves still at an early stage of digitalization, including automotive, food and beverage, rail, buildings, oil and gas, chemicals, marine, utilities, and other discrete markets, ABB expects the demand for connected devices from the company's existing customer base to grow significantly in the coming years.

ABB Ability™ is the company's unified, cross industry digital portfolio, extending from device to edge to cloud on an open architecture platform. ABB Ability™ provides over 210 solutions utilizing latest software technologies, including artificial intelligence, to improve productivity, security, safety and reliability, ultimately unlocking value for customers. ABB Ability™ solutions cover the entire life cycle of assets, from planning and building to performance management. ABB Ability™ is a globally recognized market leader for control systems for process industries and for utility and mining related asset management software. ABB also has a leading offering in connected services, for example remote monitoring services for robots, motors and machinery and remote control solutions for buildings, EV charging networks and offshore platforms. Some of the more specialized offerings address energy management for data centers and navigation optimization and automation for maritime shipping fleets.

Utilities Market

ABB focuses on delivering solutions that match the changing needs of utility customers with a complete offering for transmission and distribution. The Energy Revolution opens up numerous opportunities, and more than 30 percent of the market ABB operates in are high growth segments within the sector, such as grid automation, high voltage direct current (HVDC), software, grid control systems and micro grids. Generation, transmission and distribution are being unbundled, long standing monopolies now have competitors and new entrants (e.g. pension funds, insurance funds, project developers) are investing in the sector. Many traditional utilities have reinvented themselves; some now focus purely on renewables, others on providing additional energy services to the consumers they serve.

Utilities continued to make selective investments in 2018, adding new capacity in emerging markets, upgrading aging power infrastructure in mature markets and integrating new renewable energy capacity globally. They are also investing in automation and control solutions to enhance the stability of the grid and thus demand for services, including ABB Ability™ solutions, gained traction during the year.

ABB won orders in several key geographies, including Australia and New Zealand, to upgrade the control and protection system of existing HVDC links with advanced digitalization technologies. In addition, ABB was awarded multiple orders for ABB Ability™ digital substations, for example, to upgrade the world's largest substation in Belarus. A significant framework agreement for grid integration and automation solutions was also won from Ørsted, the Danish power company currently installing the world's largest offshore wind farm in the United Kingdom's North Sea.

Industry Market

ABB serves production facilities and factories all around the world from process to discrete industries with a comprehensive automation portfolio including robotics. Industry customers are diverse in nature and may be publicly traded or privately held companies. Automation and digitalized solutions that achieve improved safety, uptime, energy efficiency and productivity are the intended hallmarks of ABB's offerings in this customer segment. The need for cutting edge solutions to improve industrial performance continued to be an important demand driver for industry in 2018.

Investments in 2018 in robotics and machinery automation solutions from the automotive sector, notably for new EV manufacturing lines, from the food and beverage sector and other industries remained positive. Process industries, especially oil and gas, invested more in 2018 than in the prior year, although investments remained selective and concentrated on service and productivity improvements.

In robotics specifically, ABB's customer markets are successfully expanding into new market areas, for example, the logistics sector and small and medium size enterprises, particularly in the AMEA region.

Transport & Infrastructure Market

ABB's expertise provides efficient and reliable solutions for transport & infrastructure customers. We believe our offerings are key to transport customers that are focused on energy efficiency and reduced operating costs. Other major growth drivers for this customer segment are urbanization, the move to electrify transportation, and growth in data centers.

Demand in transport and infrastructure markets was solid in 2018. Demand for building automation solutions as well as solutions involving energy efficiency continued, while activity for specialty vessels, particularly cruise ships, was strong over the period. In rail, ABB won orders worth over $100 million from Swiss train manufacturer Stadler to supply traction equipment for more than 160 trains serving urban, regional and long distance routes in Europe and the United States. Demand for hyper scale data center solutions was strong during 2018, especially from U.S. and European based customers.

The development of EV charging markets accelerated sharply during 2018. ABB received multiple orders from customers in several countries across Europe and North America for EV charging infrastructure, including for the company's newest high voltage direct current (DC) fast charging station, the Terra HP. ABB now has more than 6,500 DC fast charging stations installed in 60 countries.

As a pioneering technology leader, we serve utilities, industry and transport & infrastructure customers through our business divisions. These markets and our divisions are discussed in more detail below. Revenue figures presented in this Divisions section are before interdivisional eliminations.

Electrification Products division

Overview

The Electrification Products division provides products, services and connected solutions throughout the electrical value chain from the substation to the point of consumption across the world. The innovations from this business enable safer and more reliable electricity flow, with a full range of low- and medium-voltage products and solutions for intelligent protection and connection as well as pre-engineered packaged services and solutions tailored to customers' needs. The portfolio includes modular substation packages, distribution automation products, switchgear, circuit breakers, measuring and sensing devices, control products, solar power solutions, EV charging infrastructure, wiring accessories, and enclosures and cabling systems, including KNX systems (the recognized global standard for home and building control) and data communication networks.

The division delivers products to customers through a global network of channel partners and end-customers. Most of the division's revenue is derived from sales through distributors, original equipment manufacturers (OEMs), engineering, procurement, construction (EPC) contracting companies, system integrators, utilities and panel builders, with some direct sales to end users (utilities, customers in industries, transport & infrastructure segments) and to other ABB divisions.

The Electrification Products division had approximately 55,100 employees on December 31, 2018, and generated $11.7 billion of revenues in 2018.

On June 30, 2018, ABB acquired General Electric Industrial Solutions (GEIS). The integration of GEIS into the Electrification Products division commenced during the second half of 2018.

Customers

The Electrification Products division serves a wide range of customers, including buildings, data centers, rail, wind and solar, distribution utilities, food and beverage, marine, oil and gas, and e-mobility.

Products and Services

The Protection and Connection business offers low-voltage system orientated products that protect, control and connect people, plants and systems. ABB offers solutions to restore power rapidly in case of a fault and helps provide optimum protection for people and electrical installations. The product offering includes molded case and air-circuit breakers, safety switches used for power distribution in factories and buildings, switchgear systems for short circuit and overload protection as well as cabling and connection components. It also offers power protection solutions such as uninterruptible power supply (UPS) solutions, status transfer switches and power distribution units. In addition, the business offers a range of contactors, proximity sensors, safety products for industrial protection, limit switches, along with electronic relays and overload relays.

The Building Products business provides low-voltage smart home and intelligent building control systems, including voice activated KNX systems to optimize efficiency, safety and comfort through the automated management of lighting, shutters and security. In addition, the business supplies conventional wiring accessories, industrial plugs and sockets, DIN-rail products, and enclosures ideal for single family homes, multiple dwellings, commercial buildings, infrastructure and industrial applications, including electric vehicle charging infrastructure from AC wall boxes through to DC fast charging stations and on-demand electric bus charging systems.

The Installation Products business offers products for low-voltage wire and cable management, making the task of fastening, protecting, insulating and connecting wires easier and quicker for industrial applications, construction, communications, utility and OEM professionals, as well as do-it-yourself specialists. The business offers emergency lighting and lighting for explosive environments, as well as lightning protection and earth grounding apparatus.

The Distribution Solutions business helps utility, industry and transport & infrastructure customers to improve power quality and control, reduce outage time and enhance operational reliability and efficiency. The business offers products and services that largely serve the power distribution sector, often providing the requisite medium-voltage link between high voltage transmission systems and low voltage users. Its comprehensive offering includes medium voltage equipment (1 to 66 kilovolts), indoor and outdoor circuit breakers, reclosers, fuses, contactors, relays, instrument transformers, sensors, motor control centers, ring main units for primary and secondary distribution, as well as a range of air and gas insulated switchgear. It also produces indoor and outdoor modular systems and other solutions to facilitate efficient and reliable power distribution, adding value through design, engineering, project management and service. The service offering spans the entire value chain, from the moment a customer makes the first inquiry to disposal and recycling of the product. Throughout the value chain, ABB provides training, technical support and customized contracts. All of this is supported by an extensive global sales and service network.

The Solar business offers an extensive range of solar inverters for residential, commercial and utility applications designed to optimize the performance, reliability and return on investment of any solar installation. It also offers solar packages with integrated energy storage solutions, utility-scale turnkey solutions and microgrid solutions.

The new Industrial Solutions business includes the acquired GEIS business and offers product solutions, such as switchboards, panelboards, UPS and arc prevention technologies and engineered solutions, such as modular, cost saving medium voltage switchgear, motor control centers, vacuum circuit breakers, arc resistant switchgear for industrial applications and industry leading telecom DC power.

Sales and Marketing

Sales are primarily made through indirect sales channels such as distributors to end customers including installers and system integrators. Direct customers range from electrical installers to large utilities, industrial end users, customers transport & infrastructure segments, as well as other ABB divisions. The proportion of direct sales compared to channel partner sales varies among the different industries, product technologies and geographic markets. The business is focused on creating demand to support its channel sales, with a range of promotional activities and support services including configuration and digital solutions.

Competition

The Electrification Products division’s principal competitors vary by product line and include Eaton, Legrand, Schneider Electric, Siemens, Hubbell, Rittal and Chint.

Capital Expenditures

The Electrification Products division's capital expenditures for property, plant and equipment totaled $244 million in 2018, compared to $218 million and $215 million in 2017 and 2016, respectively. Investments in 2018 were primarily related to footprint changes, equipment replacement and upgrades. Geographically, in 2018, Europe represented 49 percent of the capital expenditures, followed by the Americas (36 percent) and AMEA (15 percent).

Industrial Automation division

Overview

The Industrial Automation division offers customers solutions that are designed to optimize the productivity, energy efficiency and safety of their industrial processes and operations by combining the division's integrated control products, systems and service offerings with deep domain knowledge and expertise of each end market. Solutions include turnkey engineering, control systems, Human Machine Interfaces (HMI) and integrated safety technology, measurement products, lifecycle services, outsourced maintenance and industry-specific products such as electric propulsion for ships, Azipods, mine hoists, turbochargers and pulp and paper quality control equipment. The systems can link various processes and information flows allowing customers to manage their entire manufacturing and business process based on real-time facility or plant information. Additionally, the systems allow customers to increase production efficiency, optimize their assets and reduce environmental impact.

The Industrial Automation division offerings are available as separately sold products or as part of a total automation, electrification and/or instrumentation system. In this event, products and solutions from the Robotics and Motion and Electrification Products divisions are channeled through the Industrial Automation division. The division's technologies are sold primarily through direct sales forces as well as third-party channels.

The division had approximately 25,700 employees as of December 31, 2018, and generated revenues of $7.4 billion in 2018.

Customers

The Industrial Automation division's end customers include companies in the oil and gas, minerals and mining, metals, pulp and paper, chemicals, plastics, pharmaceuticals, food and beverage, power generation and maritime industries. These customers are looking for digitalized and automated offerings, instrumentation, and electrification solutions that deliver value mainly through lower capital costs, increased plant availability, lower life-cycle costs and reduced project costs.

Products and Services

Oil, gas and chemicals solutions cover the entire hydrocarbon value chain, from exploration and production to supply, transport and distribution, as well as refining, chemicals and petrochemicals. ABB specializes in mastering the control loop and transforming client operations through actionable insights that optimize performance in real time. From the well head to the refinery, ABB Ability™ solutions connect people with data to optimize performance, improve reliability, enhance efficiency and minimize environmental impact from project start-up throughout the entire plant life-cycle.

Other process industry markets served include mining, minerals processing, metals, pharmaceuticals and pulp and paper as well as their associated service industries. The business' added value is deep industry expertise coupled with the ability to integrate both automation and electronics, resulting in faster start-up times, increased plant productivity and reduced overall capital and operating costs for customers. For mining, metals and cement industries, solutions include specialized products and services, as well as total production systems. The business designs, plans, engineers, supplies, erects and commissions electric equipment, drives, motors, high power rectifiers and equipment for automation and supervisory control within a variety of areas including mineral handling, mining operations, aluminum smelting, hot and cold steel applications and cement production. In the pharmaceuticals and fine chemicals areas, the business offers applications to support manufacturing, packaging, quality control and compliance with regulatory agencies. The offering for the pulp and paper industries includes quality control systems, control systems, drive systems, on-line sensors, actuators and field instruments.

ABB serves the power generation market with leading automation solutions for all types of power generation. With an offering that includes instrumentation, excitation and control systems, ABB technologies help optimize performance, improve reliability, enhance efficiency and minimize environmental impact throughout the plant life cycle. The business also serves the water industry, including applications such as pumping stations and desalination plants.

ABB serves the marine and ports business through its leading solutions for specialty vessels, container and bulk cargo handling. For the shipping industry, ABB offers an extensive portfolio of integrated marine systems and solutions that improve the flexibility, reliability and energy efficiency of vessels. By coupling power, automation and marine software, proven fuel-efficient technologies and services that ensure maximum vessel uptime, ABB is in the position to improve the profitability of a customer's business throughout the entire life cycle of a fleet. ABB designs, engineers, builds, supplies and commissions automation and electrical systems for marine power generation, power distribution and electric propulsion, as well as turbochargers to improve efficiency. With ABB Ability™'s Collaborative Operations Centers around the world and marine software solutions, owners and operators can run their fleets at lower fuel and maintenance cost, while improving crew, passenger, and cargo safety and overall productivity of their operations. In addition, ABB delivers automation and electrical systems for container and bulk cargo handling, from ship to gate. These systems and services help terminal operators meet the challenge of larger ships, taller cranes and bigger volumes per call, and make terminal operations safer, greener and more productive.

ABB serves the hybrid and discrete market, focusing primarily on plastics, food and beverage, packaging and data centers. ABB combines state-of-the-art technology with advanced engineering to provide a wide range of customers with complete solutions for machine and factory automation, motion control, HMI and integrated safety technology. ABB is one of the largest providers focused on product- and software-based, open-architecture solutions for machine and factory automation worldwide.

ABB offers an extensive portfolio of products and software from stand-alone basic control to integrated collaborative systems for complex or critical processes. Solutions such as Distributed Control System (DCS) 800xA, provides a scalable extended automation system for process and production control, safety, and production monitoring. Freelance, another solution, is a full-fledged, easy-to-use DCS for small to medium size applications. The Programmable Logic Controller (PLC) automation portfolio offers a scalable range for small, middle and high-end applications. Components for basic automation solutions, process and safety controllers, field interfaces, panels, process recorders and HMI are available through our Compact Product Suite offering. The product portfolio is complemented by services such as Automation Sentinel, a subscription-based life-cycle management program that provides services to maintain and continually advance and enhance ABB Ability™ control systems (e.g. cyber security patches) and thus allows it to manage a customer's life-cycle costs. The ABB Ability™ Advanced Services offering portfolio provides individual software-based services to continuously improve automation and processes. ABB also offers Manufacturing Execution Systems that enable agility and transparency for production processes by synchronizing and orchestrating a flow across individual automation islands.

The measurement and analytics business portfolio is designed to measure product properties, such as weight, thickness, color, brightness, moisture content and additive content and includes a full line of instrumentation and analytical products to analyze, measure and record industrial and power processes. Actuators allow the customer to make automatic adjustments during the production process to improve the quality and consistency of the product. Field instruments measure properties of the process, such as flow rate, chemical content and temperature.

ABB manufactures and maintains turbochargers for diesel and gas engines having power levels ranging from 500 kilowatts to over 80 megawatts. The business provides engine builders and application operators with advanced turbocharging solutions for efficient and flexible application operations and in compliance with the most stringent environmental requirements.

Sales and Marketing

The Industrial Automation division primarily uses its direct sales force as well as third-party channel partners, such as distributors, system integrators and OEMs. The majority of revenues are derived through the division's own direct sales channels.

Competition

The Industrial Automation division's principal competitors vary by industry or product line. Competitors include Emerson, Honeywell, Valmet, Rockwell Automation, Beckhoff Automation, Schneider Electric, Siemens, Voith, and Yokogawa Electric Corporation.

Capital Expenditures

The Industrial Automation division's capital expenditures for property, plant and equipment totaled $104 million in 2018, compared to $71 million and $53 million in 2017 and 2016, respectively. Principal investments in 2018 were in the Machine and Factory Automation, Turbocharging and the Measurement and Analytics businesses. Geographically, in 2018, Europe represented 82 percent of the capital expenditures, followed by the Americas (10 percent) and AMEA (8 percent).

Robotics and Motion division

Overview

The Robotics and Motion division provides products, solutions and related services that increase industrial productivity and energy efficiency. Our key products such as motors, generators, drives and robotics provide power, motion and control for a wide range of automation applications.

Revenues are generated both from direct sales to end users as well as from indirect sales through distributors, machine builders, system integrators, and OEMs.

The Robotics and Motion division had approximately 27,600 employees as of December 31, 2018, and generated $9.1 billion of revenues in 2018.

Products and Services

The Robotics business offers robots, controllers, software systems, as well as complete robot automation solutions and a comprehensive range of advanced services for automotive and Tier One OEMs as well as for general industry. These provide flexibility for manufacturers to meet the challenge of making smaller lots of a larger number of specific products in shorter cycles for today's dynamic global markets, while also improving quality, productivity and reliability. Robots are also used in activities or environments which may be hazardous to employee health and safety, such as repetitive or strenuous lifting, dusty, hot or cold rooms, or painting booths. In the automotive industry, robot products and systems are used in such areas as press shop, body shop, paint shop, power train assembly, trim and final assembly. General industry segments in which robotics solutions are used range from metal fabrication, foundry, plastics, food and beverage, chemicals and pharmaceuticals, electronics and warehouse/logistics center automation. Typical robotic applications in general industry include welding, material handling, machine tending, painting, picking, packing, palletizing and small parts assembly automation.

The Motors and Generators business supplies a comprehensive range of electrical motors, generators, and mechanical power transmission products. The range of electrical motors includes high efficiency motors that conform to leading environmental and Minimum Energy Performance Standards (MEPS). Efficiency is an important selection criterion for customers, because electric motors account for nearly two thirds of the electricity consumed by industrial plants. The business unit manufactures synchronous motors for the most demanding applications and a full range of low and high voltage induction motors, for both IEC (International Electrotechnical Commission) and NEMA (National Electrical Manufacturers Association) standards. The business unit offers digitalized asset management solutions that monitor motor performance and provide vital intelligence on key operating parameters. These products and solutions help customers improve uptime, extend motor lifetimes, and increase productivity while becoming or remaining digitally connected.

The Drives business provides low voltage and medium voltage drives and systems for industrial, commercial and residential applications. Drives provide speed, torque and motion control for equipment such as fans, pumps, compressors, conveyors, centrifuges, mixers, hoists, cranes, extruders, printing and textile machines. They are used in industries such as building automation, marine, power, transportation, food and beverage, metals, mining, and oil and gas. The business unit also supplies traction converters (propulsion converters and auxiliary converters) for the transportation industry and wind converters.

The division offers services that complement its products and solutions, including design and project management, engineering, installation, training and life cycle care, energy efficiency appraisals, preventive maintenance and digital services such as remote monitoring and software tools.

Customers

The Robotics and Motion division serves a wide range of customers. Customers include machinery manufacturers, process industries such as pulp and paper, oil and gas, and metals and mining companies, hybrid and batch manufacturers such as food and beverage companies, transportation equipment manufacturers, discrete manufacturing companies such as “3C” (computer, communication and consumer electronic), logistics, utilities as well as customers in the automotive industry.

Sales and Marketing

Sales are made both through direct sales forces as well as through third party channel partners, such as distributors, wholesalers, installers, machine builders and OEMs, and system integrators. The proportion of direct sales compared to channel partner sales varies among the different industries, product technologies and geographic markets.

Competition

The Robotics and Motion division’s principal competitors vary by product line but include Fanuc, Kuka Robotics, Rockwell Automation, Schneider Electric, Siemens, Yaskawa, WEG Industries, SEW-EURODRIVE and Danfoss.

Capital Expenditures

The Robotics and Motion division’s capital expenditures for property, plant and equipment totaled $123 million in 2018, compared to $118 million and $112 million in 2017 and 2016, respectively. Principal investments in 2018 were primarily related to equipment replacement, footprint adjustments and automation upgrades. Geographically, in 2018, Europe represented 45 percent of the capital expenditures, followed by the Americas (31 percent) and AMEA (24 percent).

Corporate and Other

Corporate and Other includes headquarters, central research and development, real estate activities, Group Treasury Operations, Global Business Services (GBS) and other minor business activities. The remaining activities of certain EPC projects which we are completing and are in a wind down phase are also reported in Corporate and Other. In addition, we have classified the historical business activities of significant divested businesses in Corporate and Other. These include the high-voltage cables business, the EPC business for turnkey electrical AC substations and certain EPC contracts relating to the oil & gas industry.

Corporate headquarters and stewardship activities include the operations of our corporate headquarters in Zurich, Switzerland, as well as corporate related activities in various countries. These activities cover staff functions with group wide responsibilities, such as accounting and financial reporting, corporate finance and taxes, planning and controlling, internal audit, legal and integrity, compliance, risk management and insurance, corporate communications, information systems, investor relations and human resources.

Corporate research and development primarily covers our research activities, as our development activities are organized under our divisions. We have two global research laboratories, one focused on power technologies and the other focused on automation technologies, which both work on technologies relevant to the future of our business. Each laboratory works on new and emerging technologies and collaborates with universities and other external partners to support our divisions in advancing relevant technologies and in developing cross divisional technology platforms. We have corporate research centers in seven countries (China, India, Germany, Poland, Sweden, Switzerland and the United States).

GBS operates in several hub locations and consists of shared services in the area of accounting, human resources, information systems and supply chain management.

A significant portion of the costs for GBS and other shared corporate overhead costs are allocated to the operating divisions. Overhead and other management costs, including GBS costs, which would have been allocated to our Power Grids business, and which are not directly attributable to this business, are not allocated to the discontinued operation and are included in Corporate and Other.

Corporate and Other had approximately 5,500 employees at December 31, 2018.

DISCONTINUED OPERATIONS

The Power Grids business is reported as discontinued operations in the Consolidated Financial Statements for all years presented. See “Note 3 Changes in presentation of financial statements” to our Consolidated Financial Statements.

Power Grids Business

The Power Grids business is a global leader in power technologies and aspires to be the partner of choice for enabling a stronger, smarter and greener grid. The Power Grids business provides product, system, software and service solutions across the power value chain that are designed to meet the growing demand for electricity with minimum environmental impact. These solutions support utility, industry and transport & infrastructure customers to plan, build, operate and maintain their power infrastructure. They are designed to facilitate the safe, reliable and efficient integration, transmission and distribution of bulk and distributed energy generated from conventional and renewable sources.

Approximately two-thirds of the revenues in the business are generated from utility customers and the remaining portion is generated from industry and transport & infrastructure customers. Power Grids has a worldwide customer base, with a wide geographic spread of revenues across the Americas, Europe and AMEA. The business also has a globally diversified and well-balanced manufacturing and engineering footprint. Direct sales account for the majority of total revenues generated by the business while external channel partners such as EPCs, wholesalers, distributors and OEMs account for the rest.

Products and Services

The Grid Automation operation is at the forefront of grid automation and digitalization. It supplies substation automation products, systems and services. It also provides Supervisory Control and Data Acquisition (SCADA) systems for transmission and distribution networks as well as a range of wireless, fiber optic and power line carrier-based telecommunication technologies for mission critical applications. The operation offers microgrid solutions that are being increasingly deployed for remote and partially grid-connected applications. Also included in this operation is ABB Ability™ Ellipse, an industry leading software solution for managing and optimizing assets, operations, logistics, financials and HR, reducing operating costs and improving productivity for customers.

The Grid Integration operation is among the world's leading providers of transmission and distribution substations, associated life-cycle services and HVDC systems. The substations are used in utility and non utility applications including renewables, rail, data centers, various industries, battery energy storage and shore-to-ship power supply. The HVDC systems use Line Commutated Converter (HVDC Classic) technology or Voltage Sourced Converter (HVDC Light) technology. The Grid Integration portfolio also includes the Flexible Alternating Current Transmission Systems (FACTS) business, which comprises Static Var Compensation (SVC) and static compensator (STATCOM) technology. These systems stabilize voltages, minimize losses, and keep power quality in accordance with grid codes. The Grid Integration business' portfolio also includes a range of high power semiconductors, a core technology for power electronics deployed in HVDC, FACTS and rail applications.

The High Voltage products operation is a global leader in high voltage switchgear up to 1200 kV AC and 1100 kV DC with a portfolio spanning air-insulated, gas-insulated and hybrid technologies. It manufactures generator circuit breakers, a key product for integrating large power plants into the grid. The portfolio also includes a broad range of capacitors and filters that facilitate power quality, instrument transformers and other substation components.

The Transformers operation supplies transformers that are an integral component found across the power value chain, enabling the efficient and safe conversion of electricity to different voltages. The product range is designed for reliability, durability and efficiency with a portfolio that includes dry- and liquid-distribution transformers, traction transformers for rail applications and special application transformers plus related components, for example, insulation kits, bushings and other transformer accessories.

The Power Grids business also has an extensive portfolio of service offerings. This is a growing focus area, leveraging the significant installed product base. The portfolio includes spare parts, condition monitoring and maintenance services, on- and off site repairs as well as retrofits and upgrades. Advanced software-based monitoring and advisory services are being added to the portfolio to enable digitalization of grids. ABB Ability™, the company's unified, cross industry digital capability enables the business' specific connected solutions portfolio.

Simplification of business model and structure

In December 2018, we announced our intention to simplify our organizational structure through the discontinuation of the existing legacy matrix, country and regional structures, including regional Executive Committee roles. Effective April 1, 2019, our new organization will provide each business with full operational ownership of products, support functions, research and development, and geographic territories. The businesses will be the single interface to customers, maximizing proximity and speed.

Corporate activities will focus on Group strategy, portfolio and performance management, capital allocation, core technologies and the ABB Ability™ platform.

In line with the simplification, as of April 1, 2019, we will operate four customer-focused, entrepreneurial businesses: Electrification, Industrial Automation, Motion and Robotics & Discrete Automation.

CAPITAL EXPENDITURES

Total capital expenditures for property, plant and equipment and intangible assets (excluding intangibles acquired through business combinations) amounted to $772 million, $752 million and $632 million in 2018, 2017 and 2016, respectively. In 2018, 2017 and 2016, capital expenditures were 16 percent, 10 percent and 27 percent lower, respectively, than depreciation and amortization. Excluding acquisition-related amortization, capital expenditures were 20 percent, 24 percent and 1 percent higher, respectively, than depreciation and amortization.

Capital expenditures in 2018 remained at a significant level in mature markets, reflecting the geographic distribution of our existing production facilities. Capital expenditures in Europe and North America in 2018 were driven primarily by upgrades and maintenance of existing production facilities, mainly in the U.S., Finland, Italy, Sweden and Austria, including a state-of-the-art innovation and training campus in Austria, which will become one of our largest research and development centers. Capital expenditures in emerging markets were highest in China, Poland and India. Capital expenditures in emerging markets were made primarily to increase production capacity by investing in new or expanded facilities. We are planning to build an advanced, automated and flexible robotics factory in China, which is designed to combine our connected digital technologies, state-of-the-art collaborative robotics and innovative artificial intelligence research. The share of emerging markets capital expenditures as a percentage of total capital expenditures in 2018, 2017 and 2016 was 31 percent, 28 percent and 36 percent, respectively.

At December 31, 2018, construction in progress for property, plant and equipment was $464 million, mainly in the U.S., China, Sweden, Finland and Germany. At December 31, 2017, construction in progress for property, plant and equipment was $511 million, mainly in China, the U.S., Switzerland, Sweden and Germany, while at December 31, 2016, construction in progress for property, plant and equipment was $342 million, mainly in China, the U.S., Germany, Sweden and Switzerland.

Our capital expenditures relate primarily to property, plant and equipment. For 2019, we estimate the expenditures for property, plant and equipment will be higher than our annual depreciation and amortization charge, excluding acquisition-related amortization.

SUPPLIES AND RAW MATERIALS

We purchase a variety of supplies and products which contain raw materials for use in our production and project execution processes. The primary materials used in our products, by weight, are copper, aluminum, steel, mineral oil and various plastics. We also purchase a wide variety of fabricated products, electronic components and systems. We operate a worldwide supply chain management network with employees dedicated to this function in our businesses and key countries. Our supply chain management network consists of a number of teams, each focusing on different product categories. These category teams, on a global, divisional and/or regional level, take advantage of opportunities to leverage the scale of ABB and to optimize the efficiency of our supply networks, in a sustainable manner.

Our supply chain management organization’s activities have continued to expand in recent years, to:

- pool and leverage procurement of materials and services,
- provide transparency of ABB’s global spending through a comprehensive performance and reporting system linked to our ERP systems,

- strengthen ABB's supply chain network by implementing an effective product category management structure and extensive competency based training, and
- monitor and develop our supply base to ensure sustainability, both in terms of materials and processes used.

We buy many categories of products which contain steel, copper, aluminum, crude oil and other commodities. Continuing global economic growth in many emerging economies, coupled with the volatility in foreign currency exchange rates, has led to significant fluctuations in these raw material costs over the last few years. While we expect global commodity prices to remain highly volatile, we expect to offset some market volatility through the use of long term contracts and global sourcing.

We seek to mitigate the majority of our exposure to commodity price risk by entering into hedges. For example, we manage copper and aluminum price risk using principally swap contracts based on prices for these commodities quoted on leading exchanges. ABB's hedging policy is designed to safeguard margins by minimizing price volatility and providing a stable cost base during order execution. In addition to using hedging to reduce our exposure to fluctuations in raw materials prices, in some cases we can reduce this risk by incorporating changes in raw materials prices into the prices of our end products (through price escalation clauses).

Overall, during 2018 supply chain management personnel in our businesses, and in the countries in which we operate, along with the global category teams, continued to focus on value chain optimization efforts in all areas, while maintaining and improving quality and delivery performance.

In August 2012, the SEC issued its final rules regarding "Conflict Minerals", as required by section 1502 of the Dodd Frank Wall Street Reform and Consumer Protection Act. We initiated conflict minerals processes in 2013 and have continuously improved and tailored the processes to our value chain. We continue to work with our suppliers and customers, to enable us to comply with the rules and disclosure obligations. Further information on ABB's Conflict Minerals policy and supplier requirements can be found under "Material Compliance" at new.abb.com/about/supplying

PATENTS AND TRADEMARKS

While we are not materially dependent on any one of our intellectual properties, as a technology-driven company, we believe that intellectual property rights are crucial to protect the assets of our business. Over the past ten years, we have continued to substantially add new applications to our existing first patent filings, and we intend to continue our aggressive approach to seeking patent protection. Currently, we have approximately 30,500 patent applications and registrations, of which more than 8,800 are pending applications. In addition to these patents, we have more than 4,100 utility model and design applications and registrations, of which approximately 400 are pending applications. In 2018, we filed more than 800 patent, utility model and design applications for more than 1,700 new inventions. Based on our existing intellectual property strategy, we believe that we have adequate control over our core technologies. The "ABB" trademarks and logo are protected in all of the countries in which we operate. We aggressively defend our intellectual property rights to safeguard the reputation associated with the ABB technology and brand. While these intellectual property rights are fundamental to all of our businesses, there is no dependency of the business on any single patent, utility model or design application.

SUSTAINABILITY ACTIVITIES

Sustainability management is one of our highest business priorities. We seek to address sustainability issues in all our business operations in order to improve our social, health, safety and environmental performance continuously, and to enhance the quality of life in the communities and countries where we operate.

Our social, health, safety and environmental efforts include:

- implementing sustainability objectives covering all relevant parts of our operations,
- joining initiatives that foster economic, environmental, social and educational development, and strengthen observance of human rights in business practice,
- making positive contributions in the communities where we operate so they welcome us and consider ABB a good neighbor, an attractive employer and a good investment,
- offering our customers eco efficient products that save energy and are safe to use, that optimize the use of natural resources, minimize waste and reduce environmental impact over their complete life cycles,
- applying non financial risk assessment to key business decision making processes, and to projects,
- sharing our latest technologies with emerging markets by, for example, helping customers in developing countries implement environmentally sound processes and technologies and providing environmental awareness and safety training to our business partners,
- ensuring that our operations and processes comply with applicable environmental and health and safety standards and social legislation. Specifically, every operating unit must implement an environmental management system that seeks to continuously improve its environmental performance and a health and safety management system that similarly seeks to continuously improve health and safety performance,
- ensuring that our social, health and safety and environmental policies are communicated and implemented,
- working towards achieving best practices in occupational health and safety, and ensuring the health and safety of our employees, contractors and others involved in or affected by our activities,
- ensuring that suppliers have sustainability policies and systems that are comparable with our own, and
- continuing our program to decontaminate sites that were polluted by historical manufacturing processes.

To manage environmental aspects of our own operations, we have implemented environmental management systems according to the ISO 14001 standard at our manufacturing and service sites. For non manufacturing sites we have implemented an adapted environmental management system in order to ensure management of environmental aspects and continual improvement of performance. Globally, operations at 397 sites and offices are covered by externally certified environmental management systems.

We have Environmental Product Declarations to communicate the environmental performance of our core products. These describe the significant environmental aspects and impacts of a product line, viewed over its complete life cycle. Declarations are based on Life Cycle Assessment studies, created according to the international standard ISO/TR 14025. Approximately 68 declarations for major product lines are published on our Web site (*www.abb.com*), some of which have been externally certified.

In 2018, approximately 85 percent of our employees were covered by confirmed data gathered through ABB's formal environmental reporting system that is verified by an independent verification body. The operations of companies acquired during 2018 are not yet covered by our environmental reporting. We expect that this reporting will be implemented in 2019. The remaining parts of our business that are not yet covered by our environmental reporting system, mainly sales, have very limited environmental exposure. A total of 43 environmental incidents were reported in 2018, none of which had a material environmental impact.

In 2018, substantially all of our employees were covered by confirmed data gathered through ABB's formal social reporting system that is verified by an independent verification body. The remaining parts of our business that are not yet covered by our social reporting system, mainly sales offices in countries where we do not perform manufacturing, have very limited social exposure.

REGULATION

Our operations are subject to numerous governmental laws and regulations including those governing antitrust and competition, corruption, the environment, securities transactions and disclosures, import and export of products, currency conversions and repatriation, taxation of foreign earnings and earnings of expatriate personnel and use of local employees and suppliers.

As a reporting company under Section 12 of the Exchange Act, we are subject to the FCPA's anti bribery provisions with respect to our conduct around the world.

Our operations are also subject to the 1997 OECD Convention on Combating Bribery of Foreign Public Officials in International Business Transactions. The convention obliges signatories to adopt national legislation that makes it a crime to bribe foreign public officials. Those countries which have adopted implementing legislation and have ratified the convention include the U.S. and several European nations in which we have significant operations.

We conduct business in certain countries known to experience governmental corruption. While we are committed to conducting business in a legal and ethical manner, our employees or agents have taken, and in the future may take, actions that violate the U.S. FCPA, legislation promulgated pursuant to the 1997 OECD Convention on Combating Bribery of Foreign Public Officials in International Business Transactions, antitrust laws or other laws or regulations. These actions have resulted and could result in monetary or other penalties against us and could damage our reputation and, therefore, our ability to do business. For more information, see "Item 8. Financial Information—Legal Proceedings".

The U.S. Iran Threat Reduction and Syria Human Rights Act of 2012 requires U.S. listed companies to disclose information relating to certain transactions with Iran. In 2018, certain non-U.S. subsidiaries of ABB, in accordance with applicable laws, provided electrical equipment, automation systems and on-site services to OEMs, distributors, panel builders, EPC contracting companies and other customers for Iranian business. The revenues attributable to these products and services in 2018 amounted to approximately $81 million, of which $31 million is attributable to our discontinued operations. ABB discontinued its Iranian business in 2018, except for minor work on a few long-term contracts which is being performed in line with applicable sanctions.

ORGANIZATIONAL STRUCTURE

ABB Ltd is the ultimate parent company of the ABB Group. Its sole shareholding is in ABB Asea Brown Boveri Ltd which directly or indirectly owns the other companies in the ABB Group. The table below both sets forth, as of December 31, 2018, the name, place of incorporation and ownership interest of the significant direct and indirect subsidiaries of ABB Ltd, Switzerland. ABB's operational group structure is described above in the "Divisions" section of Item 4.

Company name/location	Country	ABB interest %
ABB Australia Pty Limited, Moorebank, NSW	Australia	100.00
ABB Group Investment Management Pty. Ltd., Moorebank, NSW	Australia	100.00
B&R Holding GmbH, Eggelsberg	Austria	100.00
B&R Industrial Automation GmbH, Eggelsberg	Austria	100.00
ABB Industrial Solutions (Belgium) BVBA, Gent	Belgium	100.00

Company name/location	Country	ABB interest %
ABB N.V., Zaventem	Belgium	100.00
ABB Ltda., São Paulo	Brazil	100.00
ABB Bulgaria EOOD, Sofia	Bulgaria	100.00
ABB Canada Holding Limited Partnership, Saint-Laurent, Quebec	Canada	100.00
ABB Inc., Saint-Laurent, Quebec	Canada	100.00

ABB Installation Products Ltd., Saint-Jean-sur-Richelieu, Quebec	Canada	100.00
ABB (China) Ltd., Beijing	China	100.00
ABB Beijing Drive Systems Co. Ltd., Beijing	China	90.00
ABB Electrical Machines Ltd., Shanghai	China	100.00
ABB Engineering (Shanghai) Ltd., Shanghai	China	100.00
ABB High Voltage Switchgear Co., Ltd. Beijing, Beijing	China	60.00
ABB Shanghai Free Trade Zone Industrial Co., Ltd., Shanghai	China	100.00
ABB Xiamen Low Voltage Equipment Co. Ltd., Xiamen	China	100.00
ABB Xiamen Switchgear Co. Ltd., Xiamen	China	64.30
ABB Xinhui Low Voltage Switchgear Co. Ltd., Xinhui	China	90.00
ABB s.r.o., Prague	Czech Republic	100.00
ABB A/S, Skovlunde	Denmark	100.00
ABB for Electrical Industries (ABB ARAB) S.A.E., Cairo	Egypt	100.00
Asea Brown Boveri S.A.E., Cairo	Egypt	100.00
ABB AS, Jüri	Estonia	100.00
ABB Oy, Helsinki	Finland	100.00
ABB France, Cergy Pontoise	France	99.83
ABB SAS, Cergy Pontoise	France	100.00
ABB AG, Mannheim	Germany	100.00
ABB Automation GmbH, Mannheim	Germany	100.00
ABB Automation Products GmbH, Ladenburg	Germany	100.00
ABB Beteiligungs- und Verwaltungsges. mbH, Mannheim	Germany	100.00
ABB Stotz-Kontakt GmbH, Heidelberg	Germany	100.00
Busch-Jaeger Elektro GmbH, Lüdenscheid	Germany	100.00
Industrial C&S Hungary Kft., Budapest	Hungary	100.00
ABB Global Industries and Services Private Limited, Bangalore	India	100.00
ABB India Limited, Bangalore	India	75.00
ABB S.p.A., Milan	Italy	100.00
Power-One Italy S.p.A., Terranuova Bracciolini (AR)	Italy	100.00
ABB K.K., Tokyo	Japan	100.00
ABB Ltd., Seoul	Korea, Republic of	100.00
ABB Electrical Control Systems S. de R.L. de C.V., Monterrey	Mexico	100.00
ABB Mexico S.A. de C.V., San Luis Potosi SLP	Mexico	100.00
Asea Brown Boveri S.A. de C.V., San Luis Potosi SLP	Mexico	100.00

Company name/location	Country	ABB interest %
ABB B.V., Rotterdam	Netherlands	100.00
ABB Capital B.V., Rotterdam	Netherlands	100.00
ABB Finance B.V., Rotterdam	Netherlands	100.00
ABB Holdings B.V., Rotterdam	Netherlands	100.00
ABB Investments B.V., Rotterdam	Netherlands	100.00
ABB AS, Billingstad	Norway	100.00
ABB Holding AS, Billingstad	Norway	100.00
ABB Business Services Sp. z o.o., Warsaw	Poland	99.93
ABB Industrial Solutions (Bielsko Biala) Sp. z o.o., Bielsko Biala	Poland	99.99
ABB Sp. z o.o., Warsaw	Poland	99.93
Industrial C&S of P.R. LLC, San Juan	Puerto Rico	100.00
ABB Ltd., Moscow	Russian Federation	100.00
ABB Contracting Company Ltd., Riyadh	Saudi Arabia	95.00
ABB Electrical Industries Co. Ltd., Riyadh	Saudi Arabia	65.00
ABB Holdings Pte. Ltd., Singapore	Singapore	100.00
ABB Pte. Ltd., Singapore	Singapore	100.00
ABB Holdings (Pty) Ltd., Longmeadow	South Africa	100.00
ABB South Africa (Pty) Ltd., Longmeadow	South Africa	74.91
Asea Brown Boveri S.A., Madrid	Spain	100.00
ABB AB, Västerås	Sweden	100.00
ABB Norden Holding AB, Västerås	Sweden	100.00
ABB Asea Brown Boveri Ltd, Zurich	Switzerland	100.00
ABB Information Systems Ltd., Zurich	Switzerland	100.00
ABB Investment Holding GmbH, Zurich	Switzerland	100.00
ABB Management Services Ltd., Zurich	Switzerland	100.00
ABB Schweiz AG, Baden	Switzerland	100.00
ABB Turbo Systems AG, Baden	Switzerland	100.00
ABB LIMITED, Bangkok	Thailand	100.00
ABB Elektrik Sanayi A.S., Istanbul	Turkey	99.99
ABB Industries (L.L.C.), Dubai	United Arab Emirates	49.00[1]
ABB Holdings Limited, Warrington	United Kingdom	100.00
ABB Limited, Warrington	United Kingdom	100.00
ABB Finance (USA) Inc., Wilmington, DE	United States	100.00
ABB Holdings Inc., Cary, NC	United States	100.00
ABB Inc., Cary, NC	United States	100.00
ABB Installation Products Inc, Memphis, TN	United States	100.00
ABB Motors and Mechanical Inc, Fort Smith, AR	United States	100.00
ABB Treasury Center (USA), Inc., Wilmington, DE	United States	100.00
Edison Holding Corporation, Wilmington, DE	United States	100.00

Company name/location	Country	ABB interest %
Industrial Connections & Solutions LLC, Cary, NC	United States	100.00
Verdi Holding Corporation, Wilmington, DE	United States	100.00

(1) Company consolidated as ABB exercises full management control.

DESCRIPTION OF PROPERTY

As of December 31, 2018, we occupy real estate in around 100 countries throughout the world. The facilities consist mainly of manufacturing plants, office buildings, research centers and warehouses. A substantial portion of our production and development facilities are situated in the U.S., China, Germany, Italy, Finland, Sweden, Switzerland, Canada, Poland and India. We also own or lease other properties, including office buildings, warehouses, research and development facilities and sales offices in many countries. We own substantially all of the machinery and equipment used in our manufacturing operations.

From time to time, we have a surplus of space arising from acquisitions, production efficiencies and/or restructuring of operations. Normally, we seek to sell such surplus space which may involve leasing property to third parties for an interim period.

The net book value of our property, plant and equipment at December 31, 2018, was $4,133 million, of which machinery and equipment represented $1,575 million, land and buildings represented $2,094 million and construction in progress represented $464 million. We believe that our current facilities are in good condition and are adequate to meet the requirements of our present and foreseeable future operations.

Item 4A. Unresolved Staff Comments

None

Item 5. Operating and Financial Review and Prospects

MANAGEMENT OVERVIEW

ABB reached the conclusion of its Next Level strategy in 2018. The strategy, in execution since 2014, has focused on three areas: profitable growth, relentless execution and business-led collaboration. During this period ABB transitioned its portfolio and operations to create a streamlined and strengthened company with two value propositions: bringing electricity from any power plant to any plug and automating industries from natural resources to finished products. ABB has driven profitable growth through its entrepreneurial divisions, continuing to invest in sales, research and development, and its leading digital solutions portfolio, ABB Ability.™ In 2018, the Group was better positioned in a better market compared to 2017.

Profitable growth

During 2018, ABB recorded solid order growth across all divisions and regions as the company's pioneering technology leadership in digital industries advanced. Also during 2018, ABB Ability™ solutions were recognized as global leaders in Distributed Control Systems and Enterprise Asset Management software by industry analyst Arc Advisory Group.

ABB shifted its center of gravity significantly through ongoing portfolio management, driving towards greater competitiveness, higher growth and lower risk. The integration of Bernecker + Rainer Industrie-Elektronik GmbH (B&R) into ABB's Industrial Automation division to form its global Machine & Factory Automation business unit is on track to increase mid-term revenues in the business unit to a target of more than $1 billion. In September 2018, ABB acquired Intrion, which is headquartered in Belgium. The transaction will advance ABB's logistics robotics offering to gain a strong foothold in a market that offers strong growth opportunities. Also in September, ABB completed its acquisition of AB Rotech, a privately owned company headquartered in Bursa, Turkey. AB Rotech has 20 years' experience in robotic welding solutions and services for the automotive industry. The acquisition will boost ABB's robotic welding solutions for all tiers in the growing automotive segment. In August 2018, ABB sold its terminal block business, Entrelec, further demonstrating ABB's commitment to active portfolio management.

At the end of June 2018, ABB completed the acquisition of General Electric's (GE) global electrification solutions business, GEIS. GEIS sells to more than 100 countries and has an established installed base with strong roots in North America. This purchase strengthens ABB's position as a global leader in electrification and expands its access to the attractive North American market and early-cycle business. The integration of GEIS into ABB's Electrification Products division as its Industrial Solutions business unit (EPIS) is well underway. ABB continues to work to bring EPIS' margin up to peer levels through an extensive turnaround plan that prioritizes product and technology portfolio harmonization, footprint optimization, supply chain savings and other selling and administrative cost reduction to deliver approximately $200 million of annual cost synergies by year five. The transaction includes a long-term strategic supply relationship with GE and allows ABB long-term use of the GE brand.

ABB continues to invest to drive organic growth in a disciplined manner. Building on the integration of B&R, ABB announced, in April 2018, a €100 million investment to build a state-of-the-art research center in Eggelsberg, Austria. The new campus will go into operation in 2020. ABB also inaugurated its advanced innovation and manufacturing hub in Xiamen, China, in November 2018. The hub is expected to cost $300 million to develop and, at 425,000 square meters, is ABB's largest innovation and manufacturing site, employing 3,500 people and covering the full range of business activities. In November, ABB further announced its intent to invest $150 million to build a factory-of-the-future for robotics in Shanghai, China. ABB is China's number one robotics manufacturer, employing more than 2,000 engineers, technology experts and operational leaders in 20 locations across the country. The new factory will combine connected digital technologies, state-of-the-art collaborative robotics and cutting-edge artificial intelligence research, and is expected to be commissioned by the end of 2020.

Relentless execution

Further to the completion of the business model change for EPC, a non-core business unit was established within Corporate and Other effective January 1, 2018, reporting directly to the CFO to manage the wind down of remaining EPC activities. Related to this, in September 2018, ABB commenced transferring certain projects in its turnkey AC Substation business to Linxon, a new joint venture with SNC-Lavalin. SNC-Lavalin has a majority and controlling interest in the joint venture.

ABB is building on the achievements of the 1,000-day programs that were completed at the end of 2017 with a continued strong focus on Supply Chain Management and Operations Quality. Gaps in performance, informed by customer feedback, are rigorously identified and addressed using Lean Six Sigma methods. ABB has about 1,500 continuous improvement projects underway, led from within each division.

ABB continues to benefit from its ongoing cost management and productivity efforts. Savings outpaced price impacts and commodity effects, including those driven by the introduction of trade tariffs, in particular in the United States, during 2018.

Business-led collaboration

ABB continues to strengthen its brand. Effective March 1, 2018, ABB integrated Baldor Electric Company into its global brand. On October 1, 2018, Thomas & Betts was also officially migrated into the ABB global brand.

Strategic partnership developments included the formation of a global alliance to provide industrial grade edge data center solutions between ABB, Hewlett Packard Enterprise and Rittal, building on the success of prior co-operation and a software alliance for collaborative robotics with Kawasaki Heavy Industries. Further, in October 2018, ABB and the Shanghai municipal government signed a comprehensive strategic co-operation agreement focused on supporting industry, energy, transport and infrastructure in the Shanghai region of China, and to support the "Made in Shanghai" manufacturing initiative.

In January 2018, ABB announced a ground breaking multi-year partnership agreement with the Formula E electric car motor racing series, now known as the "ABB FIA Formula E Championship". ABB FIA Formula E serves as a competitive platform to develop and test e-mobility relevant electrification and digitalization technologies.

Strategy update: shaping a leader focused in digital industries

On December 17, 2018, ABB announced its new strategy, with the company proposing fundamental actions to focus, simplify and lead in digital industries, for enhanced customer value and shareholder returns. ABB also announced an agreed sale of its Power Grids business, expanding its existing partnership with Hitachi Ltd (Hitachi) and enabling ABB to increase its focus on digital industries, which is a rapidly developing market offering attractive growth prospects. Starting April 1, 2019, ABB intends to simplify the group's business model through the discontinuation of the legacy matrix structure, as well as shaping four leading businesses aligned with customer patterns: Electrification, Industrial Automation, Motion and Robotics & Discrete Automation.

The new ABB is expected to generate around $29 billion in annual revenues and have around 110,000 employees. Its four, customer-focused, entrepreneurial businesses are either the global number one or two player in revenue terms in their respective markets. ABB's addressable market is expected to grow by 3.5 to 4.0 percent per year, growing by $140 billion to reach $550 billion by 2025. Driving this demand will be the growing influence of electric mobility, data centers and robotics.

ABB's new organization will provide each business with full entrepreneurial ownership of operations, functions, research and development, and territories. ABB's new operating model, ABB-OS™, will provide a common framework across the group governing management processes, such as market validation, budgeting and portfolio management, in order to facilitate clear decision making and a balanced approach to value creation.

Under ABB-OS™, the businesses will be the single interface to customers, maximizing proximity and speed. The corporate center will be further streamlined, while existing country and regional structures including regional Executive Committee roles will be discontinued after the closing of the Power Grids transaction. Existing resources at the country level will strengthen the new businesses.

Further, ABB expects the ABB-OS™ simplification program to drive approximately $500 million annual run-rate cost reductions across the group, with the full run-rate targeted during 2021. Approximately $300 million of savings are planned to be realized from the businesses, for example through a reduction of areas of business responsibility through combining businesses and eliminating management layers, and optimizing ABB's manufacturing footprint. Approximately $200 million of savings are planned to come from Group functions and a leaner corporate center.

ABB plans to demonstrate improved commercial quality of business and enhance exposure to faster growing markets with a greater emphasis on high value-add solutions, lower risk, less large-order volatility and more recurring revenue streams through digital solutions, software and services.

ABB's investment proposition is reflected in a new medium-term target framework for the Group:

- 3 to 6 percent annual comparable revenue growth, based on current economic outlook,
- Operational EBITA margin of 13 to 16 percent,
- Return on Capital Employed (ROCE) of 15 to 20 percent,

- Cash conversion to net income of approximately 100 percent, and
- Basic EPS growth above revenue growth.

Capital allocation

The Board of Directors is proposing a tenth consecutive increase in the dividend to 0.80 Swiss francs per share at the 2019 Annual General Meeting.

ABB's sustained capital allocation priorities are unchanged:

- funding organic growth, research and development, and capital expenditures at attractive cash returns,
- paying a rising, sustainable dividend,
- investing in value-creating acquisitions, and
- returning additional cash to shareholders.

Following the expected completion of the sale of 80.1 percent of our Power Grids business to Hitachi in the first half of 2020, valuing the business at $11 billion, ABB intends to return 100 percent of the net cash proceeds to shareholders in an expeditious and efficient manner. ABB intends to maintain the level of dividend per share post close and aims to maintain its "single A" credit rating long term.

Outlook

Macroeconomic signs are mixed in Europe but are trending positively in the United States, and growth is expected to continue in China. The overall global market is growing, with rising geopolitical uncertainties in various parts of the world. Oil prices and foreign exchange translation effects are expected to continue to influence the company's results.

The attractive long-term demand outlook in ABB's three major customer sectors — utilities, industry and transport & infrastructure — is driven by the Energy and Fourth Industrial Revolutions. We believe ABB is well-positioned to tap into these opportunities for long-term profitable growth with its market-leading digital offering ABB Ability™, strong market presence, broad geographic and business scope, technology leadership and financial strength.

APPLICATION OF CRITICAL ACCOUNTING POLICIES

General

We prepare our Consolidated Financial Statements in accordance with U.S. GAAP and present these in U.S. dollars unless otherwise stated.

The preparation of our financial statements requires us to make assumptions and estimates that affect the reported amounts of assets, liabilities, revenues and expenses and the related disclosure of contingent assets and liabilities. We evaluate our estimates on an ongoing basis, including, but not limited to, those related to: gross profit margins of performance obligations satisfied over time; costs of product guarantees and warranties; provisions for bad debts; recoverability of inventories, investments, fixed assets, goodwill and other intangible assets; the fair values of assets and liabilities assumed in business combinations; income tax expenses and provisions related to uncertain tax positions; pensions and other postretirement benefit assumptions; and legal and other contingencies. Where appropriate, we base our estimates on historical experience and on various other assumptions that we believe to be reasonable under the circumstances, the results of which form the basis for making judgments about the carrying values of assets and liabilities that are not readily apparent from other sources. Actual results may differ from our estimates and assumptions.

We deem an accounting policy to be critical if it requires an accounting estimate to be made based on assumptions about matters that are highly uncertain at the time the estimate is made and if different estimates that reasonably could have been used, or if changes in the accounting estimates that are reasonably likely to occur periodically, could materially impact our Consolidated Financial Statements. We also deem an accounting policy to be critical when the application of such policy is essential to our ongoing operations. We believe the following critical accounting policies require us to make difficult and subjective judgments, often as a result of the need to make estimates regarding matters that are inherently uncertain. These policies should be considered when reading our Consolidated Financial Statements.

Revenue recognition

A customer contract exists if collectability under the contract is considered probable, the contract has commercial substance, contains payment terms, as well as the rights and commitments of both parties, and has been approved. By analyzing the type, terms and conditions of each contract or arrangement with a customer, we determine which revenue recognition method applies.

We offer arrangements with multiple performance obligations to meet our customers' needs. These arrangements may involve the delivery of multiple products and/or performance of services (such as installation, training and maintenance) and the delivery and/or performance may occur at different points in time or over different periods of time. Goods and services under such arrangements are evaluated to determine whether they form distinct performance obligations and should be accounted for as separate revenue transactions. We allocate the sales price to each distinct performance obligation based on the price of each item sold in separate transactions at the inception of the arrangement.

We recognize revenues when control of goods or services is transferred to customers in an amount that reflects the consideration we expect to be entitled to in exchange for these goods or services. Control is transferred when the customer has the ability to direct the use and obtain the benefits from the goods or services.

Control transfer for non-customized products is not considered to have occurred, and therefore no revenues are recognized, until the customer has taken title to the products and assumed the risks and rewards of ownership of the products specified in the purchase order or sales agreement. Generally, the transfer of title and risks and rewards of ownership are governed by the contractually defined shipping terms. We use various International Commercial shipping terms (as promulgated by the International Chamber of Commerce) in our sales of products to third party customers, such as Ex Works (EXW), Free Carrier (FCA) and Delivered Duty Paid (DDP).

We generally recognize revenues for the sale of customized products, including integrated automation and electrification systems and solutions, on an over time basis using the percentage of completion method of accounting. These systems are generally accounted for as a single performance obligation as we are required to integrate equipment and services into one deliverable for the customer. Revenues are recognized as the systems are customized during the manufacturing or integration process and as control is transferred to the customer as evidenced by our right to payment for work performed or by the customer's ownership of the work in process. We use the cost to cost method to measure progress towards completion on contracts. Under this method, progress of contracts is measured by actual costs incurred in relation to management's best estimate of total estimated costs, which are reviewed and updated routinely for contracts in progress. The cumulative effect of any change in estimate is recorded in the period in which the change in estimate is determined.

The percentage of completion method of accounting involves the use of assumptions and projections, principally relating to future material, labor and project related overhead costs as well as estimates of the amount of variable consideration to which we expect to be entitled to. As a consequence, there is a risk that total contract costs or the amount of variable consideration will either exceed or be lower than, respectively, those we originally estimated (based on all information reasonably available to us) and the margin will decrease or the contract may become unprofitable. This risk increases if the duration of a contract increases because there is a higher probability that the circumstances upon which we originally developed our estimates will change, resulting in increased costs that we may not recover. Factors that could cause costs to increase include:

- unanticipated technical problems with equipment supplied or developed by us which may require us to incur additional costs to remedy,
- changes in the cost of components, materials or labor,
- difficulties in obtaining required governmental permits or approvals,
- project modifications creating unanticipated costs,
- suppliers' or subcontractors' failure to perform, and
- delays caused by unexpected conditions or events.

Changes in our initial assumptions, which we review on a regular basis between balance sheet dates, may result in revisions to estimated costs, current earnings and anticipated earnings. We recognize these changes in the period in which the changes in estimates are determined. By recognizing changes in estimates cumulatively, recorded revenue and costs to date reflect the current estimates of the stage of completion of each project. Additionally, losses on such contracts are recognized in the period when they are identified and are based upon the anticipated excess of contract costs over the related contract revenues.

Revenues from service transactions are recognized as services are performed. For long term service contracts, revenues are recognized on a straight line basis over the term of the contract or, if the performance pattern is other than straight line, as the services are provided. Service revenues reflect revenues earned from our activities in providing services to customers primarily subsequent to the sale and delivery of a product or complete system. Such revenues consist of maintenance type contracts, field service activities that include personnel and accompanying spare parts, training and installation and commissioning of products as a stand alone service or as part of a service contract.

Revenues are reported net of customer rebates, early settlement discounts, and similar incentives. Rebates are estimated based on sales terms, historical experience and trend analysis. The most common incentives relate to amounts paid or credited to customers for achieving defined volume levels.

Taxes assessed by a governmental authority that are directly imposed on revenue producing transactions between us and our customers, such as sales, use, value added and some excise taxes, are excluded from revenues.

Accounts receivable from customer contracts are regularly reviewed for collectability and allowances are calculated to estimate those receivables that will not be collected. These reserves assume a level of default based on historical information, as well as knowledge about specific invoices and customers. The risk remains that actual defaults will vary in number and amount from those originally estimated. As such, the amount of revenues recognized might exceed the amount which will be collected, resulting in a change in earnings in the future. The risk of deterioration is likely to increase during periods of significant negative industry, economic or political trends.

As a result of the above policies, judgment in the selection and application of revenue recognition methods must be made.

Contingencies

As more fully described in “Item 8. Financial Information—Legal Proceedings” and in “Note 15 Commitments and contingencies” to our Consolidated Financial Statements, we are subject to proceedings, litigation or threatened litigation and other claims and inquiries related to environmental, labor, product, regulatory, tax (other than income tax) and other matters. We are required to assess the likelihood of any adverse judgments or outcomes to these matters, as well as potential ranges of probable losses. A determination of the provision required, if any, for these contingencies is made after analysis of each individual issue, often with assistance from both internal and external legal counsel and technical experts. The required amount of a provision for a contingency of any type may change in the future due to new developments in the particular matter, including changes in the approach to its resolution.

We record provisions for our contingent obligations when it is probable that a loss will be incurred and the amount can be reasonably estimated. Any such provision is generally recognized on an undiscounted basis using our best estimate of the amount of loss or at the lower end of an estimated range when a single best estimate is not determinable. In some cases, we may be able to recover a portion of the costs relating to these obligations from insurers or other third parties; however, we record such amounts only when it is probable that they will be collected.

We provide for anticipated costs for warranties when we recognize revenues on the related products or contracts. Warranty costs include calculated costs arising from imperfections in design, material and workmanship in our products. We generally make individual assessments on contracts with risks resulting from order specific conditions or guarantees and assessments on an overall, statistical basis for similar products sold in larger quantities. There is a risk that actual warranty costs may exceed the amounts provided for, which would result in a deterioration of earnings in the future when these actual costs are determined.

Pension and other postretirement benefits

As more fully described in “Note 17 Employee benefits” to our Consolidated Financial Statements, we have a number of defined benefit pension and other postretirement plans and recognize an asset for a plan’s overfunded status or a liability for a plan’s underfunded status in our Consolidated Balance Sheets. We measure such a plan’s assets and obligations that determine its funded status as of the end of the year.

Significant differences between assumptions and actual experience, or significant changes in assumptions, may materially affect the pension obligations. The effects of actual results differing from assumptions and the changing of assumptions are included in net actuarial loss within “Accumulated other comprehensive loss”.

We recognize actuarial gains and losses gradually over time. Any cumulative unrecognized actuarial gain or loss that exceeds 10 percent of the greater of the present value of the projected benefit obligation (PBO) and the fair value of plan assets is recognized in earnings over the expected average remaining working lives of the employees participating in the plan, or the expected average remaining lifetime of the inactive plan participants if the plan is comprised of all or almost all inactive participants. Otherwise, the actuarial gain or loss is not recognized in the Consolidated Income Statements.

We use actuarial valuations to determine our pension and postretirement benefit costs and credits. The amounts calculated depend on a variety of key assumptions, including discount rates, mortality rates and expected return on plan assets. Under U.S. GAAP, we are required to consider current market conditions in making these assumptions. In particular, the discount rates are reviewed annually based on changes in long term, highly rated corporate bond yields. Decreases in the discount rates result in an increase in the PBO and in pension costs. Conversely, an increase in the discount rates results in a decrease in the PBO and in pension costs. The mortality assumptions are reviewed annually by management. Decreases in mortality rates result in an increase in the PBO and in pension costs. Conversely, an increase in mortality rates results in a decrease in the PBO and in pension costs.

Holding all other assumptions constant, a 0.25 percentage point decrease in the discount rate would have increased the PBO related to our defined benefit pension plans by $390 million while a 0.25 percentage point increase in the discount rate would have decreased the PBO related to our defined benefit pension plans by $370 million.

The expected return on plan assets is reviewed regularly and considered for adjustment annually based upon the target asset allocations and represents the long term return expected to be achieved. Decreases in the expected return on plan assets result in an increase to pension costs. Holding all other assumptions constant, an increase or decrease of 0.25 percentage points in the expected long term rate of asset return would have decreased or increased, respectively, the net periodic benefit cost in 2018 by $26 million.

The funded status, which can increase or decrease based on the performance of the financial markets or changes in our assumptions, does not represent a mandatory short term cash obligation. Instead, the funded status of a defined benefit pension plan is the difference between the PBO and the fair value of the plan assets. At December 31, 2018, our defined benefit pension plans were $1,677 million underfunded compared to an underfunding of $1,413 million at December 31, 2017. Our other postretirement plans were underfunded by $120 million and $132 million at December 31, 2018 and 2017, respectively.

We have multiple non pension postretirement benefit plans. Our health care plans are generally contributory with participants' contributions adjusted annually. For purposes of estimating our health care costs, we have assumed health care cost increases to be 6.7 percent per annum for 2019, gradually declining to 5.0 percent per annum by 2028 and to remain at that level thereafter.

Income taxes

In preparing our Consolidated Financial Statements, we are required to estimate income taxes in each of the jurisdictions in which we operate. Tax expense from continuing operations is reconciled from the weighted average global tax rate (rather than from the Swiss domestic statutory tax rate) as the parent company of the ABB Group, ABB Ltd, is domiciled in Switzerland. Income which has been generated in jurisdictions outside of Switzerland (hereafter "foreign jurisdictions") and has already been subject to corporate income tax in those foreign jurisdictions is, to a large extent, tax exempt in Switzerland. Therefore, generally no or only limited Swiss income tax has to be provided for on the repatriated earnings of foreign subsidiaries. There is no requirement in Switzerland for a parent company of a group to file a tax return of the group determining domestic and foreign pre tax income and as our consolidated income from continuing operations is predominantly earned outside of Switzerland, corporate income tax in foreign jurisdictions largely determines our global weighted average tax rate.

We account for deferred taxes by using the asset and liability method. Under this method, we determine deferred tax assets and liabilities based on temporary differences between the financial reporting and the tax bases of assets and liabilities. Deferred tax assets and liabilities are measured using the enacted tax rates and laws that are expected to be in effect when the differences are expected to reverse. We recognize a deferred tax asset when it is more likely than not that the asset will be realized. We regularly review our deferred tax assets for recoverability and establish a valuation allowance based upon historical losses, projected future taxable income and the expected timing of the reversals of existing temporary differences. To the extent we increase or decrease this allowance in a period, we recognize the change in the allowance within “Provision for taxes” in the Consolidated Income Statements unless the change relates to discontinued operations, in which case the change is recorded in “Income from discontinued operations, net of tax”. Unforeseen changes in tax rates and tax laws, as well as differences in the projected taxable income as compared to the actual taxable income, may affect these estimates.

Certain countries levy withholding taxes, dividend distribution taxes or additional corporate income taxes (hereafter “withholding taxes”) on dividend distributions. Such taxes cannot always be fully reclaimed by the shareholder, although they have to be declared and withheld by the subsidiary. Switzerland has concluded double taxation treaties with many countries in which we operate. These treaties either eliminate or reduce such withholding taxes on dividend distributions. It is our policy to distribute retained earnings of subsidiaries, insofar as such earnings are not permanently reinvested or no other reasons exist that would prevent the subsidiary from distributing them. No deferred tax liability is set up, if retained earnings are considered as permanently reinvested, and used for financing current operations as well as business growth through working capital and capital expenditure in those countries.

We operate in numerous tax jurisdictions and, as a result, are regularly subject to audit by tax authorities. We provide for tax contingencies whenever it is deemed more likely than not that a tax asset has been impaired or a tax liability has been incurred for events such as tax claims or changes in tax laws. Contingency provisions are recorded based on the technical merits of our filing position, considering the applicable tax laws and OECD guidelines and are based on our evaluations of the facts and circumstances as of the end of each reporting period. Changes in the facts and circumstances could result in a material change to the tax accruals. Although we believe that our tax estimates are reasonable and that appropriate tax reserves have been made, the final determination of tax audits and any related litigation could be different than that which is reflected in our income tax provisions and accruals.

An estimated loss from a tax contingency must be accrued as a charge to income if it is more likely than not that a tax asset has been impaired or a tax liability has been incurred and the amount of the loss can be reasonably estimated. We apply a two step approach to recognize and measure uncertainty in income taxes. The first step is to evaluate the tax position for recognition by determining if the weight of available evidence indicates that it is more likely than not that the position will be sustained on audit, including resolution of related appeals or litigation processes, if any. The second step is to measure the tax benefit as the largest amount which is more than 50 percent likely of being realized upon ultimate settlement. The required amount of provisions for contingencies of any type may change in the future due to new developments.

Business combinations

The amount of goodwill initially recognized in a business combination is based on the excess of the purchase price of the acquired company over the fair value of the assets acquired and liabilities assumed. The determination of these fair values requires us to make significant estimates and assumptions. For instance, when assumptions with respect to the timing and amount of future revenues and expenses associated with an asset are used to determine its fair value, but the actual timing and amount differ materially, the asset could become impaired. In some cases, particularly for large acquisitions, we may engage independent third party appraisal firms to assist in determining the fair values.

Critical estimates in valuing certain intangible assets include but are not limited to: future expected cash flows of the acquired business, brand awareness, customer retention, technology obsolescence and discount rates.

In addition, uncertain tax positions and tax related valuation allowances assumed in connection with a business combination are initially estimated at the acquisition date. We reevaluate these items quarterly, based upon facts and circumstances that existed at the acquisition date with any adjustments to our preliminary estimates being recorded to goodwill provided that we are within the twelve month measurement period. Subsequent to the measurement period or our final determination of the tax allowance's or contingency's estimated value, whichever comes first, changes to these uncertain tax positions and tax related valuation allowances will affect our provision for income taxes in our Consolidated Income Statements and could have a material impact on our results of operations and financial position. The fair values assigned to the intangible assets acquired are described in "Note 4 Acquisitions and business divestments" as well as "Note 11 Goodwill and other intangible assets", to our Consolidated Financial Statements.

Goodwill and other intangible assets

We review goodwill for impairment annually as of October 1, or more frequently if events or circumstances indicate the carrying value may not be recoverable.

We use either a qualitative or quantitative assessment method for each reporting unit. The qualitative assessment involves determining, based on an evaluation of qualitative factors, whether it is more likely than not that the fair value of a reporting unit is less than its carrying amount. If, based on this qualitative assessment, it is determined to be more likely than not that the reporting unit's fair value is less than its carrying value, then a quantitative impairment test is performed. If we elect not to perform the qualitative assessment for a reporting unit, then we perform the quantitative impairment test.

Our reporting units are the same as our business divisions for Electrification Products and Robotics and Motion. For the Industrial Automation division, we determined the reporting units to be one level below the division, as the different products produced or services provided by this division do not share sufficiently similar economic characteristics to permit testing of goodwill on a total division level.

When performing the qualitative assessment, we first determine, for a reporting unit, factors which would affect the fair value of the reporting unit including: (i) macroeconomic conditions related to the business, (ii) industry and market trends, and (iii) the overall future financial performance and future opportunities in the markets in which the business operates. We then consider how these factors would impact the most recent quantitative analysis of the reporting unit's fair value. Key assumptions in determining the value of the reporting unit include the projected level of business operations, the weighted average cost of capital, the income tax rate and the terminal growth rate.

If, after performing the qualitative assessment, we conclude that events or circumstances have occurred which would indicate that it is more likely than not that the fair value of the reporting unit is less than its carrying value, or if we have elected not to perform a qualitative assessment, then a quantitative impairment test is performed. First, we calculate the fair value of the reporting unit (using an income approach whereby the fair value is calculated based on the present value of future cash flows applying a discount rate that represents our weighted average cost of capital) and compare it to the reporting unit's carrying value. Where the fair value of the reporting unit exceeds the carrying value of the net assets assigned to that unit, goodwill is not impaired and no further testing is performed. However, if the carrying value of the net assets assigned to the reporting unit is equal to or exceeds the reporting unit's fair value, we would record an impairment loss equal to the difference, up to the full amount of goodwill. Any goodwill impairment losses would be recorded as a separate line item in the income statement in continuing operations, unless related to a discontinued operation, in which case the losses would be recorded in "Income from discontinued operations, net of tax".

In 2018, we performed a quantitative impairment test for all of our reporting units to reflect new assumptions and forecasts resulting from our newly developed strategic plan for the period from 2019 to 2023. The quantitative test concluded that the estimated fair values for each of our reporting units exceeded their respective carrying values by more than 20 percent and hence we concluded that none of the reporting units were "at risk" of failing the goodwill impairment test.

The projected future cash flows used in the 2018 fair value calculation for all reporting units, except for Machine and Factory Automation within the Industrial Automation division, were based on approved business plans for the reporting units which covered a period of five years plus a calculated terminal value. The after-tax weighted-average cost of capital of 8 percent was based on variables such as the risk-free rate derived from the yield of 10 year U.S. treasury bonds as well as an ABB-specific risk premium. The terminal value growth rate was assumed to be 1 percent. The mid-term tax rate used in the test was 27 percent.

For Machine and Factory Automation, which includes the acquisition in 2017 of B&R, the projected future cash flows used in the 2018 fair value calculation were based on an approved business plan which covered a period of eight years plus a calculated terminal value. The business plan covered a longer projected period due to a higher growth trajectory as well as a longer term view for the business which was available following the acquisition process. The terminal value growth rate was assumed to be 3 percent and the after tax weighted-average cost of capital (WACC) was 9.4 percent. The mid-term tax rate used in the test was 25 percent which is based on tax rates in countries where the business is primarily operating.

Determining the projected future cash flows required significant judgments and estimates involving variables such as future sales volumes, sales prices, awards of large orders, production and other operating costs, capital expenditures, net working capital requirements and other economic factors.

We based our fair value estimates on assumptions we believed to be reasonable, but which were inherently uncertain. Consequently, actual future results may differ from those estimates.

We assessed the reasonableness of the fair value calculations of our reporting units by reconciling the sum of the fair values for all our reporting units to our total market capitalization. The assumptions used in the fair value calculation were stressed (through the use of sensitivity analysis) to determine the impact on the fair value of the reporting units. Our sensitivity analysis in 2018 showed that, holding all other assumptions constant, a 1 percentage point increase in the discount rate would have reduced the calculated fair value by approximately 13.0 percent, while a 1 percentage point decrease in the terminal value growth rate would have reduced the calculated fair value by approximately 9.3 percent.

In 2017, we performed a qualitative assessment and determined that it was not more likely than not that the fair value for each of these reporting units was below the carrying value. As a result, we concluded that it was not necessary to perform the quantitative impairment test.

Intangible assets are reviewed for recoverability upon the occurrence of certain triggering events (such as a decision to divest a business or projected losses of an entity) or whenever events or changes in circumstances indicate that the carrying amount may not be recoverable. We record impairment charges in “Other income (expense), net”, in our Consolidated Income Statements, unless they relate to a discontinued operation, in which case the charges are recorded in “Income from discontinued operations, net of tax”.

NEW ACCOUNTING PRONOUNCEMENTS

For a description of accounting changes and recent accounting pronouncements, including the expected dates of adoption and estimated effects, if any, on our Consolidated Financial Statements, see “Note 2 Significant accounting policies” to our Consolidated Financial Statements.

RESEARCH AND DEVELOPMENT

Each year, we invest significantly in research and development. Our research and development focuses on developing and commercializing the technologies of our businesses that are of strategic importance to our future growth. In 2018 we invested $1,147 million, or approximately 4.2 percent of our 2018 consolidated revenues, on research and development activities in our continuing operations. We also had expenditures of $57 million, or approximately 0.2 percent of our 2018 consolidated revenues, on order related development activities. These are customer and project specific development efforts that we undertake to develop or adapt equipment and systems to the unique needs of our customers in connection with specific orders or projects. Order related development amounts are initially recorded in inventories as part of the work in process of a contract and then are reflected in cost of sales at the time revenue is recognized in accordance with our accounting policies.

In addition to continuous product development, and order related engineering work, we develop platforms for technology applications in our automation and power businesses in our research and development laboratories, which operate on a global basis. Through active management of our investment in research and development, we seek to maintain a balance between short term and long term research and development programs and optimize our return on investment.

Universities are incubators of future technology, and a central task of our research and development team is to transform university research into industry ready technology platforms. We collaborate with a number of universities and research institutions to build research networks and foster new technologies. We believe these collaborations shorten the amount of time required to turn basic ideas into viable products, and they additionally help us recruit and train new personnel. We have built numerous university collaborations in the U.S., Europe and Asia, including long term, strategic relationships with the Carnegie Mellon University, North Carolina State University, Virginia Polytechnic Institute and State University, Massachusetts Institute of Technology, Imperial College London, ETH Zurich, Royal Institute of Technology (KTH) Stockholm, Cambridge University, Dresden University of Technology, Huazhong University of Science & Technology (HUST) and Xi'an Jiaotong University (XJTU). Our collaborative projects include research on materials, sensors, micro engineered mechanical systems, robotics, controls, manufacturing, distributed power and communication. Common platforms for power and automation technologies are developed around advanced materials, efficient manufacturing, information technology and data communication, as well as sensor and actuator technology.

Common applications of basic power and automation technologies can also be found in power electronics, electrical insulation, and control and optimization. Our power technologies, including our insulation technologies, current interruption and limitation devices, power electronics, flow control and power protection processes, apply as much to large, reliable, blackout free transmission systems as they do to everyday household needs. Our automation technologies, including our control and optimization processes, power electronics, sensors and microelectronics, mechatronics and wireless communication processes, are designed to improve efficiency in plants and factories around the world, including our own.

ACQUISITIONS AND DIVESTMENTS

Acquisitions

During 2018, 2017 and 2016, ABB paid $2,638 million, $1,992 million and $13 million to purchase three, four and one businesses, respectively. The amounts exclude increases in investments made in cost and equity accounted companies.

The principal acquisition in 2018 was GE Industrial Solutions (GEIS), GE's global electrification solutions business, which was acquired in June. GEIS, headquartered in the United States, has approximately 13,500 employees and provides technologies that distribute and control electricity and support the commercial, data center, health care, mining, renewable energy, oil and gas, water and telecommunications sectors.

The principal acquisition in 2017 was B&R, which was acquired in July. B&R is a worldwide provider of product- and software-based, open-architecture solutions for machine and factory automation and employs more than 3,000 people, including about 1,000 research and development, and application engineers. It operates across 70 countries in the machine and factory automation market segment.

The acquisition in 2016 was not significant.

Divestments

On March 1, 2017, ABB divested its high-voltage cable system business. Total cash proceeds from all business divestments during 2017 amounted to $605 million, net of transaction costs and cash disposed.

There were no significant divestments in 2016 and 2018.

Planned divestment of Power Grids

In December 2018, ABB announced an agreement to divest 80.1 percent of its Power Grids business to Hitachi, valuing the business at $11 billion. The business also includes certain real estate properties which were previously reported within Corporate and Other. The divestment is expected to be completed in the first half of 2020, following the receipt of customary regulatory approvals. As this divestment represents a strategic shift that will have a major effect on the Company's operations and financial results, the results of operations for this business have been presented as discontinued operations and the assets and liabilities are reflected as held-for-sale for all periods presented. For more information on our discontinued operations, see "Note 3 Changes in presentation of financial statements" to our Consolidated Financial Statements.

For more information on our acquisitions and divestments, see "Note 4 Acquisitions and business divestments" to our Consolidated Financial Statements.

EXCHANGE RATES

We report our financial results in U.S. dollars. Due to our global operations, a significant amount of our revenues, expenses, assets and liabilities are denominated in other currencies. As a consequence, movements in exchange rates between currencies may affect: (i) our profitability, (ii) the comparability of our results between periods, and (iii) the reported carrying value of our assets and liabilities.

We translate non USD denominated results of operations, assets and liabilities to USD in our Consolidated Financial Statements. Balance sheet items are translated to USD using year end currency exchange rates. Income statement and cash flow items are translated to USD using the relevant monthly average currency exchange rate.

Increases and decreases in the value of the USD against other currencies will affect the reported results of operations in our Consolidated Income Statements and the value of certain of our assets and liabilities in our Consolidated Balance Sheets, even if our results of operations or the value of those assets and liabilities have not changed in their original currency. As foreign exchange rates impact our reported results of operations and the reported value of our assets and liabilities, changes in foreign exchange rates could significantly affect the comparability of our reported results of operations between periods and result in significant changes to the reported value of our assets, liabilities and stockholders' equity.

While we operate globally and report our financial results in USD, exchange rate movements between the USD and both the EUR and the CHF are of particular importance to us due to (i) the location of our significant operations and (ii) our corporate headquarters being in Switzerland.

The exchange rates between the USD and the EUR and the USD and the CHF at December 31, 2018, 2017 and 2016, were as follows:

Exchange rates into $	2018	2017	2016
EUR 1.00	1.15	1.20	1.05
CHF 1.00	1.02	1.02	0.98

The average exchange rates between the USD and the EUR and the USD and the CHF for the years ended December 31, 2018, 2017 and 2016, were as follows:

Exchange rates into $	2018	2017	2016
EUR 1.00	1.18	1.13	1.10
CHF 1.00	1.02	1.02	1.01

When we incur expenses that are not denominated in the same currency as the related revenues, foreign exchange rate fluctuations could affect our profitability. To mitigate the impact of exchange rate movements on our profitability, it is our policy to enter into forward foreign exchange contracts to manage the foreign exchange transaction risk of our operations.

In 2018, approximately 76 percent of our consolidated revenues were reported in currencies other than the USD. The following percentages of consolidated revenues were reported in the following currencies:

- Euro, approximately 23 percent, and
- Chinese renminbi, approximately 14 percent

In 2018, approximately 73 percent of our cost of sales and selling, general and administrative expenses were reported in currencies other than the USD. The following percentages of consolidated cost of sales and selling, general and administrative expenses were reported in the following currencies:

- Euro, approximately 22 percent, and
- Chinese renminbi, approximately 12 percent

We also incur expenses other than cost of sales and selling, general and administrative expenses in various currencies.

The results of operations and financial position of many of our subsidiaries outside of the United States are reported in the currencies of the countries in which those subsidiaries are located. We refer to these currencies as “local currencies”. Local currency financial information is then translated into USD at applicable exchange rates for inclusion in our Consolidated Financial Statements.

The discussion of our results of operations below provides certain information with respect to orders, revenues, income from operations and other measures as reported in USD (as well as in local currencies). We measure period to period variations in local currency results by using a constant foreign exchange rate for all periods under comparison. Differences in our results of operations in local currencies as compared to our results of operations in USD are caused exclusively by changes in currency exchange rates.

While we consider our results of operations as measured in local currencies to be a significant indicator of business performance, local currency information should not be relied upon to the exclusion of U.S. GAAP financial measures. Instead, local currencies reflect an additional measure of comparability and provide a means of viewing aspects of our operations that, when viewed together with the U.S. GAAP results, provide a more complete understanding of factors and trends affecting the business. As local currency information is not standardized, it may not be possible to compare our local currency information to other companies' financial measures that have the same or a similar title. We encourage investors to review our financial statements and publicly filed reports in their entirety and not to rely on any single financial measure.

ORDERS

Our policy is to book and report an order when a binding contractual agreement has been concluded with a customer covering, at a minimum, the price and scope of products or services to be supplied, the delivery schedule and the payment terms. The reported value of an order corresponds to the undiscounted value of revenues that we expect to recognize following delivery of the goods or services subject to the order, less any trade discounts and excluding any value added or sales tax. The value of orders received during a given period of time represents the sum of the value of all orders received during the period, adjusted to reflect the aggregate value of any changes to the value of orders received during the period and orders existing at the beginning of the period. These adjustments, which may in the aggregate increase or decrease the orders reported during the period, may include changes in the estimated order price up to the date of contractual performance, changes in the scope of products or services ordered and cancellations of orders.

The undiscounted value of revenues we expect to generate from our orders at any point in time is represented by our order backlog. Approximately 6.6 percent of the value of total orders we recorded in 2018 were "large orders", which we define as orders from third parties involving a value of at least $15 million for products or services. Approximately 47 percent of the total value of large orders in 2018 were recorded in our Industrial Automation division. The other divisions as well as our non-core business activities accounted for the remainder of the total large orders recorded during 2018. The remaining portion of total orders recorded in 2018 was "base orders", which we define as orders from third parties with a value of less than $15 million for products or services.

The level of orders fluctuates from year to year. Portions of our business involve orders for long term projects that can take months or years to complete and many large orders result in revenues in periods after the order is booked. Consequently, the level of large orders and orders generally cannot be used to accurately predict future revenues or operating performance. Orders that have been placed can be cancelled, delayed or modified by the customer. These actions can reduce or delay any future revenues from the order or may result in the elimination of the order.

PERFORMANCE MEASURES

We evaluate the performance of our divisions based on orders received, revenues and Operational EBITA.

Operational EBITA represents income from operations excluding:

- amortization expense on intangibles arising upon acquisitions (acquisition-related amortization),
- restructuring and restructuring-related expenses,
- changes in the amount recorded for obligations related to divested businesses occurring after the divestment date (changes in obligations related to divested businesses),
- changes in estimates relating to opening balance sheets of acquired businesses (changes in pre acquisition estimates),

- gains and losses from sale of businesses,
- acquisition- and divestment-related expenses and integration costs,
- certain other non-operational items, as well as
- foreign exchange/commodity timing differences in income from operations consisting of: (a) unrealized gains and losses on derivatives (foreign exchange, commodities, embedded derivatives), (b) realized gains and losses on derivatives where the underlying hedged transaction has not yet been realized, and (c) unrealized foreign exchange movements on receivables/payables (and related assets/liabilities).

Certain other non-operational items generally includes: certain regulatory, compliance and legal costs, certain asset write downs/impairments as well as other items which are determined by management on a case by case basis.

See “Note 23 Operating segment and geographic data” to our Consolidated Financial Statements for a reconciliation of the total consolidated Operational EBITA to income from continuing operations before taxes.

ANALYSIS OF RESULTS OF OPERATIONS

Our consolidated results from operations were as follows:

ORDERS AND ORDER BACKLOG:

($ in millions)	**2018**	**2017**	**2016**
Orders	28,590	25,034	23,658
Order backlog at December 31,	13,084	12,491	12,950

INCOME STATEMENT DATA:

($ in millions, except per share data in $)			
Revenues	27,662	25,196	24,929
Cost of sales	(19,118)	(17,350)	(17,396)
Gross profit	**8,544**	**7,846**	**7,533**
Selling, general and administrative expenses	(5,295)	(4,765)	(4,532)
Non-order related research and development expenses	(1,147)	(1,013)	(967)
Other income (expense), net	124	162	(105)
Income from operations	**2,226**	**2,230**	**1,929**
Net interest and other finance expense	(190)	(161)	(130)
Non-operational pension (cost) credit	83	33	(38)
Provision for taxes	(544)	(583)	(526)
Income from continuing operations, net of tax	**1,575**	**1,519**	**1,235**
Income from discontinued operations, net of tax	723	846	799
Net income	**2,298**	**2,365**	**2,034**
Net income attributable to noncontrolling interests	(125)	(152)	(135)
Net income attributable to ABB	**2,173**	**2,213**	**1,899**
Amounts attributable to ABB shareholders:			
Income from continuing operations, net of tax	1,514	1,441	1,172
Income from discontinued operations, net of tax	659	772	727
Net income	2,173	2,213	1,899
Basic earnings per share attributable to ABB shareholders:			
Income from continuing operations, net of tax	0.71	0.67	0.54
Income from discontinued operations, net of tax	0.31	0.36	0.34
Net income	1.02	1.04	0.88
Diluted earnings per share attributable to ABB shareholders:			
Income from continuing operations, net of tax	0.71	0.67	0.54
Income from discontinued operations, net of tax	0.31	0.36	0.34
Net income	1.02	1.03	0.88

A more detailed discussion of the orders, revenues, income from operations and Operational EBITA for our divisions follows in the sections of “Divisional analysis” below entitled “Electrification Products”, “Industrial Automation”, “Robotics and Motion”, and “Corporate and Other”. Orders and revenues of our divisions include interdivisional transactions which are eliminated in the “Corporate and Other” line in the tables below.

Orders

($ in millions)	2018	2017	2016	% Change 2018	% Change 2017
Electrification Products	11,867	10,143	9,780	17%	4%
Industrial Automation	7,631	6,553	5,990	16%	9%
Robotics and Motion	9,570	8,465	7,857	13%	8%
Operating divisions	**29,068**	**25,161**	**23,627**	**16%**	**6%**
Corporate and Other					
Non-Core and divested businesses	364	643	933	(43)%	(31)%
Intersegment Eliminations and Other	(842)	(770)	(902)	n.a.	n.a.
Total	**28,590**	**25,034**	**23,658**	**14%**	**6%**

In 2018, total orders increased 14 percent (14 percent in local currencies). Orders grew organically in all divisions with the most significant growth in the Robotics and Motion division, supported by strong orders in the Drives business while the Industrial Automation division also received strong order levels in the Marine & Ports business. Order growth reflected a recovery of demand in certain end markets as well as the demand for ABB Ability™. Orders also increased approximately 6 percent due to changes in the business portfolio as we acquired GE Industrial Solutions at the end of June 2018 and also benefitted from a full year of orders in B&R which we acquired in July 2017. For additional information about divisional order performance in all periods, please refer to the relevant sections of “Divisional analysis” below.

In 2018, base orders increased 14 percent (13 percent in local currencies) with growth in all divisions. The increase in base orders reflects improvements in the global economic conditions across our key markets. Large orders also increased 20 percent (18 percent in local currencies).

In 2017, total orders were up 6 percent (6 percent in local currencies). Growth was driven by the Robotics and Motion division where demand was supported by strong orders in the Robotics business. Orders grew in the Electrification Products division as end market demand improved in the second half of the year. In 2017, orders also reflected an increase in demand for ABB Ability™ solutions. Changes in the business portfolio had a limited impact on order growth as the increase in orders due to the acquisition of B&R was offset by the impacts of divestments which occurred in 2017.

In 2017, base orders increased 6 percent (7 percent in local currencies) with growth in all divisions. The increase in base orders reflects improvements in economic conditions across our key markets. Large orders decreased 3 percent (3 percent in local currencies).

We determine the geographic distribution of our orders based on the location of the ultimate destination of the products’ end use, if known, or the location of the customer. The geographic distribution of our consolidated orders was as follows:

($ in millions)	2018	2017	2016	% Change 2018	% Change 2017
Europe	10,725	9,202	8,920	17%	3%
The Americas	8,243	7,006	6,520	18%	7%
Asia, Middle East and Africa	9,622	8,826	8,218	9%	7%
Total	**28,590**	**25,034**	**23,658**	**14%**	**6%**

Orders in 2018 increased in all regions. In Europe orders grew 17 percent (14 percent in local currencies) and grew in all divisions. In local currencies, orders increased in Finland, Switzerland, Germany, Sweden and Italy while they decreased in the United Kingdom. In the Americas orders increased 18 percent (19 percent in local currencies). In local currencies, orders increased in the U.S., Brazil, Mexico and Argentina while orders decreased in Canada, Chile and Panama. In Asia, Middle East and Africa orders grew 9 percent (8 percent in local currencies), driven by the Robotics and Motion division. Orders were higher in China, Japan, Egypt, Malaysia and India while they declined in Saudi Arabia, South Korea and South Africa. Growth in the Americas included a 12 percent impact due to acquisitions, including GEIS and B&R. In Europe, these acquisitions had a positive impact of 4 percent while the impact in Asia, Middle East and Africa was 2 percent.

Orders in 2017 were higher in all regions. Orders in Europe increased 3 percent (2 percent in local currencies) due primarily to an increase in base orders compared to 2016. Orders in Europe in the Electrification Products and Industrial Automation divisions grew in local currencies while they were flat in the Robotics and Motion division. In local currencies, orders were lower in Germany, Italy, Norway and Switzerland while orders increased in the United Kingdom, France and Spain. In the Americas orders increased 7 percent (7 percent in local currencies). In local currencies, orders increased in the U.S. and Canada. In Asia, Middle East and Africa, orders grew 7 percent (8 percent in local currencies). Orders grew in local currencies in China, India and South Korea while orders decreased in Saudi Arabia.

Order backlog

	December 31,			% Change	
($ in millions)	**2018**	**2017**	**2016**	**2018**	**2017**
Electrification Products	4,113	3,098	2,839	33%	9%
Industrial Automation	5,148	5,301	5,230	(3)%	1%
Robotics and Motion	4,016	3,823	3,514	5%	9%
Operating divisions	**13,277**	**12,222**	**11,583**	**9%**	**6%**
Corporate and Other					
Non-core and divested businesses	555	1,055	2,308	(47)%	(54)%
Intersegment Eliminations and Other	(748)	(786)	(941)	n.a.	n.a.
Total	**13,084**	**12,491**	**12,950**	**5%**	**(4)%**

Consolidated order backlog increased 5 percent (10 percent in local currencies) from December 31, 2017, to December 31, 2018. Order backlog increased in the Electrification Products division due to the acquisition of GEIS in June 2018 and in the Robotics and Motion division. In the Industrial Automation division, the order backlog decreased compared to the end of 2017 due to high levels of execution that could not be fully compensated with new orders. The net impact on order backlog from divestments and acquisitions was an increase of 4 percent.

Consolidated order backlog declined 4 percent (9 percent in local currencies) from December 31, 2016, to December 31, 2017. Order backlog declined in the Industrial Automation division in local currencies while increasing in the Electrification Products as well as in the Robotics and Motion divisions. The decrease in the order backlog was mainly due to the divestment of the cable business as the net impact on order backlog from divestments and acquisitions was a decrease of 7 percent.

Revenues

($ in millions)	2018	2017	2016	% Change 2018	% Change 2017
Electrification Products	11,686	10,094	9,920	16%	2%
Industrial Automation	7,394	6,879	6,654	7%	3%
Robotics and Motion	9,147	8,396	7,888	9%	6%
Operating divisions	**28,227**	**25,369**	**24,462**	**11%**	**4%**
Corporate and Other					
Non-Core and divested businesses	273	661	1,595	(59)%	(59)%
Intersegment Eliminations and Other	(838)	(834)	(1,128)	n.a.	n.a.
Total	**27,662**	**25,196**	**24,929**	**10%**	**1%**

Revenues in 2018 increased 10 percent (9 percent in local currencies) with growth in all divisions, reflecting the trend in orders during 2018. In Electrification Products, the increase in revenues was mainly attributable to the acquisition of GEIS but also other revenues through distributors and to end-customer channels grew compared to 2017. The increase in revenues in the Industrial Automation division was mainly attributable to the inclusion of a full year of revenues for B&R which was acquired in July 2017 and a recovery in Measurement and Analytics business. The growth in the Robotics and Motion division was mainly attributable to the growth in the Drives business. For additional information about the divisional revenues performance in all periods, please refer to “Divisional analysis” below.

Revenues in 2017 increased 1 percent (flat in local currencies) as growth in 2017 was generally hindered by a lower opening order backlog compared to 2016. Revenues in the Robotics and Motion division were positively impacted by growth in the Robotics business with strong demand from the automotive and general industry sectors. The increase in revenues in the Industrial Automation division was mainly attributable to the acquisition of B&R in July 2017, partially offset by lower revenues in the division’s other businesses. Revenues in the Electrification Products division increased with growth from both the distributors as well as certain end-customer channels.

We determine the geographic distribution of our revenues based on the location of the ultimate destination of the products’ end use, if known, or the location of the customer. The geographic distribution of our consolidated revenues was as follows:

($ in millions)	2018	2017	2016	% Change 2018	% Change 2017
Europe	10,129	9,142	8,959	11%	2%
The Americas	8,042	6,870	6,807	17%	1%
Asia, Middle East and Africa	9,491	9,184	9,163	3%	0%
Total	**27,662**	**25,196**	**24,929**	**10%**	**1%**

In 2018, revenues increased in all regions. In Europe, revenues increased 11 percent (9 percent in local currencies) reflecting growth in the Robotics and Motion division, the Electrification Products division, which benefited from the acquisition of GEIS, as well as the Industrial Automation division, which benefited from the inclusion of a full year of revenues from B&R. In local currencies, revenues declined in Sweden, Norway and the United Kingdom, while revenues increased in Switzerland, Spain and Poland. Revenues in the Americas increased 17 percent (19 percent in local currencies), mainly driven by the acquisition of GEIS. In local currencies, revenues were higher in the U.S., Canada, Brazil, Mexico and Argentina. In Asia, Middle East and Africa, revenues increased 3 percent (3 percent in local currencies). In local currencies, revenues declined in Saudi Arabia, Qatar and South Korea while revenues increased in China, India, and Australia.

In 2017, revenues increased in Europe and in the Americas but were flat in Asia, Middle East and Africa. In Europe, revenues increased 2 percent (1 percent in local currencies) reflecting growth in the Robotics and Motion and Electrification Products divisions, as well as in the Industrial Automation division, which benefited from the acquisition of B&R. In local currencies, revenues declined in Germany and the United Kingdom, while revenues increased in France, Italy, Spain and Sweden. Revenues in the Americas were up 1 percent (flat in local currencies). In local currencies, revenues decreased in Brazil, Canada, Chile and Peru, while revenues were higher in the United States. In Asia, Middle East and Africa, revenues were flat (also flat in local currencies). In local currencies, revenues declined in India, Japan, Saudi Arabia, South Korea and Singapore while revenues increased in China and Australia.

Cost of sales

Cost of sales consists primarily of labor, raw materials and component costs but also includes indirect production costs, expenses for warranties, contract and project charges, as well as order related development expenses incurred in connection with projects for which corresponding revenues have been recognized.

In 2018, cost of sales increased 10 percent (10 percent in local currencies) to $19,118 million, a similar increase as revenues. Growth was due to the acquisition of GEIS, a full year of inclusion of B&R and growth in the Robotics and Motion division. Cost of sales as a percentage of revenues increased slightly from 68.9 percent in 2017 to 69.1 percent in 2018, due to the impact of the lower gross margin business in the acquired GEIS business, the impact of higher commodity prices and certain project-related charges in the non-core EPC business. Cost of sales benefited from continued efforts to generate savings from supply chain and operational excellence programs.

In 2017, cost of sales was flat (flat in local currencies) at $17,350 million while revenues increased slightly. As a percentage of revenues, cost of sales decreased from 69.8 percent in 2016 to 68.9 percent in 2017. The decrease in the cost of sales as a percentage of revenues occurred in all divisions except Robotics and Motion, and was impacted by the reversal in 2017 of previously recorded restructuring costs. Total restructuring costs in cost of sales, net of reversals, was $72 million in 2017 compared to $126 million in 2016. In addition, cost of sales continued to reflect improvements generated from supply chain programs aimed at reducing costs. In 2017, cost of sales also included additional charges recorded in the turnkey full train retrofit business, which is included as a non core business within Corporate and Other.

Selling, general and administrative expenses

The components of selling, general and administrative expenses were as follows:

($ in millions, unless otherwise stated)	**2018**	**2017**	**2016**
Selling expenses	3,228	2,864	2,796
Selling expenses as a percentage of orders received	*11.3%*	*11.4%*	*11.8%*
General and administrative expenses	2,067	1,901	1,736
General and administrative expenses as a percentage of revenues	*7.5%*	*7.5%*	*7.0%*
Total selling, general and administrative expenses	**5,295**	**4,765**	**4,532**
Total selling, general and administrative expenses as a percentage of revenues	*19.1%*	*18.9%*	*18.2%*
Total selling, general and administrative expenses as a percentage of the average of orders received and revenues	*18.8%*	*19.0%*	*18.7%*

In 2018, general and administrative expenses increased 9 percent compared to 2017 (8 percent in local currencies). As a percentage of revenues, general and administrative expenses remained at 7.5 percent. Despite a significant reduction in restructuring and restructuring related expenses for the White Collar Productivity program of $131 million compared to last year, general and administrative expenses increased driven by the continuation of a series of strategic initiatives and additional general and administrative expenses from the acquired B&R and GEIS businesses. General and administrative expenses in 2018 includes $297 million of stranded corporate costs compared with $286 million in 2017. Stranded costs are overhead and other management costs which were previously allocated to the Power Grids business which is reported as discontinued operations.

In 2017, general and administrative expenses increased 10 percent compared to 2016 (9 percent in local currencies). As a percentage of revenues, general and administrative expenses increased from 7.0 percent to 7.5 percent. Although we recorded a reduction of $48 million in restructuring and restructuring related expenses for the White Collar Productivity program compared to last year, general and administrative expenses increased driven by a series of strategic investments including the Power Up program and additional general and administrative expenses from the acquired B&R business. General and administrative expenses in 2017 includes $286 million of stranded corporate costs compared with $252 million in 2016.

In 2018, selling expenses increased 13 percent compared to 2017 (12 percent in local currencies) primarily driven by extended sales activities in selective business units like Robotics, Drives and Motors & Generators and additional selling expenses from the acquired B&R and GEIS businesses. Selling expenses as a percentage of orders received decreased from 11.4 percent to 11.3 percent on higher orders received.

In 2017, selling expenses increased 2 percent compared to 2016 (2 percent in local currencies) primarily driven by extended sales activities in selective business units like Robotics and Building Products and additional selling expenses from the acquired B&R business, despite a reduction of $29 million in expenses for the White Collar Productivity program. Selling expenses as a percentage of orders received decreased from 11.8 percent to 11.4 percent on higher orders received.

In 2018, selling, general and administrative expenses increased 11 percent compared to 2017 (10 percent in local currencies) and as a percentage of the average of orders and revenues, selling, general and administrative expenses decreased from 19.0 percent to 18.8 percent mainly from the impact of the higher average orders and revenues.

In 2017, selling, general and administrative expenses increased 5 percent compared to 2016 (5 percent in local currencies) and as a percentage of the average of orders and revenues, selling, general and administrative expenses increased from 18.7 percent to 19.0 percent mainly from the impact of the higher expenses described above.

Non order related research and development expenses

In 2018, non order related research and development expenses increased 13 percent (11 percent in local currencies) compared to 2017 due to expanded investment in specific future growth areas. In 2017, non order related research and development expenses increased 5 percent (4 percent in local currencies) compared to 2016 reflecting a focused increase in investment to build up competencies in certain new technologies.

Non order related research and development expenses as a percentage of revenues increased in 2018 to 4.1 percent, after increasing to 4.0 percent in 2017 from 3.9 percent in 2016.

Other income (expense), net

($ in millions)	2018	2017	2016
Restructuring and restructuring-related expenses[1]	(37)	(35)	(35)
Net gain from sale of property, plant and equipment	50	37	37
Asset impairments	(36)	(27)	(57)
Net gain (loss) from sale of businesses	57	252	(10)
Misappropriation (loss) recovery, net	18	(9)	(73)
Gain on liquidation of foreign subsidiary	31	—	—
Income from equity-accounted companies and other income (expense), net	41	(56)	33
Total	**124**	**162**	**(105)**

(1) Excluding asset impairments

"Other income (expense), net" primarily includes certain restructuring and restructuring related expenses, gains and losses from sale of businesses and sale of property, plant and equipment, recognized asset impairments, as well as our share of income or loss from equity accounted companies.

In 2018, "Other income (expense), net" was an income of $124 million, lower than in 2017. The primary reason was that 2017 included a significant gain on sale of the Cables business. Partially offsetting this was that 2018 included lower costs for legal claims (recorded within other expense), a currency-related gain on a substantial liquidation of a foreign subsidiary and a partial recovery of funds misappropriated by the former treasurer of our subsidiary in South Korea in previous years.

In 2017, "Other income (expense), net" was an income of $162 million compared to an expense of $105 million in 2016. The change was mainly due to a significant gain recorded on the sale of the Cables business in 2017. In 2017, we also recorded higher charges in connection with certain legal claims and lower asset impairments. The change compared to 2016 also reflects that in 2016 we recorded a large misappropriation loss, for the misappropriation of cash by the treasurer of our subsidiary in South Korea.

Income from operations

				% Change	
($ in millions)	2018	2017	2016	2018	2017
Electrification Products	1,290	1,352	1,094	(5)%	24%
Industrial Automation	887	798	772	11%	3%
Robotics and Motion	1,346	1,126	1,048	20%	7%
Operating divisions	**3,523**	**3,276**	**2,914**	**8%**	**12%**
Corporate and Other	(1,302)	(1,052)	(989)	n.a.	n.a.
Intersegment elimination	5	6	4	n.a.	n.a.
Total	**2,226**	**2,230**	**1,929**	**0%**	**16%**

In 2018 and 2017, changes in income from operations were a result of the factors discussed above and in the divisional analysis below.

Net interest and other finance expense

Net interest and other finance expense consists of “Interest and dividend income” offset by “Interest and other finance expense”.

“Interest and other finance expense” includes interest expense on our debt, the amortization of upfront transaction costs associated with long term debt and committed credit facilities, commitment fees on credit facilities, foreign exchange gains and losses on financial items and gains and losses on marketable securities. In addition, interest accrued relating to uncertain tax positions is included within interest expense. “Interest and other finance expense” excludes interest expense which has been allocated to discontinued operations.

($ in millions)	2018	2017	2016
Interest and dividend income	72	73	71
Interest and other finance expense	(262)	(234)	(201)
Net interest and other finance expense	**(190)**	**(161)**	**(130)**

In 2018, “Interest and other finance expense” increased compared to 2017 primarily due to an increase in average outstanding commercial paper borrowings and the interest expense associated with the bonds issued in 2018.

In 2017, “Interest and other finance expense” increased compared to 2016. Interest expense on issued bonds and other outstanding borrowings was lower than 2016 but was offset by higher interest charges for uncertain tax positions.

Non-operational pension (cost) credit

The Non-operational pension credit of $83 million in 2018 was higher than the $33 million recorded in 2017 primarily due to a reduction in 2018 of the discount rate applicable to the computation of the defined benefit pension obligation and a larger pension asset base used in the computation of the expected return on plan assets. The change in the amount in 2017 compared to the Non-operational pension cost of $38 million in 2016 was due primarily to changes in actuarial assumptions, including the discount rate but also lower curtailment and settlement costs in 2017 compared to 2016.

Provision for taxes

($ in millions)	2018	2017	2016
Income from continuing operations before taxes	2,119	2,102	1,761
Provision for taxes	(544)	(583)	(526)
Effective tax rate for the year	25.7%	27.7%	29.9%

In 2018, the effective tax rate decreased from 27.7 percent to 25.7 percent. The distribution of income within the group resulted in a lower weighted-average global tax rate. In addition, the impact from changes in interpretation of law and double tax treaty agreements by competent tax authorities decreased the effective tax rate. These impacts were partially offset by a negative impact from changes in valuation allowance and a lower positive impact compared to 2017 from non-taxable amounts for net gains from sale of businesses.

In 2017, the effective tax rate decreased from 29.9 percent to 27.7 percent. The distribution of income within the group resulted in a higher weighted-average global tax rate. In addition, the impact from changes to the interpretation of law and double tax treaty agreements by competent tax authorities increased the effective tax rate. However, these were more than offset primarily by the positive impact from non-taxable amounts for the net gain from sale of businesses and the net benefit from a change in tax rate.

Income from continuing operations, net of tax

As a result of the factors discussed above, income from continuing operations, net of tax, increased by $56 million to $1,575 million in 2018 compared to 2017, and increased by $284 million to $1,519 million in 2017 compared to 2016.

Income from discontinued operations, net of tax

Income from discontinued operations, net of tax, was $723 million, $846 million and $799 million for 2018, 2017 and 2016, respectively.

In December 2018, we announced an agreement to divest 80.1 percent of our Power Grids business to Hitachi. The business also includes certain real estate properties which were previously reported within Corporate and Other. The divestment is expected to be completed in the first half of 2020, following the receipt of customary regulatory approvals. As this divestment represents a strategic shift that will have a major effect on our operations and financial results, the results of operations for this business have been presented as discontinued operations for all periods presented.

Income from discontinued operations before taxes excludes certain costs which were previously allocated to the Power Grids division as these costs were not directly attributable to the business. As a result, $297 million, $286 million and $252 million, for 2018, 2017 and 2016, respectively, of allocated overhead and other management costs (stranded corporate costs), which were previously included in the measure of division profit for Power Grids are now reported as part of Corporate and Other. In 2018, income from discontinued operations, before taxes, includes $18 million for costs incurred to execute the transaction.

Income from discontinued operations for 2018, 2017 and 2016 included income from operations of $951 million, $1,119 million and $1,050 million, respectively. In addition, in 2018, 2017 and 2016 we recorded $228 million, $273 million and $251 million, respectively, as provision for taxes within discontinued operations.

For additional information on the planned divestment and discontinued operations see “Note 3 Changes in presentation of financial statements” to our Consolidated Financial Statements.

Net income attributable to ABB

As a result of the factors discussed above, net income attributable to ABB decreased by $40 million to $2,173 million in 2018 compared to 2017, and increased by $314 million to $2,213 million in 2017 compared to 2016.

Earnings per share attributable to ABB shareholders

(in $)	2018	2017	2016
Basic earnings per share attributable to ABB shareholders:			
Income from continuing operations, net of tax	0.71	0.67	0.54
Income from discontinued operations, net of tax	0.31	0.36	0.34
Net income	1.02	1.04	0.88
Diluted earnings per share attributable to ABB shareholders:			
Income from continuing operations, net of tax	0.71	0.67	0.54
Income from discontinued operations, net of tax	0.31	0.36	0.34
Net income	1.02	1.03	0.88

Basic earnings per share is calculated by dividing income by the weighted average number of shares outstanding during the year. Diluted earnings per share is calculated by dividing income by the weighted average number of shares outstanding during the year, assuming that all potentially dilutive securities were exercised, if dilutive. Potentially dilutive securities comprise: outstanding written call options and outstanding options and shares granted subject to certain conditions under our share based payment arrangements. See "Note 20 Earnings per share" to our Consolidated Financial Statements.

Divisional analysis

Electrification Products

The financial results of our Electrification Products division, including the operations of GEIS which was acquired on June 30, 2018, were as follows:

				% Change	
($ in millions)	**2018**	**2017**	**2016**	**2018**	**2017**
Orders	11,867	10,143	9,780	17%	4%
Third-party base orders	11,240	9,559	9,242	18%	3%
Order backlog at December 31,	4,113	3,098	2,839	33%	9%
Revenues	11,686	10,094	9,920	16%	2%
Income from operations	1,290	1,352	1,094	(5)%	24%
Operational EBITA	1,626	1,510	1,459	8%	3%

Orders

Approximately two-thirds of the division's orders are for products with short delivery times; orders are usually recorded and delivered within a three month period and thus are generally considered as short cycle. The remainder of orders is comprised of smaller projects that require longer lead times, as well as larger solutions requiring engineering and installation. Substantially all of the division's orders are comprised of base orders. In addition, approximately half of the division's orders are received via third party distributors; as a consequence, end customer market data is based partially on management estimates.

In 2018, orders increased 17 percent (16 percent in local currencies) with broad based growth across business units and regions. The increase in orders was impacted by 12 percent due to acquisitions, primarily GEIS, which was acquired on June 30, 2018. Orders for products grew stronger than the orders for systems. Construction demand was robust, driven by continued investment in residential and commercial buildings. Transport & infrastructure demand was positive with continued investment in rail infrastructure and strong demand for electric vehicles infrastructure. Demand for data centers was also strong and resulted in the award of a few large orders. From an industry perspective, stronger oil prices earlier in the year contributed to a return to investment in oil and gas projects. Solar orders improved slightly from the low levels recorded in 2017.

In 2017, orders increased 4 percent (4 percent in local currencies) with stronger order growth in the second half of the year. Orders for products increased throughout the division as end market demand improved in utilities and construction, specifically non residential construction. Increased demand for low voltage and medium voltage solutions was primarily driven by continued investments in light industries such as data centers as well as food and beverage. The division's order growth was also supported by large orders for electric vehicle products and systems, while a lower order level for solar products and systems negatively impacted the order intake in 2017.

The geographic distribution of orders for our Electrification Products division was as follows:

(in %)	2018	2017	2016
Europe	35	37	37
The Americas	32	27	27
Asia, Middle East and Africa	33	36	36
Total	**100**	**100**	**100**

In 2018, orders grew in all regions. The relative share of orders from the Americas increased due to strong order growth in the United States including the impact of the acquisition of GEIS, which has a significant portion of its operations in the United States. Although the share of orders from Europe decreased slightly compared with the previous year, orders in Europe developed positively with order growth in key markets such as Germany and Italy compensating for lower order volumes in Turkey. Order growth in Asia, Middle East and Africa was supported by growth in China, Taiwan and Egypt, whereas orders from Saudi Arabia and Qatar were significantly lower than in 2017.

In 2017, relative order growth was similar in all regions, leading to a stable regional distribution. In Asia, Middle East and Africa, a positive order trend was seen in China, Australia and India. The European market performed well with order growth across the majority of countries including Germany, Turkey and Sweden. Growth in the Americas was mainly supported by the United States and Canada.

Order backlog

In 2018, the order backlog increased 33 percent (39 percent in local currencies). The acquisition of the GEIS business contributed 36 percentage points to the growth of the order backlog. The remaining order backlog increase in local currencies reflected the receipt of orders for electric vehicle charging infrastructure with deliveries scheduled to occur after 2018.

In 2017, the order backlog increased 9 percent (3 percent in local currencies), with strong growth in the Building Products business, driven by significant order intake for electric vehicle charging infrastructure.

Revenues

In 2018, revenues increased by 16 percent (16 percent in local currencies). The acquisition of the GEIS business contributed 13 percentage points of the revenue growth. Revenues grew in the short cycle low voltage product businesses, with growth broad based across end customer markets including construction, specifically non residential construction, and industries such as oil and gas. Revenue growth from the distributor channel was strong. There was significant revenue growth in our electric vehicle charging infrastructure business, although the business remains a small portion of total revenues. Revenues from the medium voltage systems business decreased, negatively impacted by longer lead times for the conversion of orders into revenues. Revenues decreased in solar, reflecting a lower opening order backlog and the impact of continued price pressure across the solar market.

In 2017, revenues increased 2 percent (2 percent in local currencies) compared to 2016. Revenues for low voltage products for buildings, protection and connection and installation increased, driven by end market demand in utilities and construction, specifically non residential construction. Across the division, revenue levels improved both from distributors as well as some end customer channels. Revenues were lower in medium voltage systems and in solar, impacted by a lower opening order backlog.

The geographic distribution of revenues for our Electrification Products division was as follows:

(in %)	2018	2017	2016
Europe	35	37	36
The Americas	32	27	27
Asia, Middle East and Africa	33	36	37
Total	**100**	**100**	**100**

In 2018, the relative share of revenues from the Americas increased primarily due to the impact of the acquisition of GEIS, which has a significant portion of its operations in the United States. Although the relative share of revenues from Europe decreased, revenues were higher as growth in multiple markets such as Germany, Switzerland and Netherlands helped offset a lower revenue level from Turkey. Although the share of revenues from Asia, Middle East and Africa decreased, revenues for this region were steady as a positive revenue development in China and Egypt offset lower revenue volumes from Saudi Arabia and Qatar.

In 2017, the share of revenues from Europe increased, supported by positive growth in Germany. The share of revenues from the Americas was stable supported by the United States, which returned to growth. The relative share of revenues from Asia, Middle East and Africa decreased slightly despite China returning to growth and mixed results in the Middle East.

Income from operations

In 2018, income from operations decreased 5 percent, mainly reflecting a $145 million increase of acquisition related expenses and post acquisition integration costs compared with 2017, due to the acquisition of GEIS. Pricing actions across the product businesses and the benefits from savings from ongoing restructuring and cost savings programs had a positive impact on the operating margin. The division realized a gain of $81 million on the sale of a business. These benefits were offset by the negative impact of higher commodity prices and pricing pressures for distribution solutions and solar. The division also recorded significant costs for warranty liabilities for certain solar inverters. In addition, restructuring and restructuring related expenses in 2018 of $98 million were $70 million higher than in 2017, reflecting manufacturing footprint changes as well as organizational simplification. Acquisition related amortization was 8 percent higher than in 2017, mainly due to the GEIS acquisition. Changes in foreign currencies, including the impacts from FX/commodity timing differences summarized in the table below, negatively affected income from operations by 2 percent.

In 2017, income from operations increased 24 percent, mainly reflecting significantly lower warranty costs than in 2016 when the division recorded significant costs for a change in estimated warranty liabilities for certain solar inverters designed and sold by Power One. Restructuring and restructuring related expenses in 2017 of $28 million were $65 million lower than in 2016, partially because we recorded a reversal of the previously recorded estimated restructuring expenses in connection with the White Collar Productivity program. Acquisition related amortization was lower in 2017 as certain intangibles from previous acquisitions had been fully amortized. During 2017, we also realized higher income due to the impact of price increases in certain businesses and the benefits from savings resulting from ongoing restructuring and cost savings programs. Partially offsetting these benefits was the impact of higher commodity prices, which affected all businesses, as well as the impacts from pricing pressures. Changes in foreign currencies, including the impacts from FX/commodity timing differences, positively impacted income from operations by 3 percent.

Operational EBITA

The reconciliation of Income from operations to Operational EBITA for the Electrification Products division was as follows:

($ in millions)	2018	2017	2016
Income from operations	**1,290**	**1,352**	**1,094**
Acquisition-related amortization	106	98	121
Restructuring and restructuring-related expenses[1]	98	28	93
Changes in pre-acquisition estimates	19	8	131
Gains and losses on sale of businesses	(81)	—	—
Acquisition-related expenses and integration costs	168	23	—
Certain other non-operational items	(2)	21	8
FX/commodity timing differences in income from operations	28	(20)	12
Operational EBITA	**1,626**	**1,510**	**1,459**

(1) Amounts in 2017 and 2016 also include the incremental implementation costs in relation to the White Collar Productivity program.

In 2018, Operational EBITA increased 8 percent (6 percent excluding the impacts from changes in foreign currencies) compared to 2017, primarily due to the reasons described under “Income from operations”, excluding the explanations related to the reconciling items in the table above.

In 2017, Operational EBITA increased 3 percent (4 percent excluding the impacts from changes in foreign currencies) compared to 2016, primarily due to the reasons described under “Income from operations”, excluding the explanations related to the reconciling items in the table above.

Industrial Automation

The results of B&R, acquired in July 2017, have been included in the Industrial Automation division since the acquisition date, including for the full year 2018.

The financial results of our Industrial Automation division were as follows:

				% Change	
($ in millions)	2018	2017	2016	2018	2017
Orders	7,631	6,553	5,990	16%	9%
Third-party base orders	6,592	5,840	5,229	13%	12%
Order backlog at December 31,	5,148	5,301	5,230	(3)%	1%
Revenues	7,394	6,879	6,654	7%	3%
Income from operations	887	798	772	11%	3%
Operational EBITA	1,019	953	897	7%	6%

Orders

Orders in 2018 increased 16 percent (15 percent in local currencies) primarily reflecting the impact of including B&R for a full year in 2018 which contributed 7 percent to the order growth. Large orders as a percent of total orders was 12 percent in 2018 compared to 9 percent in 2017,

supported by selective demand for cruise ships and specialty vessels. Large capital expenditure projects in some end markets like oil and gas, and mining continued to be selective and at low levels. Investment in maintenance activities, digitalization upgrades and other discretionary projects improved, in particular for oil, gas and chemical, and process industry customers. Demand for factory automation solutions continued to be positive. In 2018, third party base orders improved 13 percent (12 percent in local currencies), in particular in the Measurement and Analytics and Machine and Factory Automation businesses. Demand for ABB Ability™ solutions and services contributed to positive third party base order growth.

Orders in 2017 increased 9 percent (9 percent in local currencies) primarily reflecting the impact of the B&R acquisition which contributed 7 percent to order growth. Large orders as a percent of total orders was 9 percent in 2017 compared to 10 percent in 2016, showing a continued low level of large capital expenditure projects in some end markets including oil and gas, and mining. Market demand for maintenance activities and other discretionary investments improved, in particular for oil, gas and chemical customers. Demand for factory automation solutions was positive. In 2017, third party base orders improved 12 percent (11 percent in local currencies), in particular in the Measurement and Analytics and Process Industries businesses, aided by selective capital expenditure investments in mining.

The geographic distribution of orders for our Industrial Automation division was as follows:

(in %)	2018	2017	2016
Europe	47	42	42
The Americas	22	23	21
Asia, Middle East and Africa	31	35	37
Total	**100**	**100**	**100**

Orders from all regions increased in 2018. The share of revenues for each region was affected primarily due to inclusion of B&R for a full year in 2018. In Europe, the share of orders increased as the operations of B&R are more concentrated in this region as well as due to strong demand for cruise and specialty vessels. Orders in the Americas grew but the share of orders decreased as the business of B&R is more focused in the other two regions. In Asia, Middle East and Africa, growth was steady but lower than the other regions, thus reducing this region's share.

In 2017, the share of orders from the Americas increased, helped by strong base order development in the U.S., mainly in the Measurement and Analytics business. In 2017, Europe maintained its share of orders as impacts from weakness in the large German market were offset from the impacts of the inclusion of B&R. The share of orders from the Asia, Middle East and Africa region declined as the region had only moderate growth due mainly to weak demand in China.

Order backlog

The order backlog at end of 2018 was 3 percent lower (2 percent higher in local currencies) than at the end of 2017. The backlog continued to benefit from orders for cruise and specialty vessels which are executed over multiple years. In addition, the division continued to see recovery in demand for oil, gas and chemical, and the process industries as well as strong demand for shorter cycle products.

The order backlog at end 2017 was 1 percent higher (6 percent lower in local currencies) than at the end of 2016. Although the division saw some stabilization in demand, shown by a lower decline in the backlog than in previous year, the market environment was difficult while political uncertainty weakened confidence in key markets.

Revenues

In 2018, revenues increased 7 percent (7 percent higher in local currencies) primarily reflecting the impact of including B&R for a full year in 2018 which contributed 6 percent to the revenue growth. The majority of the other businesses in the division also recorded higher revenues, especially the Process Industries, Measurement and Analytics and Turbocharging businesses. Revenues were lower in the Oil and Gas, and Power Generation businesses. During the year, the division realized higher revenues from book and bill business and good execution of the backlog. Notwithstanding, the lower order backlog at the beginning of 2018 dampened revenue growth.

In 2017, revenues increased 3 percent (3 percent in local currencies) compared to 2016 due to the acquisition of B&R, which contributed 6 percent to revenue growth. The majority of the division's other businesses recorded lower revenues as the project business units suffered from a weaker opening order backlog and the market environment dampened the book to bill ratio. However, revenues were higher in the Measurement and Analytics and Turbocharging businesses.

The geographic distribution of revenues for our Industrial Automation division was as follows:

(in %)	2018	2017	2016
Europe	44	42	37
The Americas	21	20	22
Asia, Middle East and Africa	35	38	41
Total	**100**	**100**	**100**

In 2018, revenues improved in Europe and the Americas primarily benefiting from a selective recovery in Process Industries and the inclusion of B&R for a full year in 2018. The share of revenues from Europe increased due to the inclusion of B&R. The Americas increased their share of revenues benefitting from an upturn in mining as well as continued demand for Measurement and Analytics and Turbocharging products. The share of revenues from Asia, Middle East and Africa was lower as the region recorded lower revenue growth compared to the other regions, impacted by the lower opening backlog and lower book and bill orders.

In 2017, revenues continued to decline in the Americas and in Asia, Middle East and Africa while Europe benefited from the acquisition of B&R as well as higher revenues from the Marine and Ports business. In the Americas region, revenues were higher in the U.S., especially in the Measurement and Analytics and Turbocharging businesses, though the increase was offset by revenue declines in other countries in the region.

Income from operations

In 2018, income from operations increased 11 percent compared to 2017. Of this increase, B&R contributed approximately 8 percent which included both the inclusion of the operations for a full year as well as the negative comparative impact in 2017 of purchase price adjustments (primarily for inventories) which reduced income in 2017. In addition, income from operations benefitted from an improved revenue mix, ongoing progress in the division's rationalization efforts and benefits realized from cost savings measures, productivity improvements and solid project execution. Income from operations was also higher due to a reduction of restructuring and restructuring related expenses compared to 2017. The impact from changes in foreign currencies, including the impacts from changes in FX/commodity timing differences summarized in the table below which, combined, negatively impacted income from operations by 4 percent.

In 2017, income from operations increased 3 percent compared to 2016. The inclusion of B&R reduced income from operations by 4 percent driven by the related charges for amortization of intangible assets and the higher charges in cost of sales resulting from recording the opening balance of inventory at fair value. Offsetting this was the impact from changes in foreign currencies, including the impacts from changes in FX/commodity timing differences summarized in the table below which, combined, positively impacted income from operations by 7 percent. Restructuring and restructuring related expenses in 2017 of $85 million were $9 million higher than in 2016. Restructuring expenses recorded for the White Collar Productivity program were $57 million lower compared to 2016 because 2017 included a net reversal of $23 million of estimated amounts recorded in previous years. This benefit was more than offset by an increased amount of restructuring expenses for specific initiatives to align the cost structure and footprint of the operations to reflect changing market conditions. Excluding these impacts, higher income from operations reflects an improved mix, ongoing progress in the division's rationalization efforts and benefits secured from the implementation of the White Collar Productivity program.

Operational EBITA

The reconciliation of Income from operations to Operational EBITA for the Industrial Automation division was as follows:

($ in millions)	2018	2017	2016
Income from operations	**887**	**798**	**772**
Acquisition-related amortization	86	47	11
Restructuring and restructuring-related expenses[1]	35	85	76
Changes in pre-acquisition estimates	(11)	—	—
Gains and losses on sale of businesses	3	(2)	—
Acquisition-related expenses and integration costs	4	52	4
Certain other non-operational items	3	1	5
FX/commodity timing differences in income from operations	12	(28)	29
Operational EBITA	**1,019**	**953**	**897**

(1) Amounts in 2017 and 2016 also include the incremental implementation costs in relation to the White Collar Productivity program.

In 2018, Operational EBITA increased 7 percent (7 percent excluding the impacts from changes in foreign currencies) compared to 2017. The change is due to the reasons described under “Income from operations”, excluding the explanations related to the reconciling items in the table above. The inclusion of B&R for a full year increased Operational EBITA by 5 percent after consideration of the related adjustments in the table above relating to that business.

In 2017, Operational EBITA increased 6 percent (5 percent excluding the impacts from changes in foreign currencies) compared to 2016. The change is due to the reasons described under “Income from operations”, excluding the explanations related to the reconciling items in the table above. The acquisition of B&R increased Operational EBITA by 5 percent after consideration of the related adjustments in the table above relating to that business.

Robotics and Motion

The financial results of our Robotics and Motion division were as follows:

				% Change	
($ in millions)	2018	2017	2016	2018	2017
Orders	9,570	8,465	7,857	13%	8%
Third-party base orders	8,560	7,651	7,029	12%	9%
Order backlog at December 31,	4,016	3,823	3,514	5%	9%
Revenues	9,147	8,396	7,888	9%	6%
Income from operations	1,346	1,126	1,048	20%	7%
Operational EBITA	1,447	1,260	1,232	15%	2%

Orders

In 2018, orders increased 13 percent (12 percent in local currencies). Third party base orders grew 12 percent (11 percent in local currencies). Order growth was driven by demand from process industries such as oil, gas, and mining and metals as well as demand from discrete industries such as automotive and food and beverage. The division noted rising demand from light industries for smaller robots and smaller sized drives and motor solutions. The division benefited from solid large order intake for robot systems from the automotive sector, including for new electric vehicle manufacturing lines, and for traction solutions from the rail industry.

Orders in 2017 were 8 percent higher (8 percent in local currencies). Third party base orders in 2017 were 9 percent higher (9 percent in local currencies). The third party base order growth was driven by increased demand for operational solutions in process and discrete industries. Growth was particularly strong in the Robotics business with strong demand from general industry sectors as well as demand for industry solutions such as motors, generators and drives. Demand from the automotive sector remained at a high level. Large orders were received for transportation related orders and for robotics driven by ongoing investment in the automotive industry as well as investment by the electronics and semiconductor industries. The division noted rising demand for smaller robots and smaller sized drives and motor as solutions for light industries, such as food and beverage, were in high demand. Orders from process industries such as the oil, gas and mining sectors stabilized.

The geographic distribution of orders for our Robotics and Motion division was as follows:

(in %)	2018	2017	2016
Europe	36	35	37
The Americas	30	32	33
Asia, Middle East and Africa	34	33	30
Total	**100**	**100**	**100**

In 2018, orders grew in all regions. The relative share of orders from Asia, Middle East and Africa increased on double digit growth in China and India. The European market performed well with order growth across the majority of countries including Germany, Italy and Switzerland. The relative share of orders from the Americas declined despite solid growth in the United States.

In 2017, the share of orders from Asia, Middle East and Africa increased on double digit growth in China but was somewhat tempered by lower order growth from India, following the introduction of both a new Goods and Services Tax and a new tariff regime for wind renewables. The Americas performed well, with the U.S. market exhibiting increased demand for solutions for motors and drives.

Order backlog

The order backlog in 2018 increased 5 percent (10 percent in local currencies) compared to 2017. The backlog improved in all business units on strong order growth in 2018.

The order backlog in 2017 increased 9 percent (1 percent in local currencies) compared to 2016. In local currencies, the backlog improved in the Motors and Generators business, while the backlog in the Drives and Robotics businesses remained stable.

Revenues

In 2018, revenues increased 9 percent (8 percent in local currencies) compared to 2017. Revenues grew in all business units driven by steady execution of the order backlog as well as book and bill business. Service revenues continued to improve as the division leveraged its installed base and increased customer demand for ABB Ability™ solutions.

In 2017, revenues were 6 percent higher compared to 2016 (6 percent in local currencies). Revenues were positively impacted by growth in deliveries of robotics solutions for the automotive and general industry sectors with stronger growth in the second half of 2017, due to execution of the strong order levels received in the first half of the year. Service revenues were higher as the division serviced more of the installed base and as customers demanded remote monitoring solutions such as ABB Ability.™

The geographic distribution of revenues for our Robotics and Motion division was as follows:

(in %)	2018	2017	2016
Europe	35	35	36
The Americas	31	33	34
Asia, Middle East and Africa	34	32	30
Total	**100**	**100**	**100**

In 2018, revenues were higher in all regions. The relative share of revenues from Asia, Middle East and Africa increased on double digit revenue growth in China and India. The share of revenues from Europe remained steady despite revenue growth across the majority of countries including Germany, Italy and Switzerland. The relative share of revenues from the Americas declined despite generating higher revenues including moderate growth in the United States.

In 2017, revenues grew in all regions. The relative share of revenues from Europe declined despite modest growth in the region, supported by Finland, Germany and Sweden. The share of revenues from the Americas decreased slightly with growth in the United States and lower revenues in Brazil. The share of revenues from Asia, Middle East and Africa increased, supported by double digit revenue growth in China, especially in the Robotics business. This reflected ongoing strong orders from China.

Income from operations

In 2018, income from operations increased 20 percent compared to 2017, driven by positive volumes and continued cost discipline. Restructuring and restructuring related expenses were lower in 2018 than in 2017, positively impacting income from operations. Acquisition related amortization was slightly lower as certain acquired intangible assets were fully amortized in early 2018. These positive effects were partly offset by the effects of increased commodity prices and pricing pressures. Changes in foreign currencies, including the impacts from FX/commodity timing differences summarized in the table below, positively impacted income from operations by 2 percent.

In 2017, income from operations increased 7 percent compared to 2016. Income from operations benefited from positive impacts of cost reduction efforts in all businesses, including cost savings from the White Collar Productivity program. In addition, increased volumes, especially in the Robotics business, contributed positively. Income from operations also reflected the positive impact of lower amortization of intangible assets as certain acquired intangible assets were fully amortized. These positive effects were offset by negative impacts including increased commodity prices and the impact of low capacity utilization in the Motors and Generators business. There was no significant impact on income from operations from changes in foreign currencies.

Operational EBITA

The reconciliation of income from operations to Operational EBITA for the Robotics and Motion division was as follows:

($ in millions)	2018	2017	2016
Income from operations	**1,346**	**1,126**	**1,048**
Acquisition-related amortization	63	66	94
Restructuring and restructuring-related expenses[1]	21	64	69
Gains and losses on sale of businesses	4	—	—
Acquisition-related expenses and integration costs	2	2	—
Certain other non-operational items	11	—	18
FX/commodity timing differences in income from operations	—	2	3
Operational EBITA	**1,447**	**1,260**	**1,232**

(1) Amounts in 2017 and 2016 also include the incremental implementation costs in relation to the White Collar Productivity program.

In 2018, Operational EBITA increased 15 percent (14 percent excluding the impact from changes in foreign currency exchange rates) primarily due to the reasons described under “Income from operations”, excluding the explanations related to the reconciling items in the table above.

In 2017, Operational EBITA increased 2 percent (2 percent excluding the impact from changes in foreign currency exchange rates) primarily due to the reasons described under “Income from operations”, excluding the explanations related to the reconciling items in the table above.

Corporate and Other

Net loss from operations for Corporate and Other was as follows:

($ in millions)	2018	2017	2016
Corporate headquarters and stewardship	(496)	(430)	(347)
Corporate research and development	(170)	(128)	(133)
Corporate real estate	75	45	47
Net gain (loss) from sale of businesses	(17)	250	(10)
White Collar Productivity program costs	—	(107)	(199)
Misappropriation loss, net	18	(9)	(73)
Stranded corporate costs	(297)	(286)	(252)
Other corporate costs	(99)	(83)	(29)
Divested businesses and other non-core activities	(316)	(304)	7
Total Corporate and Other	**(1,302)**	**(1,052)**	**(989)**

In 2018, the net loss from operations within Corporate and Other was $1,302 million compared to $1,052 million in 2017. The primary reason was that 2017 included a significant net gain on sales of businesses, primarily a gain of $338 million for the sale of the high voltage cables business. In addition, lower White Collar Productivity costs were offset by an increase in corporate headquarters and stewardship costs. In 2017, the loss from operations within Corporate and Other was $1,052 million, $63 million higher than in 2016. The increase was primarily due to significant losses in divested businesses and other non-core activities. In addition, higher corporate headquarters and stewardship costs offset lower White Collar Productivity program costs. 2017 also included the gain on the sale of the cables businesses.

In 2018, corporate headquarters and stewardship costs were $496 million, an increase of $66 million from 2017. Higher costs were due to higher costs relating to ABB Digital and the sponsorship of the ABB FIA Formula E Championship. In 2017, corporate headquarters and stewardship costs increased to $430 million from $347 million in 2016, mainly due to higher costs for information technology and costs relating to ABB Digital.

Corporate real estate primarily includes income from property rentals and gains from the sale of real estate properties. In 2018, 2017 and 2016, income from operations in Corporate real estate included gains from the sale of real estate properties of $49 million, $28 million and $33 million, respectively.

As of December 31, 2017, we had incurred substantially all costs related to the White Collar Productivity program. In 2017 and 2016, costs incurred in connection with this program amounted to $107 million and $199 million, respectively, including program implementation costs. In 2017, the amount decreased as 2017 included the impact of a change in estimated costs and the related reversal of the previously recorded liability. The program costs relate mainly to employee severance and both external and internal costs relating to the execution of the program. For further information on the White Collar Productivity program see “Restructuring and other cost savings initiatives” below.

In 2017 and 2016, we recorded a loss of $9 million and $73 million, respectively, net of expected insurance recoveries, for the misappropriation of cash by the treasurer of our subsidiary in South Korea. In 2018, recoveries relating to this loss totaled $18 million.

Stranded corporate costs includes the amount of allocated general and administrative and other overhead costs previously included in the measure of segment profit (Operational EBITA) for the Power Grids business which has been reclassified to discontinued operations. These allocated costs do not qualify for being reported as costs within the discontinued operation.

Other corporate costs consists of operational costs of our Global Treasury Operations and certain other charges such as costs and penalties associated with legal cases, environmental expenses and impairment charges related to investments. Other corporate costs in 2017 were higher than the previous year as 2016 included the positive impact of a reduction in certain insurance-related provisions for self-insured risks.

Divested businesses and other non-core activities

The results of operations for certain divested businesses and other non core activities are presented in Corporate and Other. Divested businesses include the high voltage cables business, which was divested in March 2017. Also, certain EPC contracts relating to the oil & gas industry were divested to an unconsolidated joint venture at the end of 2017. In addition, in September 2018, we commenced transferring certain projects in our EPC business for turnkey electrical AC substations to a new unconsolidated joint venture, Linxon, which is controlled by the SNC-Lavalin Group. Other non core activities includes amounts relating to the execution and wind down of certain legacy EPC and other contracts.

Income from operations for divested businesses and other non-core activities in 2018 primarily reflects losses incurred in legacy substations and plant electrification EPC contracts and were driven by project cost overruns and contractual costs relating to delayed project completion. The amount in 2018 also reflects project cost overruns in the full train retrofit business. In 2017, the loss includes charges of $94 million recorded for certain retained liabilities associated with the divested cables businesses and losses for project cost overruns in the full train retrofit business. In 2017, the amount also includes losses incurred in legacy substations and plant electrification EPC contracts driven by cost overruns, credit losses and contractual costs for delayed project completion.

At December 31, 2018, our remaining non core activities primarily include the completion of the remaining EPC contracts for substations and plant electrification and the completion of the remaining obligations for the full train retrofit business. Of the open order backlog at December 31, 2018, approximately 40 percent relates to contracts which are planned to be transferred to the Linxon joint venture and the majority of the remaining amounts are expected to be fulfilled in 2019.

Restructuring and other cost savings initiatives

White Collar Productivity program

From September 2015 to December 2017, we executed a restructuring program to make ABB leaner, faster and more customer-focused. The program involved the rapid expansion and use of regional shared service centers as well as a streamlining of global operations and head office functions, with business units moving closer to their respective key markets. The program involved various restructuring initiatives across all operating segments and regions.

The restructuring program resulted in total annual cost savings of $1.2 billion in continuing operations. The savings were realized as reductions in cost of sales, selling, general and administrative expenses and non-order related research and development expenses.

As of December 31, 2017, we had incurred substantially all costs related to the White Collar Productivity program.

The following table outlines the costs incurred in 2017 and 2016 as well as the cumulative amount of costs incurred under the program.

($ in millions)	Net costs incurred in 2017[1]	Net costs incurred in 2016[1]	Cumulative costs incurred up to December 31, 2017[1]
Electrification Products	(17)	15	72
Industrial Automation	(23)	34	106
Robotics and Motion	(14)	26	56
Corporate and Other	(32)	32	91
Total	**(86)**	**107**	**325**

(1) Total costs have been recast to reflect the reorganization of our operating segments as outlined in "Note 23 Operating segment and geographic data" to our Consolidated Financial Statements.

During the course of the restructuring program total expected costs were reduced mainly due to the realization of significantly higher than originally expected attrition and internal redeployment rates. The reductions were made across all operating divisions as well as for corporate functions.

In 2017, net restructuring reversals of $86 million were recorded mainly due to higher than expected rates of attrition and internal redeployment. In 2016, net restructuring costs of $107 million were recorded based on the anticipated number of personnel to be impacted by the program and a country-specific average severance cost per person. Various functions including marketing and sales, supply chain management, research and development, engineering, service, and certain other support functions were impacted in various phases commencing in 2015 and continuing in 2016 and in 2017.

In 2017 and 2016, we experienced a significantly higher than expected rate of attrition and redeployment and a lower than expected severance cost per employee for the employee groups affected by the restructuring programs initiated in 2015 and 2016. As a result, in 2017, we adjusted the amount of our estimated liability for restructuring which was recorded in 2016 and 2015. This change in estimate of $118 million during 2017 resulted in a reduction primarily in cost of sales of $53 million and in selling, general and administrative expenses of $55 million in the year. In 2016, we adjusted the amount of our estimated liability for restructuring which was recorded in 2015. This change in estimate of $86 million during 2016 resulted in a reduction primarily in cost of sales of $38 million and in selling, general and administrative expenses of $35 million for the year.

The remaining cash outlays as of December 31, 2018, primarily for employee severance benefits, are expected to occur in 2019.

For details of the nature of the costs incurred and their impact on the Consolidated Financial Statements, see ''Note 22 Restructuring and related expenses'' to our Consolidated Financial Statements.

OS program

In December 2018, ABB announced a two-year restructuring program with the objective to simplify its business model and structure through the implementation of a new organizational structure driven by its businesses. The program includes the elimination of the country and regional structures within the current matrix organization, including the elimination of the three regional Executive Committee roles. The operating businesses will each be responsible for both their customer-facing activities and business support functions, while the remaining Group-level corporate activities will primarily focus on Group strategy, portfolio and performance management, capital allocation and core technologies.

Over the course of the program, we will execute a number of restructuring activities across all operating segments and functions. The following table outlines the cumulative amount of costs incurred to date and the total amount of costs expected under the program:

($ in millions)	Costs incurred in 2018	Cumulative costs incurred up to December 31, 2018	Total expected costs
Electrification Products	32	32	40
Industrial Automation	21	21	60
Robotics and Motion	1	1	50
Corporate and Other	11	11	200
Total	**65**	**65**	**350**

By the completion of the program, we expect to realize annual cost savings of approximately $500 million. These savings are expected to impact cost of sales, selling, general and administrative expenses and non-order related research and development expenses.

For details of the nature of the costs incurred and the impact on the Consolidated Financial Statements, see “Note 22 Restructuring and related expenses” to our Consolidated Financial Statements.

We expect the majority of the cash payments, primarily for employee severance benefits, to be in 2019 and 2020. We expect that our cash provided by operating activities will be sufficient to cover any expenditures for this restructuring program.

Other restructuring-related activities and cost savings initiatives

In 2018, 2017 and 2016, we also executed other restructuring-related and cost savings measures to sustainably reduce our costs and protect our profitability. Costs associated with these other measures amounted to $116 million, $181 million and $133 million in 2018, 2017 and 2016, respectively.

LIQUIDITY AND CAPITAL RESOURCES

Principal sources of funding

We meet our liquidity needs principally using cash from operations, proceeds from the issuance of debt instruments (bonds and commercial paper), and short term bank borrowings.

During 2018, 2017 and 2016, our financial position was strengthened by the positive total cash flow from operating activities (both from continuing and discontinued operations) of $2,924 million, $3,799 million and $3,843 million, respectively.

Our net debt is shown in the table below:

	December 31,	
($ in millions)	2018	2017
Short-term debt and current maturities of long-term debt	2,031	726
Long-term debt	6,587	6,682
Cash and equivalents	(3,445)	(4,526)
Marketable securities and short-term investments	(712)	(1,083)
Net debt (defined as the sum of the above lines)	**4,461**	**1,799**

Net debt at December 31, 2018, increased $2,662 million compared to December 31, 2017, as cash flows from operating activities during 2018 of $2,924 million was more than offset by cash outflows for acquisitions of businesses ($2,664 million) (primarily GEIS), the dividend payment to our shareholders ($1,717 million), net purchases of property, plant and equipment and intangible assets ($700 million) and amounts paid to purchase treasury stock ($250 million). Other significant transactions affecting our liquidity included the issuance of treasury shares for $42 million and payments of dividends to noncontrolling shareholders of $86 million. There was no significant movement in net debt due to changes in foreign exchange rates. See “Financial position”, “Investing activities” and “Financing activities” for further details.

Our Group Treasury Operations is responsible for providing a range of treasury management services to our group companies, including investing cash in excess of current business requirements. At December 31, 2018 and 2017, the proportion of our aggregate “Cash and equivalents” and “Marketable securities and short term investments” managed by our Group Treasury Operations amounted to approximately 38 percent and 49 percent, respectively.

Throughout 2018 and 2017, the investment strategy for cash (in excess of current business requirements) has generally been to invest in short-term time deposits with maturities of less than 3 months, supplemented at times by investments in corporate commercial paper, money market funds, and in some cases, government securities. During 2018 and 2017, we also continued to place limited funds in connection with reverse repurchase agreements. We actively monitor credit risk in our investment portfolio and hedging activities. Credit risk exposures are controlled in accordance with policies approved by our senior management to identify, measure, monitor and control credit risks. We have minimum rating requirements for our counterparts and closely monitor developments in the credit markets making appropriate changes to our investment policy as deemed necessary. In addition to minimum rating criteria, we have strict investment parameters and specific approved instruments as well as restrictions on the types of investments we make. These parameters are closely monitored on an ongoing basis and amended as we consider necessary.

Our cash is held in various currencies around the world. Approximately 24 percent of our cash and cash equivalents held at December 31, 2018, was in U.S. dollars, while other significant amounts were held in Chinese renminbi (28 percent), euro (17 percent) and Indian rupee (6 percent).

We believe the cash flows generated from our business, supplemented, when necessary, through access to the capital markets (including short term commercial paper) and our credit facilities are sufficient to support business operations, capital expenditures, business acquisitions, the payment of dividends to shareholders and contributions to pension plans. Consequently, we believe that our ability to obtain funding from these sources will continue to provide the cash flows necessary to satisfy our working capital and capital expenditure requirements, as well as meet our debt repayments and other financial commitments for the next twelve months. See “Disclosures about contractual obligations and commitments”.

Due to the nature of our operations, including the timing of annual incentive payments to employees, our cash flow from operations generally tends to be weaker in the first half of the year than in the second half of the year.

Debt and interest rates

Total outstanding debt was as follows:

	December 31,	
($ in millions)	**2018**	**2017**
Short-term debt and current maturities of long-term debt	2,031	726
Long-term debt:		
Bonds	6,411	6,487
Other long-term debt	176	195
Total debt	**8,618**	**7,408**

The increase in short term debt in 2018 was due to the reclassification from long-term debt of our EUR 1,250 million 2.625% instruments due in 2019, offset by the repayment in 2018 of the CHF 350 million 1.5% Bonds. In addition, we increased the amount of issued commercial paper ($464 million outstanding at December 31, 2018, compared to $259 million outstanding at December 31, 2017).

At December 31, 2018, Long-term debt remained at a similar amount to the end of 2017 as the issuance in 2018 of three new bonds with net proceeds totaling $1,494 million was offset by the reclassification to short-term debt of the EUR 1,250 million bond discussed above, which had a book value of $1,493 million at the end of 2017.

Our debt has been obtained in a range of currencies and maturities and on various interest rate terms. For certain of our debt obligations, we use derivatives to manage the fixed interest rate exposure. For example, we use interest rate swaps to effectively convert fixed rate debt into floating rate liabilities. After considering the effects of interest rate swaps, the effective average interest rate on our floating rate long term debt (including current maturities) of $3,106 million and our fixed rate long term debt (including current maturities) of $4,951 million was 1.1 percent and 3.6 percent, respectively. This compares with an effective rate of 0.6 percent for floating rate long term debt of $3,213 million and 3.5 percent for fixed rate long term debt of $3,878 million at December 31, 2017.

For a discussion of our use of derivatives to modify the interest characteristics of certain of our individual bond issuances, see “Note 12 Debt” to our Consolidated Financial Statements.

Credit facility

We have a $2 billion multicurrency revolving credit facility expiring in 2021 that is available for general corporate purposes. No amount was drawn under the credit facility at December 31, 2018 and 2017. The facility contains cross default clauses whereby an event of default would occur if we were to default on indebtedness, as defined in the facility, at or above a specified threshold.

The credit facility does not contain financial covenants that would restrict our ability to pay dividends or raise additional funds in the capital markets. For further details of the credit facility, see “Note 12 Debt” to our Consolidated Financial Statements.

Commercial paper

At December 31, 2018, we had two commercial paper programs in place:

- a $2 billion commercial paper program for the private placement of U.S. dollar denominated commercial paper in the United States, and
- a $2 billion Euro commercial paper program for the issuance of commercial paper in a variety of currencies.

At December 31, 2018, $292 million was outstanding under the $2 billion program in the United States, compared to $259 million outstanding at December 31, 2017. At March 27, 2019, the amount outstanding under this program had increased to $825 million.

At December 31, 2018, $172 million was outstanding under the $2 billion Euro commercial paper program. No amount was outstanding under this program at December 31, 2017. At March 27, 2019, the amount outstanding under this program had increased to $509 million.

European program for the issuance of debt

The European program for the issuance of debt allows the issuance of up to the equivalent of $8 billion in certain debt instruments. The terms of the program do not obligate any third party to extend credit to us and the terms and possibility of issuing any debt under the program are determined with respect to, and as of the date of issuance of, each debt instrument. During 2017, we issued EUR 750 million 0.75% Notes, due 2024, and during 2016, we issued EUR 700 million 0.625% Notes, due 2023, under the program. At December 31, 2018, three bonds (principal amount of EUR 1,250 million, due in 2019, principal amount of EUR 700 million, due in 2023 and principal amount of EUR 750 million, due in 2024) having a combined carrying amount of $3,100 million, were outstanding under the program. At December 31, 2017, the same three bonds were outstanding having a combined carrying amount of $3,216 million. At March 27, 2019, it was more than 12 months since the program had been updated. New bonds could be issued under the program but could not be listed without us formally updating the program.

Credit ratings

Credit ratings are assessments by the rating agencies of the credit risk associated with ABB and are based on information provided by us or other sources that the rating agencies consider reliable. Higher ratings generally result in lower borrowing costs and increased access to capital markets. Our ratings are of “investment grade” which is defined as Baa3 (or above) from Moody’s and BBB− (or above) from Standard & Poor’s.

At both December 31, 2018 and 2017, our long term debt was rated A2 by Moody’s and A by Standard & Poor’s.

Limitations on transfers of funds

Currency and other local regulatory limitations related to the transfer of funds exist in a number of countries where we operate, including: China, Egypt, India, Indonesia, South Korea, Malaysia, Taiwan (Chinese Taipei), Thailand and Turkey. Funds, other than regular dividends, fees or loan repayments, cannot be readily transferred offshore from these countries and are therefore deposited and used for working capital needs in those countries. In addition, there are certain countries where, for tax reasons, it is not considered optimal to transfer the cash offshore. As a consequence, these funds are not available within our Group Treasury Operations to meet short term cash obligations outside the relevant country. The above described funds are reported as cash in our Consolidated Balance Sheets, but we do not consider these funds immediately available for the repayment of debt outside the respective countries where the cash is situated, including those described above. At December 31, 2018 and 2017, the balance of “Cash and equivalents” and “Marketable securities and other short term investments” under such limitations (either regulatory or sub optimal from a tax perspective) totaled approximately $1,796 million and $2,010 million, respectively.

During 2018 we continued to direct our subsidiaries in countries with restrictions to place such cash with our core banks or investment grade banks, in order to minimize credit risk on such cash positions. We continue to closely monitor the situation to ensure bank counterparty risks are minimized.

FINANCIAL POSITION

Balance sheets

($ in millions)	December 31, 2018	2017	% Change
Current assets			
Cash and equivalents	3,445	4,526	(24)%
Marketable securities and short-term investments	712	1,083	(34)%
Receivables, net	6,386	5,861	9%
Contract assets	1,082	1,141	(5)%
Inventories, net	4,284	3,737	15%
Prepaid expenses	176	159	11%
Other current assets	616	585	5%
Assets held for sale	5,164	5,043	2%
Total current assets	**21,865**	**22,135**	**(1)%**

For a discussion on cash and equivalents, see sections “Liquidity and Capital Resources—Principal sources of funding” and “Cash flows” for further details.

Marketable securities and short term investments decreased in 2018 as the amount of excess liquidity available for investments was reduced as funds were needed for acquisitions of businesses. The reduction resulted primarily in lower amounts deposited with banks with fixed deposit terms over three months (see “Cash flows—Investing activities”, below, and “Note 5 Cash and equivalents, marketable securities and short-term investments” to our Consolidated Financial Statements).

Receivables increased 9 percent (14 percent in local currencies). The increase was primarily due to the impact of the acquisition of GEIS. For details on the components of Receivables, see “Note 8 Receivables, net and Contract assets and liabilities” to our Consolidated Financial Statements.

Contract assets decreased 5 percent (2 percent in local currencies).

Inventories increased 15 percent (20 percent in local currencies). The increase in inventory was primarily due to the impact of the GEIS acquisition but also due to increases of inventories resulting from growth in certain businesses.

($ in millions)	December 31, 2018	2017	% Change
Current liabilities			
Accounts payable, trade	4,424	3,736	18%
Contract liabilities	1,707	1,792	(5)%
Short-term debt and current maturities of long-term debt	2,031	726	180%
Provisions for warranties	948	909	4%
Other provisions	1,372	1,277	7%
Other current liabilities	3,780	3,509	8%
Liabilities held for sale	4,185	4,520	(7)%
Total current liabilities	**18,447**	**16,469**	**12%**

Accounts payable increased 18 percent (22 percent in local currencies) primarily as a result of the acquisition of GEIS, but as well as a result of continuing efforts to negotiate extended payment terms with suppliers. During 2018, we also enhanced our supplier payment processes and the changes resulted in generally longer payment times.

The increase in Short-term debt and current maturities of long-term debt was primarily due to increases in the U.S. and Euro commercial paper programs of $205 million and the reclassification to short-term debt of the EUR 1,250 million bond (having a book value of $1,431 million) partially offset by the repayment at maturity of the CHF 350 million bond.

Contract liabilities decreased 5 percent (flat in local currencies).

Provisions for warranties increased 4 percent (8 percent in local currencies). Warranties increased approximately 5 percent due to the acquisition of GEIS. In addition, we recorded an increase of $92 million in the warranty provision relating to a divested business. We also had higher claims paid in cash due to warranties in the solar business. For details on the change in the Provision for warranties, see “Note 15 Commitments and contingencies” to our Consolidated Financial Statements.

Other provisions increased 7 percent (10 percent in local currencies) as we recorded higher loss order provisions for certain EPC projects in the non-core business.

The increase in Other current liabilities of 8 percent (12 percent in local currencies) was primarily due to the impact on accrued liabilities of the acquired business of GEIS.

	December 31,		
($ in millions)	**2018**	**2017**	**% Change**
Non-current assets			
Property, plant and equipment, net	4,133	3,804	9%
Goodwill	10,764	9,536	13%
Other intangible assets, net	2,607	2,425	8%
Prepaid pension and other employee benefits	83	143	(42)%
Investments in equity-accounted companies	87	72	21%
Deferred taxes	1,006	1,212	(17)%
Other non-current assets	469	571	(18)%
Non-current assets held for sale	3,427	3,560	(4)%
Total non-current assets	**22,576**	**21,323**	**6%**

In 2018, Property, plant and equipment increased 9 percent (13 percent in local currencies) predominately due to the acquisition of GEIS, but as well due to the significant capital expenditures in the recently acquired B&R as well as the expenditures for the Xiamen hub construction in China.

In 2018, Goodwill increased 13 percent (15 percent in local currencies) due primarily to the acquisition of GEIS.

Other intangible assets increased 8 percent (10 percent in local currencies) primarily due to the addition of intangibles related to the acquisition of GEIS, partially offset by the impact of amortization of intangibles in 2018. For additional information on intangible assets see “Note 11 Goodwill and other intangible assets” to our Consolidated Financial Statements.

In 2018, Deferred taxes, non-current, decreased 17 percent (11 percent in local currencies) primarily due to the impacts of the adoption of a new accounting standard affecting the income tax consequences of intra entity transfer of assets other than inventory (see “Note 2 Significant accounting policies” to our Consolidated Financial Statements).

($ in millions)	December 31, 2018	2017	% Change
Non-current liabilities			
Long-term debt	6,587	6,682	(1)%
Pension and other employee benefits	1,828	1,589	15%
Deferred taxes	927	1,050	(12)%
Other non-current liabilities	1,689	1,849	(9)%
Non-current liabilities held for sale	429	470	(9)%
Total non-current liabilities	**11,460**	**11,640**	**(2)%**

Long-term debt decreased 1 percent. During 2018, we issued three new bonds with net proceeds totaling $1,494 million. This was offset by the reclassification to short-term debt of the EUR 1,250 million bond, which had a book value of $1,493 million at the end of 2017. See "Liquidity and Capital Resources—Debt and interest rates" for information on long term debt.

The increase in the Pension and other employee benefits liability was primarily due to lower than expected returns on pension plan assets in 2018. For additional information, see "Note 17 Employee benefits" to our Consolidated Financial Statements.

For a breakdown of Other non current liabilities, see "Note 13 Other provisions, other current liabilities and other non current liabilities" to our Consolidated Financial Statements.

Cash flows

The Consolidated Statements of Cash Flows are shown on a continuing operations basis, with the effects of discontinued operations shown in aggregate for each major cash flow activity.

The Consolidated Statements of Cash Flows can be summarized as follows:

($ in millions)	2018	2017	2016
Net cash provided by operating activities	2,924	3,799	3,843
Net cash used in investing activities	(3,085)	(1,450)	(1,305)
Net cash used in financing activities	(789)	(1,735)	(3,355)
Effects of exchange rate changes on cash and equivalents	(131)	268	(104)
Net change in cash and equivalents	**(1,081)**	**882**	**(921)**

Operating activities

($ in millions)	2018	2017	2016
Net income	2,298	2,365	2,034
Less: Income from discontinued operations, net of tax	(723)	(846)	(799)
Depreciation and amortization	916	836	870
Total adjustments to reconcile net income to net cash provided by operating activities (excluding depreciation and amortization)	(189)	(406)	(26)
Total changes in operating assets and liabilities	50	639	528
Net cash provided by operating activities — continuing operations	**2,352**	**2,588**	**2,607**
Net cash provided by operating activities — discontinued operations	**572**	**1,211**	**1,236**

Cash flows from operating activities of continuing operations in 2018 provided net cash of $2,352 million, a decrease of 9 percent from 2017 as higher cash effective net income (net income adjusted for depreciation, amortization and other non-cash items) was offset by a lower improvement in working capital. Cash flow impacts from changes in working capital continued to show the impact of extending payment terms with suppliers and the changes in our supplier payment process, which resulted in an increase in trade payables. Payables and inventory also increased due to higher inventories to support growth. In addition, the timing of tax payments, including income taxes and value-added taxes, negatively impacted cash provided by operating activities.

Cash flows from operating activities in 2017 provided net cash of $2,588 million, a decrease of 1 percent from 2016 as lower cash effective net income mostly offset the positive cash effects of stronger net working capital management. Working capital improvements included a significant increase in trade and non-trade payables, resulting from continuing company wide efforts to extend payment terms with suppliers. Partially offsetting these benefits were cash outflows resulting from higher inventories and trade receivables. In addition, the timing of tax payments positively impacted cash provided by operating activities.

Cash flows from operating activities of discontinued operations in 2018 decreased to $572 million from $1,211 million in 2017. The primary reason was lower income as well as negative impacts from the timing of cash collections on large projects and other receivables. Cash flows from operating activities of discontinued operations in 2017 was similar to 2016 as the impacts of higher income were offset by negative impacts from the timing of tax payments. The amount reported for cash flows from operating activities of discontinued operations benefits directly from the allocation of stranded costs to continuing operations.

Investing activities

($ in millions)	**2018**	**2017**	**2016**
Purchases of investments	(322)	(666)	(4,299)
Purchases of property, plant and equipment and intangible assets	(772)	(752)	(632)
Acquisition of businesses (net of cash acquired) and increases in cost- and equity-accounted companies	(2,664)	(2,011)	(26)
Proceeds from sales of investments	567	1,443	3,295
Proceeds from maturity of investments	160	100	539
Proceeds from sales of property, plant and equipment	72	61	59
Proceeds from sales of businesses (net of transaction costs and cash disposed) and cost- and equity-accounted companies	113	607	(1)
Net cash from settlement of foreign currency derivatives	(30)	63	(57)
Other investing activities	(32)	37	14
Net cash used in investing activities — continuing operations	**(2,908)**	**(1,118)**	**(1,108)**
Net cash used in investing activities — discontinued operations	**(177)**	**(332)**	**(197)**

Net cash used in investing activities for continuing operations in 2018 was $2,908 million, compared to $1,118 million in 2017. The amount in 2018 reflects higher amounts used to fund acquisitions of businesses (primarily GEIS). In addition, cash used in investing activities was higher in 2018 as 2017 included the positive cash flows resulting from reducing investments in marketable securities and short-term investments. Purchases of property, plant and equipment and intangible assets were slightly higher in 2018 with continued global investment including high spending on information technology as well as large investments in the U.S. and China. We also increased our capital expenditures in Austria with large investments in the B&R business. In addition, changes in the impacts from derivative cash flows classified as investing activities increased cash used in investing activities by $93 million. These cash flows primarily result from the maturity and settlement of derivatives that are in place to hedge foreign currency exposures on internal subsidiary funding and the amount of the settlement results from movements in foreign currency exchange rates throughout the year.

Net cash used in investing activities in 2017 was $1,118 million, compared to $1,108 million in 2016. Cash used to fund acquisitions of businesses (primarily B&R) was significantly higher than in 2016 but was partially offset by sales of marketable securities and short-term investments as well as the proceeds received from sales of businesses (primarily the high voltage cables business). We also had higher purchases of property, plant and equipment and intangible assets due to higher investments in information technology assets as well as specific investments in facilities in the U.S. and China. In addition, changes in the impacts from derivative cash flows classified as investing activities reduced cash used in investing activities by $120 million.

The following presents purchases of property, plant and equipment and intangibles by significant asset category:

($ in millions)	2018	2017	2016
Construction in process	523	520	459
Purchase of machinery and equipment	152	125	126
Purchase of land and buildings	28	32	10
Purchase of intangible assets	69	75	37
Purchases of property, plant and equipment and intangible assets	**772**	**752**	**632**

In 2018 and 2017, we decreased the amount of our excess liquidity invested in marketable securities and short-term investments as funds were needed for acquisitions of businesses while, in 2016, we increased the amounts invested in marketable securities and short term investments. Marketable securities and short-term investments at December 31, 2018 and 2017, consisted primarily of fixed-term deposits with banks, available-for-sale debt securities as well as amounts placed in reverse repurchase agreements. At December 31, 2016, amounts were placed primarily in fixed-term deposits with banks and in short-term money market funds. In 2018 and 2017, the net decrease in investments during the year resulted in inflows of $405 million and $877 million, respectively, while in 2016, the net increase in investments resulted in outflows of $465 million.

In 2018, acquisitions of businesses primarily represents the purchase of GEIS, which was acquired in June. In 2017, acquisitions of businesses primarily represents the purchase of B&R, which was acquired in July, while proceeds from sales of businesses primarily represents the divestment of the high-voltage cables and cable accessories businesses. In 2016, there were no significant acquisitions or divestments of businesses.

Cash used in investing activities from discontinued operations primarily represents net purchases of property, plant and equipment. Cash used in investing activities was higher in 2017 compared to both 2018 and 2016 as 2017 also included cash paid for acquisition of a business.

Financing activities

($ in millions)	2018	2017	2016
Net changes in debt with maturities of 90 days or less	221	204	(144)
Increase in debt	1,914	920	911
Repayment of debt	(830)	(1,000)	(1,242)
Delivery of shares	42	163	192
Purchase of treasury stock	(250)	(251)	(1,299)
Dividends paid	(1,717)	(1,635)	—
Reduction in nominal value of common shares paid to shareholders	—	—	(1,610)
Dividends paid to noncontrolling shareholders	(86)	(83)	(89)
Other financing activities	(35)	(6)	(27)
Net cash used in financing activities — continuing operations	**(741)**	**(1,688)**	**(3,308)**
Net cash used in financing activities — discontinued operations	**(48)**	**(47)**	**(47)**

Our financing cash flow activities primarily include debt transactions (both from the issuance of debt securities and borrowings directly from banks), share transactions and payments of distributions to controlling and noncontrolling shareholders. Net cash used in financing activities for discontinued operations represents primarily distributions paid to noncontrolling shareholders of certain subsidiaries classified in discontinued operations.

In 2018, the net inflow for debt with maturities of 90 days or less related primarily to combined increases of $194 million for borrowings outstanding under our commercial paper programs in the U.S. and Europe. In 2017, a net increase of $202 million related to borrowings outstanding under our commercial paper program in the U.S.

In 2018, the increase in debt was due primarily to the issuance of the following: USD 300 million 2.8% Notes due 2020, USD 450 million 3.375% Notes due 2023 and USD 750 million 3.8% Notes due 2028. In 2018, the increase also included $316 million for commercial paper borrowings having an original maturity of more than 90 days. In 2017, the increase in debt was due primarily to the issuance of our EUR 750 million 0.75% Notes due 2024 (equal to $824 million at date of issuance). In 2016, the increase in debt was due primarily to the issuance of our EUR 700 million 0.625% Notes due 2023 (equal to $807 million at date of issuance).

During 2018, the CHF 350 million 1.50% bonds (equivalent to $350 million on the date of repayment) were repaid as well as repayments at maturity of $316 million in commercial paper borrowings having an original maturity of more than 90 days. During 2017, $1,000 million of debt was repaid, reflecting primarily the repayment at maturity of both the USD 500 million 1.625% Notes and the AUD 400 million 4.25% Notes (in total equivalent to $803 million at dates of repayment). During 2016, $1,242 million of debt was repaid, reflecting primarily the repayment at maturity of the USD 600 million 2.5% Notes and CHF 500 million 1.25% Bonds (in total equivalent to $1,106 million at dates of repayment).

In 2018 and 2017, “Purchase of treasury stock” reflects the cash paid to purchase 10 million of our own shares on the open market in each period. In 2016, the amount reflects the cash paid to purchase 65 million of our own shares in connection with the share buyback program which was announced in September 2014 and completed in September 2016. For additional information on the share buyback program see “Note 19 Stockholders’ equity” to our Consolidated Financial Statements.

Disclosures about contractual obligations and commitments

The contractual obligations presented in the table below represent our estimates of future payments under fixed contractual obligations and commitments. The amounts in the table may differ from those reported in our Consolidated Balance Sheet at December 31, 2018. Changes in our business needs, cancellation provisions and changes in interest rates, as well as actions by third parties and other factors, may cause these estimates to change. Therefore, our actual payments in future periods may vary from those presented in the table. The following table summarizes certain of our contractual obligations and principal and interest payments under our debt instruments, leases and purchase obligations at December 31, 2018.

($ in millions)	Total	Less than 1 year	1 - 3 years	3 - 5 years	More than 5 years
Payments due by period					
Long-term debt obligations	7,911	1,448	1,595	2,502	2,366
Interest payments related to long-term debt obligations	1,496	221	346	187	742
Operating lease obligations	1,278	329	445	237	267
Capital lease obligations[(1)]	239	34	51	43	111
Purchase obligations	2,862	2,419	407	22	14
Total	**13,786**	**4,451**	**2,844**	**2,991**	**3,500**

(1) Capital lease obligations represent the total cash payments to be made in the future and include interest expense of $87 million and executory costs of $1 million.

In the table above, the long term debt obligations reflect the cash amounts to be repaid upon maturity of those debt obligations. The cash obligations above will differ from the long term debt balance reflected in “Note 12 Debt” to our Consolidated Financial Statements due to the impacts of fair value hedge accounting adjustments and premiums or discounts on certain debt. In addition, capital lease obligations are shown separately in the table above while they are combined with Long term debt amounts in our Consolidated Balance Sheets.

We have determined the interest payments related to long term debt obligations by reference to the payments due under the terms of our debt obligations at the time such obligations were incurred. However, we use interest rate swaps to modify the interest characteristics of certain of our debt obligations. The net effect of these swaps may be to increase or decrease the actual amount of our cash interest payment obligations, which may differ from those stated in the above table. For further details on our debt obligations and the related hedges, see “Note 12 Debt” to our Consolidated Financial Statements.

Of the total of $1,163 million unrecognized tax benefits (net of deferred tax assets) at December 31, 2018, it is expected that $52 million will be paid within less than a year. However, we cannot make a reasonably reliable estimate as to the related future payments for the remaining amount.

Off balance sheet arrangements

Commercial commitments

We disclose the maximum potential exposure of certain guarantees, as well as possible recourse provisions that may allow us to recover from third parties amounts paid out under such guarantees. The maximum potential exposure does not allow any discounting of our assessment of actual exposure under the guarantees. The information below reflects our maximum potential exposure under the guarantees, which is higher than our assessment of the expected exposure.

Guarantees

The following table provides quantitative data regarding our third party guarantees. The maximum potential payments represent a worst case scenario, and do not reflect our expected outcomes.

	December 31,	
	2018	**2017**
($ in millions)	**Maximum potential payments[1]**	
Performance guarantees	1,584	1,775
Financial guarantees	10	17
Indemnification guarantees	64	72
Total	**1,658**	**1,864**

(1) Maximum potential payments include amounts in both continuing and discontinued operations

The carrying amounts of liabilities recorded in the Consolidated Balance Sheets in respect of the above guarantees were not significant at December 31, 2018 and 2017, and reflect our best estimate of future payments, which we may incur as part of fulfilling our guarantee obligations.

In addition, in the normal course of bidding for and executing certain projects, we have entered into standby letters of credit, bid/performance bonds and surety bonds (collectively “performance bonds”) with various financial institutions. Customers can draw on such performance bonds in the event that ABB does not fulfill its contractual obligations. ABB would then have an obligation to reimburse the financial institution for amounts paid under the performance bonds. At December 31, 2018 and 2017, the total outstanding performance bonds aggregated to $7.4 billion and $7.7 billion, respectively, of which $4.3 billion and $4.7 billion, respectively, relate to discontinued operations. There have been no significant amounts reimbursed to financial institutions under these types of arrangements in 2018, 2017 and 2016.

For additional descriptions of our performance, financial and indemnification guarantees see “Note 15 Commitments and contingencies” to our Consolidated Financial Statements.

Item 6. Directors, Senior Management and Employees

SUMMARY OF CORPORATE GOVERNANCE APPROACH

Corporate governance - general principles

ABB is committed to the highest international standards of corporate governance and this is reinforced in its structure, processes and rules as outlined in this section of the Annual Report. In line with this, ABB complies with the general principles as set forth in the Swiss Code of Best Practice for Corporate Governance, as well as those of the capital markets where its shares are listed and traded. In addition to the provisions of the Swiss Code of Obligations, ABB’s key principles and rules on corporate governance are laid down in ABB’s Articles of Incorporation, the ABB Ltd Board Regulations & Corporate Governance Guidelines (which includes the regulations of ABB’s Board committees and the ABB Ltd Related Party Transaction Policy, which was prepared based on the Swiss Code of Best Practice for Corporate Governance and the independence criteria set forth in the corporate governance rules of the New York Stock Exchange), and the ABB Code of Conduct and the Addendum to the ABB Code of Conduct for Members of the Board of Directors and the Executive Committee (EC) (together, the "Code of Conduct"). These documents are available on ABB’s website at www.abb.com. It is the duty of ABB’s Board of Directors (the Board) to review and amend or propose amendments to those documents from time to time to reflect the most recent developments and practices, as well as to ensure compliance with applicable laws and regulations. Shareholders and other interested parties may communicate with the Chairman of the Board by writing to ABB Ltd (Attn: Chairman of the Board), at Affolternstrasse 44, CH-8050 Zurich, Switzerland.

Compensation governance and Board and EC compensation

Information about ABB’s compensation governance and Board and EC compensation and shareholdings can be found in the section titled “Compensation” below.

BOARD OF DIRECTORS

Board and Board committees (2018 - 2019 board term)

Chairman: Peter R. Voser
Vice Chairman: Jacob Wallenberg

Board of Directors

Matti Alahuhta
Gunnar Brock
David Constable
Frederico Fleury Curado
Lars Förberg
Jennifer Xin Zhe Li
Geraldine Matchett
David Meline
Satish Pai

Finance, Audit and Compliance Committee

David Meline (chairman)
Gunnar Brock
Geraldine Matchett
Satish Pai

Governance and Nomination Committee

Peter R. Voser (chairman)
Matti Alahuhta
Lars Förberg
Jacob Wallenberg

Compensation Committee

David Constable (chairman)
Frederico Fleury Curado
Jennifer Xin Zhe Li

Board governance

The Board

The Board defines the ultimate direction of the business of ABB and issues the necessary instructions. It determines the organization of the ABB Group and appoints, removes and supervises the persons entrusted with the executive management and representation of ABB. The internal organizational structure and the definition of the areas of responsibility of the Board, as well as the information and control instruments vis–à–vis the Executive Committee are set forth in the ABB Ltd Board Regulations & Corporate Governance Guidelines.

The Board takes decisions as a whole, supported by its three committees: the Finance, Audit and Compliance Committee (FACC), the Governance and Nomination Committee (GNC), and the Compensation Committee (CC). These committees assist the Board in its tasks and report regularly to the Board. The members of the Board committees either are required to be independent or are elected directly by the shareholders. The Board and its committees meet regularly throughout the year.

The directors and officers of a Swiss corporation are bound, as specified in the Swiss Code of Obligations, to perform their duties with all due care, to safeguard the interests of the corporation in good faith and to extend equal treatment to shareholders in like circumstances.

The Swiss Code of Obligations does not specify what standard of due care is required of the directors of a corporate board. However, it is generally held by Swiss legal scholars and jurisprudence that the directors must have the requisite capability and skill to fulfill their function, and must devote the necessary time to the discharge of their duties. Moreover, the directors must exercise all due care that a prudent and diligent director would have taken in like circumstances. Finally, the directors are required to take actions in the best interests of the corporation and may not take any actions that may be harmful to the corporation.

Although the Swiss Code of Obligations does not discuss specifically conflicts of interest for board members, the ABB Ltd Board Regulations and Corporate Governance Guidelines state that board members shall avoid entering into any situation in which their personal or financial interest may conflict with the interests of ABB.

Chairman of the Board

The Chairman is elected by the shareholders to represent their interests in creating sustainable value through effective governance. In addition, the Chairman (1) takes provisional decisions on behalf of the Board on urgent matters where a regular Board decision cannot be obtained, (2) calls for Board meetings and sets the related agendas, (3) interacts with the CEO and other EC members on a more frequent basis outside of Board meetings and (4) represents the Board internally and in the public sphere.

Vice-Chairman of the Board

The Vice Chairman is elected by the Board and handles the responsibilities of the Chairman to the extent the Chairman is unable to do so or would have a conflict of interest in doing so. He also acts as counselor/advisor to the Chairman on any matters that are Company or Board relevant and as appropriate or as the Chairman may require and with a particular focus on strategic aspects related to the Company and its business in general. In addition, the Vice Chairman takes such other actions as may be decided by the Board or requested by the Chairman.

Finance, Audit and Compliance Committee

The FACC is responsible for overseeing (1) the integrity of ABB's financial statements, (2) ABB's compliance with legal, tax and regulatory requirements, (3) the independent auditors' qualifications and independence, (4) the performance of ABB's internal audit function and external auditors, and (5) ABB's capital structure, funding requirements and financial risk and policies.

The FACC must comprise three or more independent directors who have a thorough understanding of finance and accounting. The Chairman of the Board and, upon invitation by the committee's chairman, the CEO or other members of the Executive Committee may participate in the committee meetings, provided that any potential conflict of interest is avoided and confidentiality of the discussions is maintained. In addition, the chief integrity officer, the head of internal audit and the external auditors participate in the meetings as appropriate. The Board has determined that each member of the FACC is an audit committee financial expert as such term is defined in Form 20-F.

Governance and Nomination Committee

The GNC is responsible for (1) overseeing corporate governance practices within ABB, (2) nominating candidates for the Board, the role of CEO and other positions on the Executive Committee, and (3) succession planning and employment matters relating to the Board and the Executive Committee. The GNC is also responsible for maintaining an orientation program for new Board members and an ongoing education program for existing Board members.

The GNC must comprise three or more independent directors. The Chairman of the Board (unless he is already a member) and, upon invitation by the committee's chairman, the CEO or other members of the Executive Committee may participate in the committee meetings, provided that any potential conflict of interest is avoided and confidentiality of the discussions is maintained.

Compensation Committee

The CC is responsible for compensation matters relating to the Board and the Executive Committee.

The CC must comprise three or more directors who are elected by the shareholders. The Chairman of the Board and, upon invitation by the committee's chairman, the CEO or other members of the Executive Committee may participate in the committee meetings, provided that any potential conflict of interest is avoided and confidentiality of the discussions is maintained.

Board membership

Board composition

In proposing individuals to be elected to the Board, the Board seeks to align the composition and skills of the Board with the company's strategic needs, business portfolio, geographic reach and culture. The Board must be diverse in all aspects including gender, nationalities, geographic/regional experience and business experience. In addition, the average tenure of the members of the Board should be well balanced. The Board also considers the number of other mandates of each Board member to ensure that he/she will have sufficient time to dedicate to his/her role as an ABB Board member.

Elections and term of office

The members of the Board of Directors and the Chairman of the Board as well as the members of the Compensation Committee are elected by shareholders at the general meeting of shareholders for a term of office extending until completion of the next ordinary general meeting of shareholders. Members whose terms of office have expired shall be immediately eligible for re election. Our Articles of Incorporation do not provide for the retirement of directors based on their age. However, an age limit for members of the Board is set forth in the ABB Ltd Board Regulations & Corporate Governance Guidelines (although waivers are possible and subject to Board discretion). If the office of the Chairman of the Board of Directors or any position on the Compensation Committee becomes vacant during a Board term, the Board of Directors may appoint (shall appoint in the case of the Chairman of the Board) another individual from among its members to that position for the remainder of that term. The Board of Directors shall consist of no less than 7 and no more than 13 members.

Members of the Board (2018-2019 board term):

Board Member	Board Experience		Corporate Officer Experience			Other Business Experience			Global Experi−ence	Country of Origin / Nationality	Gender	Non-Execu−tive	Indep−e
	ABB Board Tenure (years)	Other Public Board Experience	CEO	CFO	Operations	Risk Management	Sustainability	Digital / Technology					
Peter R. Voser	4									CH	M	Yes	Ye
Jacob Wallenberg	20									SE	M	Yes	Ye
Matti Alahuhta	5									FI	M	Yes	Ye
Gunnar Brock	1									SE	M	Yes	Ye
David Constable	4									CA	M	Yes	Ye
Frederico Fleury Curado	3									BR	M	Yes	Ye
Lars Förberg	2									SE	M	Yes	Ye
Jennifer Xin.Zhe Li	1									CN, CA	F	Yes	Ye
Geraldine Matchett	1									UK, FR, CH	F	Yes	Ye
David Meline	3									US, CH	M	Yes	Ye
Satish Pai	3									IN	M	Yes	Ye

Peter R. Voser has been a member and Chairman of ABB's Board of Directors since April 2015. He is a member of the boards of directors of Roche Holding Ltd (Switzerland), IBM Corporation (U.S.) and Catalyst (U.S.), a non profit organization. He is also a member of the board of directors of Temasek Holdings (Private) Limited (Singapore) as

well as deputy chairman of the board of PSA International Pte Ltd (Singapore), one of its subsidiaries. In addition, he is the chairman of the board of trustees of the St. Gallen Foundation for International Studies. He was previously the chief executive officer of Royal Dutch Shell plc (The Netherlands). Mr. Voser was born in 1958 and is a Swiss citizen.

Jacob Wallenberg has been a member of ABB's Board of Directors since June 1999 and Vice-Chairman since April 2015. He is the chairman of the board of Investor AB (Sweden). He is vice chairman of the boards of Telefonaktiebolaget LM Ericsson, FAM AB and Patricia Industries (all Sweden). He is also a member of the boards of directors of Nasdaq, Inc. (U.S.) and the Knut and Alice Wallenberg Foundation (Sweden) as well as a member of the nomination committee of SAS AB (Sweden). Mr. Wallenberg was born in 1956 and is a Swedish citizen.

Matti Alahuhta has been a member of ABB's Board of Directors since April 2014. He is the chairman of the boards of Outotec Corporation and of DevCo Partners Oy (both Finland). He is also a member of the boards of directors of KONE Corporation (Finland) and AB Volvo (Sweden). He was previously the president and chief executive officer of KONE Corporation and he served in several executive positions at Nokia Corporation (Finland). Mr. Alahuhta was born in 1952 and is a Finnish citizen.

Gunnar Brock has been a member of ABB's Board of Directors since March 2018. He is currently chairman of the boards of Slättö Invest AB, Mölnlycke Health Care AB and Stena AB (all Sweden). He is a member of the boards of directors of Syngenta Ltd (Switzerland), Investor AB and Patricia Industries (both Sweden). He was formerly president and chief executive officer of Atlas Copco AB (Sweden). Mr. Brock was born in 1950 and is a Swedish citizen.

David Constable has been a member of ABB's Board of Directors since April 2015. He is a member of the boards of directors of Rio Tinto plc (U.K.), Rio Tinto Limited (Australia) and Anadarko Petroleum Corporation (U.S.). He was formerly the chief executive officer and president as well as a member of the board of directors of Sasol Limited (South Africa). He joined Sasol after more than 29 years with Fluor Corporation (U.S.). Mr. Constable was born in 1961 and is a Canadian citizen.

Frederico Fleury Curado has been a member of ABB's Board of Directors since April 2016. He is the chief executive officer of Ultrapar Participações S.A. (Brazil) and a member of the board of directors of Transocean Ltd. (Switzerland). He was formerly the chief executive officer of Embraer S.A. (Brazil). Mr. Curado was born in 1961 and is a Brazilian citizen.

Lars Förberg has been a member of ABB's Board of Directors since April 2017. He is co founder and managing partner of Cevian Capital. Mr. Förberg is the chairman of the Human Practice Foundation (Denmark). Mr. Förberg was born in 1965 and is a Swedish citizen.

Jennifer Xin Zhe Li has been a member of ABB's Board of Directors since March 2018. She is a member of the boards of directors of Philip Morris International Inc. (U.S.), HSBC Asia (Hong Kong) and Flex Ltd (Singapore/U.S.). Ms. Li is a founder and general partner of Changcheng Investment Partners (P.R.C.) and was previously the chief executive officer (general managing partner) of Baidu Capital (P.R.C.). She formerly served as chief financial officer of Baidu Inc. (P.R.C.). Ms. Li was born in 1967 and is a Canadian citizen.

Geraldine Matchett has been a member of ABB's Board of Directors since March 2018. She is the chief financial officer and a member of the managing board of Royal DSM N.V. (The Netherlands). She was previously chief financial officer of SGS Ltd (Switzerland). Prior to joining SGS she worked as an auditor at Deloitte Ltd (Swit−zerland) and KPMG LLP (U.K.). Ms. Matchett was born in 1972 and is a Swiss, British and French citizen.

David Meline has been a member of ABB's Board of Directors since April 2016. He is the chief financial officer of Amgen Inc. (U.S.). Mr. Meline was formerly with the 3M Company (U.S.), where he served as chief financial officer. Prior to joining 3M, Mr. Meline worked for more than 20 years for General Motors Company (U.S.). Mr. Meline was born in 1957 and is a Swiss and U.S. citizen.

Satish Pai has been a member of ABB's Board of Directors since April 2016. He is the managing director and a member of the board of directors of Hindalco Industries Ltd. (India). He joined Hindalco in 2013 after 28 years with Schlumberger Limited (U.S.). Mr. Pai was born in 1961 and is an Indian citizen.

As of December 31, 2018, all ABB Board members were non executive and independent directors and none of them held any official functions or political posts. Further information on ABB's Board members can be found by clicking on the ABB Board of Directors CV link which can be found at www.abb.com/about/corporate governance.

Board meetings

The Board meets as frequently as needed but at least four times per annual Board term. The Board has meetings with Executive Committee members as well as private meetings without them. Board meetings are convened by the Chairman or upon request by any other board member or the CEO. Documentation covering the various items of the agenda for each Board meeting is sent out in advance to each Board member in order to allow each member time to study the covered matters prior to the meetings. Further, Board members are entitled to information concerning ABB's business and affairs. Decisions made at the Board meetings are recorded in written minutes of the meetings.

Meetings and attendance

The Board and its committees have regularly scheduled meetings throughout the year. These meetings are supplemented by additional meetings (either in person or by conference call), as necessary. 2018 was a very intensive year for the Board and its committees. The table below shows the number of meetings held during 2018 by the Board and its committees, their average duration, as well as the attendance of the individual Board members. The Board meetings shown include a strategic retreat attended by the members of the Board and the EC.

2018 Board and board Committee Meetings

	2018									
	Pre annual general meeting 2018					Post annual general meeting 2018				
	Board		FACC	GNC	CC	Board[3]		FACC	GNC	CC
Meetings and attendance	*Mtg.*	*Conf. Call*				*Mtg.*	*Conf. Call*			
Average duration (hours)	8	1	2.5	1.5	1.5	8	2	3.4	1.7	1.5
Number of meetings	1	2	2	2	3	5	9	4	5	4
Meetings attended:										
Peter R. Voser	1	2	-	2	-	5	9	-	5	-
Jacob Wallenberg	1	2	-	2	-	5	9	-	5	-
Matti Alahuhta	1	2	-	2	-	5	9	-	5	-
Gunnar Brock[1]	-	-	-	-	-	5	9	3	-	-
David Constable	1	2	-	-	3	5	9	-	-	4
Frederico Fleury Curado	1	2	-	-	2	5	9	-	-	4
Lars Förberg	1	2	-	2	-	5	9	-	5	-
Louis R. Hughes[2]	1	2	2	-	-	-	-	-	-	-
Jennifer Xin Zhe Li[1]	-	-	-	-	-	4	8	-	-	4
Geraldine Matchett[1]	-	-	-	-	-	5	9	4	-	-
David Meline	1	2	2	-	-	5	9	4	-	-
Satish Pai	1	2	2	-	-	4	9	4	-	-
Ying Yeh[2]	1	2	-	-	3	-	-	-	-	-

(1) Gunnar Brock, Jennifer Xin Zhe Li and Geraldine Matchett were first elected to the Board at the March 2018 AGM.

(2) Louis R. Hughes and Ying Yeh stepped down from the Board in March 2018.

(3) One conference call post annual general meeting 2018 was attended only by the Chairman of the Board and the Chairman of the FACC to whom the Board had delegated authority.

Mandates of Board members outside the ABB Group

No member of the Board may hold more than ten additional mandates of which no more than four may be in listed companies. Certain types of mandates, such as those in our subsidiaries, those in the same group of companies and those in non profit and charitable institutions, are not subject to those limits. Additional details can be found in Article 38 of ABB's Articles of Incorporation.

Business relationships between ABB and its Board members

This section describes important business relationships between ABB and its Board members, or companies and organizations represented by them. This determination has been made based on ABB Ltd's Related Party Transaction Policy. This policy is contained in the ABB Ltd Board Regulations & Corporate Governance Guidelines.

Sasol Ltd (Sasol) is an important customer of ABB. ABB supplies Sasol primarily with modular systems through its Electrification Products division. David Constable was president, chief executive officer and member of the board of Sasol until June 2016.

IBM Corporation (IBM) is an important supplier to ABB. IBM supplies ABB primarily with IT related hardware, software and services. Peter R. Voser is a director of IBM.

After reviewing the level of ABB's business with Sasol and the level of purchases from IBM, the Board has determined that ABB's business relationships with those companies are not unusual in their nature or conditions and do not constitute material business relationships. As a result, the Board concluded that all members of the Board are considered to be independent directors. This determination was made in accordance with ABB's Related Party Transaction Policy.

EXECUTIVE COMMITTEE

Composition of the Executive Committee

Ulrich Spiesshofer
Chief Executive Officer

Corporate Officers	Division Presidents	Region Presidents
Timo Ihamuotila Chief Financial Officer	Tarak Mehta Electrification Products	Frank Duggan Europe
Jean Christophe Deslarzes Chief Human Resources Officer	Sami Atiya Robotics and Motion	Chunyuan Gu Asia, Middle East & Africa
Diane de Saint Victor General Counsel	Peter Terwiesch Industrial Automation	Greg Scheu Americas
	Claudio Facchin Power Grids	

Executive Committee responsibilities and organization

The Board has delegated the executive management of ABB to the CEO. The CEO and, under his direction, the other members of the Executive Committee are responsible for ABB's overall business and affairs and day to day management. The CEO reports to the Board regularly, and whenever extraordinary circumstances so require, on the course of ABB's business and financial performance and on all organizational and personnel matters, transactions and other issues material to the Group. Each member of the Executive Committee is appointed and discharged by the Board.

Members of the Executive Committee (at December 31, 2018):

Ulrich Spiesshofer was appointed Chief Executive Officer in September 2013 and has been a member of the Executive Committee since 2005. From January 2010 to September 2013, Mr. Spiesshofer was Head of the Discrete Automation and Motion division. He joined ABB in November 2005 as Head of Corporate Development. From 2002 until he joined ABB, he was senior partner and global head of operations practice at Roland Berger AG (Switzerland). From 1991 to 2002, he held various management positions with A.T. Kearney Ltd. and its affiliates. Mr. Spiesshofer was born in 1964 and is a Swiss and German citizen.

Timo Ihamuotila was appointed Chief Financial Officer and member of the Executive Committee in April 2017. From 2009 to 2016, Mr. Ihamuotila was chief financial officer and an executive vice president of the Nokia Corporation (Finland). From 1999 to 2009, he held various senior roles with Nokia. Mr. Ihamuotila was born in 1966 and is a Finnish citizen.

Jean Christophe Deslarzes was appointed Chief Human Resources Officer and member of the Executive Committee in November 2013. He is a member of the board of directors of Adecco Group AG (Switzerland). From 2010 through 2013, he was the chief human resources and organization officer of the Carrefour Group (France). From 2008 to 2010 he was the president and chief executive officer of the Downstream Aluminum Businesses of Rio Tinto (Canada). He was senior vice president human resources of Alcan Inc. (Canada) from 2006–2008 and in addition he co led the integration of Rio Tinto and Alcan from 2007 to 2008. From 1994 to 2006, he held various human resources and management roles with Alcan Inc. Mr. Deslarzes was born in 1963 and is a Swiss citizen.

Diane de Saint Victor was appointed General Counsel, Company Secretary and member of the Executive Committee in January 2007. She is a member of the board of directors of the American Chamber of Commerce (France). From 2013 to 2017, she was a non executive director of Barclays plc and Barclays Bank plc (both U.K.). From 2004 to 2006, she was general counsel of the Airbus Group (France/Germany). From 2003 to 2004, she was general counsel of SCA Hygiene Products (Germany). From 1993 to 2003, she held various legal positions with Honeywell International (France/Belgium). From 1988 to 1993, she held various legal positions with General Electric (U.S.). Ms. de Saint Victor was born in 1955 and is a French citizen.

Tarak Mehta was appointed President of the Electrification Products division effective January 2016 and has been a member of the Executive Committee since October 2010. From October 2010 through December 2015, he was President of the Low Voltage Products division. From 2007 to 2010, he was Head of ABB's transformers business. Between 1998 and 2006, he held several management positions with ABB. Mr. Mehta was born in 1966 and is a U.S. citizen.

Sami Atiya was appointed President of the Robotics and Motion Division effective January 2017 and has been a member of the Executive Committee since June 2016. From June to December 2016 he was President of the Discrete Automation and Motion division. Prior to joining ABB, Mr. Atiya held senior roles at Siemens in Germany from 1997 to 2015, including as chief executive officer of the mobility and logistics division in the infrastructure and cities sector from 2011. Mr. Atiya was born in 1964 and is a German citizen.

Peter Terwiesch was appointed President of the Industrial Automation division effective January 2017 and has been a member of the Executive Committee since January 2015. He is a member of the board of directors of Metall Zug AG (Switzerland). He was the President of the Process Automation division from 2015 to 2016. From 2011 to 2014, Mr. Terwiesch was Head of ABB's Central Europe region. He was ABB's Chief Technology Officer from 2005 to 2011. From 1994 to 2005, he held several positions with ABB. Mr. Terwiesch was born in 1966 and is a Swiss and German citizen.

Claudio Facchin was appointed President of the Power Grids division effective January 2016 and has been a member of the Executive Committee since December 2013. From December 2013 through December 2015, he was President of the Power Systems division. From 2010 to 2013, Mr. Facchin was Head of ABB's North Asia region. From 2004 to 2009, Mr. Facchin was the Head of ABB's substations global business unit and from 1995 to 2004, he held various management roles with ABB. Mr. Facchin was born in 1965 and is an Italian citizen.

Frank Duggan was appointed President of the Europe region in July 2017 and has been a member of the Executive Committee since 2011. From 2015 to June 2017, Mr. Duggan held the role of President of the Asia, Middle East and Africa region. Prior to this from 2011 to 2014, he was Head of Global Markets. From 2008 to 2014, he was also ABB's Region Manager for India, Middle East and Africa. From 1986 and 2011, he held several management positions with ABB. Mr. Duggan was born in 1959 and is an Irish citizen.

Chunyuan Gu was appointed President of the Asia, Middle East and Africa region and a member of the Executive Committee in July 2017. In addition, Mr. Gu was the Managing Director of ABB China from 2014 to 2018. From 2012 to 2013, he was the Regional Division Head of ABB's Discrete Automation and Motion for North Asia and China. From 2010 to 2011, he was the Head of ABB's robotics business unit in China. Before this, Mr. Gu held various management and technical roles in ABB's robotics business in China and Sweden. Mr. Gu was born in 1958 and is a Swedish citizen.

Greg Scheu was appointed President of the Americas region as well as Head of Group Service and Business Integration in January 2015 and has been a member of the Executive Committee since 2012. From 2013 to 2014, he was Head of Business Integration, Group Service and North America. From 2012 to 2013, he was Head of Marketing and Customer Solutions. Mr. Scheu, a former executive of Rockwell International, joined ABB in 2001 and was responsible for the integration of both Baldor Electric Co. and of Thomas & Betts into ABB. Mr. Scheu was born in 1961 and is a U.S. citizen.

Further information about the members of the Executive Committee can be found by clicking on the Executive Committee CV link at www.abb.com/about/corporate governance

Mandates of EC members outside the ABB Group

No member of the EC may hold more than five additional mandates of which no more than one may be in a listed company. Certain types of mandates, such as those in our subsidiaries, those in the same group of companies and those in non profit and charitable institutions, are not subject to those limits. Additional details can be found in Article 38 of ABB's Articles of Incorporation.

Business relationships between ABB and its EC members

This section describes important business relationships between ABB and its EC members, or companies and organizations represented by them. This determination has been made based on ABB Ltd's Related Party Transaction Policy. This policy is contained in the ABB Ltd Board Regulations & Corporate Governance Guidelines.

Adecco Group AG (Adecco) is an important supplier to ABB. Adecco primarily supplies ABB with temporary personnel services. Jean Christophe Deslarzes is a director of Adecco.

ABB has an unsecured syndicated $2 billion revolving credit facility. As of December 31, 2018, Barclays Bank plc (Barclays Bank) had committed to approximately $74 million out of the $2 billion total. In addition, ABB has regular banking business with Barclays. Diane de Saint Victor was a director of Barclays Bank and Barclays plc until May 2017.

After reviewing the level of purchases from Adecco, and after reviewing the banking commitments of Barclays, the Board has determined that ABB's business relationships with those companies are not unusual in their nature or conditions and do not constitute material business relationships. This determination was made in accordance with ABB Ltd's Related Party Transaction Policy.

SHARES

Share capital of ABB

At December 31, 2018, ABB's ordinary share capital (including treasury shares) as registered with the Commercial Register amounted to CHF 260,177,791.68, divided into 2,168,148,264 fully paid registered shares with a par value of CHF 0.12 per share.

ABB Ltd's shares are listed on the SIX Swiss Exchange, the NASDAQ OMX Stockholm Exchange and the New York Stock Exchange (where its shares are traded in the form of American depositary shares (ADS) – each ADS representing one registered ABB share). At December 31, 2018, ABB Ltd had a market capitalization based on outstanding shares (total number of outstanding shares: 2,131,962,406) of approximately CHF 40 billion ($41 billion, SEK 364 billion). The only consolidated subsidiary in the ABB Group with listed shares is ABB India Limited, Bangalore, India, which is listed on the BSE Ltd. (Bombay Stock Exchange) and the National Stock Exchange of India. At December 31, 2018, ABB Ltd, Switzerland, directly or indirectly owned 75 percent of ABB India Limited, Bangalore, India, which at that time had a market capitalization of approximately INR 280 billion.

Stock exchange listings (At December 31, 2018)

Stock exchange	Security	Ticker symbol	ISIN code
SIX Swiss Exchange	ABB Ltd, Zurich, share	ABBN	CH0012221716
NASDAQ OMX Stockholm Exchange	ABB Ltd, Zurich, share	ABB	CH0012221716
New York Stock Exchange	ABB Ltd, Zurich, ADS	ABB	US0003752047
BSE Ltd. (Bombay Stock Exchange)	ABB India Limited, Bangalore, share	ABB[(1)]	INE117A01022
National Stock Exchange of India	ABB India Limited, Bangalore, share	ABB	INE117A01022

(1) also called Scrip ID

Share repurchases and cancellation

Under the share buyback program that ran from September 2014 to September 2016, ABB repurchased a total of 146,595,000 shares for cancellation. In 2016, 100 million shares were cancelled. At ABB's General Meeting of Shareholders in 2017, the shareholders approved the cancellation of 46.595 million shares. This was completed in July 2017. As a result of the share cancellation in 2017, the total number of ABB's Ltd's issued shares is 2,168,148,264.

Changes to the ordinary share capital

In 2018, ABB paid a dividend of 0.78 Swiss francs per share relating to the year 2017. In 2017, ABB paid a dividend of 0.76 Swiss francs per share relating to the year 2016. In 2016, ABB paid its dividend relating to the year 2015 by way of a nominal value reduction in the par value of its shares from CHF 0.86 to CHF 0.12. Corresponding adjustments were made to the par value of ABB's contingent and authorized shares.

Except for the share cancellation and nominal value reductions described above, there were no other changes to ABB's ordinary share capital during 2018, 2017 and 2016.

Convertible bonds and options

ABB does not have any bonds outstanding that are convertible into ABB shares. For information about options on shares issued by ABB, please refer to "Note 19 Stockholders' equity" to ABB's Consolidated Financial Statements.

Contingent share capital

At December 31, 2018, ABB's share capital may be increased by an amount not to exceed CHF 24,000,000 through the issuance of up to 200,000,000 fully paid registered shares with a par value of CHF 0.12 per share through the exercise of conversion rights and/or warrants granted in connection with the issuance on national or international capital markets of newly or already issued bonds or other financial market instruments.

At December 31, 2018, ABB's share capital may be increased by an amount not to exceed CHF 1,200,000 through the issuance of up to 10,000,000 fully paid registered shares with a par value of CHF 0.12 per share through the exercise of warrant rights granted to its shareholders. The Board may grant warrant rights not taken up by shareholders for other purposes in the interest of ABB.

The pre emptive rights of the shareholders are excluded in connection with the issuance of convertible or warrant-bearing bonds or other financial market instruments or the grant of warrant rights. The then current owners of conversion rights and/or warrants will be entitled to subscribe for new shares. The conditions of the conversion rights and/or warrants will be determined by the Board.

The acquisition of shares through the exercise of warrants and each subsequent transfer of the shares will be subject to the restrictions of ABB's Articles of Incorporation (see "Limitations on transferability of shares and nominee registration" in Shareholders section below).

In connection with the issuance of convertible or warrant-bearing bonds or other financial market instruments, the Board is authorized to restrict or deny the advance subscription rights of shareholders if such bonds or other financial market instruments are for the purpose of financing or refinancing the acquisition of an enterprise, parts of an enterprise, participations or new investments or an issuance on national or international capital markets. If the Board denies advance subscription rights, the convertible or warrant bearing bonds or other financial market instruments will be issued at the relevant market conditions and the new shares will be issued pursuant to the relevant market conditions taking into account the share price and/or other comparable instruments having a market price. Conversion rights may be exercised during a maximum ten year period, and warrants may be exercised during a maximum seven year period, in each case from the date of the respective issuance. The advance subscription rights of the shareholders may be granted indirectly.

At December 31, 2018, ABB's share capital may be increased by an amount not to exceed CHF 11,284,656 through the issuance of up to 94,038,800 fully paid shares with a par value of CHF 0.12 per share to employees. The pre emptive and advance subscription rights of ABB's shareholders are excluded. The shares or rights to subscribe for shares will be issued to employees pursuant to one or more regulations to be issued by the Board, taking into account performance, functions, level of responsibility and profitability criteria. ABB may issue shares or subscription rights to employees at a price lower than that quoted on a stock exchange. The acquisition of shares within the context of employee share ownership and each subsequent transfer of the shares will be subject to the restrictions of ABB's Articles of Incorporation (see "Limitations on transferability of shares and nominee registration" in Shareholders section below).

Authorized share capital

At December 31, 2018, ABB had an authorized share capital in the amount of up to CHF 24,000,000 through the issuance of up to 200,000,000 fully paid registered shares with a par value of CHF 0.12 each, which is valid through April 13, 2019. The Board is authorized to determine the date of issue of new shares, the issue price, the type of payment, the conditions for the exercise of pre emptive rights and the beginning date for dividend entitlement. In this regard, the Board may issue new shares by means of a firm underwriting through a banking institution, a syndicate or another third party with a subsequent offer of these shares to the shareholders. The Board may permit pre emptive rights that have not been exercised by shareholders to expire or it may place these rights and/or shares as to which pre emptive rights have been granted but not exercised at market conditions or use them for other purposes in the interest of the company. Furthermore, the Board is authorized to restrict or deny the pre emptive rights of shareholders and allocate such rights to third parties if the shares are used (1) for the acquisition of an enterprise, parts of an enterprise, or participations, or for new investments, or in case of a share placement, for the financing or refinancing of such transactions; or (2) for the purpose of broadening the shareholder constituency in connection with a listing of shares on domestic or foreign stock exchanges. The subscription and the acquisition of the new shares, as well as each subsequent transfer of the shares, will be subject to the restrictions of ABB's Articles of Incorporation.

SHAREHOLDERS

Shareholder structure

As of December 31, 2018, the total number of shareholders directly registered with ABB Ltd was approximately 114,000 and another 364,000 shareholders held shares indirectly through nominees. In total as of that date, ABB had approximately 478,000 shareholders.

Significant shareholders

Investor AB, Sweden, held 232,165,142 ABB shares as of December 31, 2018. This holding represents approximately 10.71 percent of ABB's total share capital and voting rights as registered in the Commercial Register on December 31, 2018. The number of shares held by Investor AB does not include shares held by Mr. Jacob Wallenberg, the chairman of Investor AB and a director of ABB, in his individual capacity.

Cevian Capital II GP Limited, Jersey, disclosed that as of September 8, 2017, it held 115,868,333 ABB shares. This holding represents approximately 5.34 percent of ABB's total share capital and voting rights as registered in the Commercial Register on December 31, 2018.

BlackRock Inc., U.S., disclosed that as of August 31, 2017, it, together with its direct and indirect subsidiaries, held 72,900,737 ABB shares. This holding represents 3.36 percent of ABB's total share capital and voting rights as registered in the Commercial Register on December 31, 2018.

At December 31, 2018, to the best of ABB's knowledge, no other shareholder held 3 percent or more of ABB's total share capital and voting rights as registered in the Commercial Register on that date.

ABB Ltd has no cross shareholdings in excess of 5 percent of capital, or voting rights with any other company.

Under ABB's Articles of Incorporation, each registered share represents one vote. Significant shareholders do not have different voting rights. To our knowledge, we are not directly or indirectly owned or controlled by any government or by any other corporation or person.

Shareholders' rights

Shareholders have the right to receive dividends, to vote and to execute such other rights as granted under Swiss law and the Articles of Incorporation.

Right to vote:

ABB has one class of shares and each registered share carries one vote at the general meeting. Voting rights may be exercised only after a shareholder has been registered in the share register of ABB as a shareholder with the right to vote, or with Euroclear Sweden AB (Euroclear), which maintains a subregister of the share register of ABB.

A shareholder may be represented at the Annual General Meeting by its legal representative, by another shareholder with the right to vote or by the independent proxy elected by the shareholders (unabhängiger Stimmrechtsvertreter). If the Company does not have an independent proxy, the Board of Directors shall appoint the independent proxy for the next General Meeting of Shareholders. All shares held by one shareholder may be represented by one representative only.

For practical reasons shareholders must be registered in the share register no later than 6 business days before the general meeting in order to be entitled to vote. Except for the cases described under Limitations on transferability of shares and nominee registration below, there are no voting rights restrictions limiting ABB's shareholders' rights.

Shareholders' dividend rights

The unconsolidated statutory financial statements of ABB Ltd are prepared in accordance with Swiss law. Based on these financial statements, dividends may be paid only if ABB Ltd has sufficient distributable profits from previous years or sufficient free reserves to allow the distribution of a dividend. Swiss law requires that ABB Ltd retain at least 5 percent of its annual net profits as legal reserves until these reserves amount to at least 20 percent of ABB Ltd's share capital. Any net profits remaining in excess of those reserves are at the disposal of the shareholders' meeting.

Under Swiss law, ABB Ltd may only pay out a dividend if it has been proposed by a shareholder or the Board of Directors and approved at a general meeting of shareholders, and the auditors confirm that the dividend conforms to statutory law and ABB's Articles of Incorporation. In practice, the shareholders' meeting usually approves dividends as proposed by the Board of Directors.

Dividends are usually due and payable no earlier than two trading days after the shareholders' resolution and the ex date for dividends is normally two trading days after the shareholders' resolution approving the dividend. Dividends are paid out to the holders that are registered on the record date. Euroclear administers the payment of those shares registered with it. Under Swiss law, dividends not collected within five years after the due date accrue to ABB Ltd and are allocated to its other reserves. As ABB Ltd pays cash dividends, if any, in Swiss francs (subject to the exception for certain shareholders in Sweden described below), exchange rate fluctuations will affect the U.S. dollar amounts received by holders of ADSs upon conversion of those cash dividends by Citibank, N.A., the depositary, in accordance with the Amended and Restated Deposit Agreement dated May 7, 2001.

For shareholders who are residents of Sweden, ABB has established a dividend access facility (for up to 600,004,716 shares). With respect to any annual dividend payment for which this facility is made available, shareholders who register with Euroclear may elect to receive the dividend from ABB Norden Holding AB in Swedish krona (in an amount equivalent to the dividend paid in Swiss francs) without deduction of Swiss withholding tax. For further information on the dividend access facility, see ABB's Articles of Incorporation.

Limitations on transferability of shares and nominee registration

ABB may decline a registration with voting rights if a shareholder does not declare that it has acquired the shares in its own name and for its own account. If the shareholder refuses to make such declaration, it will be registered as a shareholder without voting rights. A person failing to expressly declare in its registration / application that it holds the shares for its own account (a nominee), will be entered in the share register with voting rights, provided that such nominee has entered into an agreement with ABB concerning its status, and further provided that the nominee is subject to recognized bank or financial market supervision. In special cases the Board may grant exemptions. There were no exemptions granted in 2018. The limitation on the transferability of shares may be removed by an amendment of ABB's Articles of Incorporation by a shareholders' resolution requiring two thirds of the votes represented at the meeting.

No restriction on trading of shares

No restrictions are imposed on the transferability of ABB shares. The registration of shareholders in the ABB Share register, Euroclear and the ADS register kept by Citibank does not affect transferability of ABB shares or ADSs. Registered ABB shareholders or ADR holders may therefore purchase or sell their ABB shares or ADRs at any time, including before a General Meeting regardless of the record date. The record date serves only to determine the right to vote at a General Meeting.

Duty to make a public tender offer:

ABB's Articles of Incorporation do not contain any provisions raising the threshold (opting up) or waiving the duty (opting out) to make a public tender offer pursuant to article 32 of the Swiss Stock Exchange and Securities Trading Act.

OTHER GOVERNANCE INFORMATION

Management contracts

There are no management contracts between ABB and companies or natural persons not belonging to the ABB Group.

Change of control clauses

Board members, Executive Committee members, and other members of senior management do not receive any special benefits in the event of a change of control. However, the conditional grants under the Long Term Incentive Plan and the Management Incentive Plan may be subject to accelerated vesting in the event of a change of control.

Employee participation programs

In order to align its employees' interests with the business goals and financial results of the company, ABB operates a number of incentive plans, linked to ABB's shares, such as the Employee Share Acquisition Plan, the Management Incentive Plan and the Long Term Incentive Plan. For a more detailed description of these incentive plans, please refer to "Note 18 Share based payment arrangements" to ABB's Consolidated Financial Statements.

Governance differences from NYSE Standards

According to the New York Stock Exchange's corporate governance standards (the Standards), ABB is required to disclose significant ways in which its corporate governance practices differ from the Standards. ABB has reviewed the Standards and concluded that its corporate governance practices are generally consistent with the Standards, with the following significant exceptions:

- Swiss law requires that the external auditors be elected by the shareholders at the Annual General Meeting rather than by the audit committee or the board of directors.

- The Standards require that all equity compensation plans and material revisions thereto be approved by the shareholders. Consistent with Swiss law such matters are decided by our Board. However, the shareholders decide about the creation of new share capital that can be used in connection with equity compensation plans.

- Swiss law requires that the members of the compensation committee are elected by the shareholders rather than appointed by our Board.

- Swiss law requires shareholders to approve the maximum aggregate Board compensation and the maximum aggregate Executive Committee compensation.

COMPENSATION

Compensation governance

Shareholder engagement

ABB's Articles of Incorporation, approved by its shareholders, contain provisions on compensation which govern and outline the principles of compensation relating to our Board and Executive Committee (EC). They can be found on ABB's Corporate governance website new.abb.com/about/corporate-governance and are summarized below:

- **Compensation Committee** (Articles 28 to 31): The Compensation Committee (CC) is composed of a minimum of three members of the Board of Directors who are elected individually by the shareholders at the Annual General Meeting (AGM) for a period of one year. The CC supports the Board in establishing and reviewing the compensation strategy, principles and programs, in preparing the proposals to the AGM on compensation matters and in determining the compensation of the Board and of the EC. The responsibilities of the CC are defined in more detail in the Board Regulations and Corporate Governance guidelines, which are available on ABB's Corporate governance website.

- **Compensation principles** (Article 33): Compensation of the members of the Board consists of fixed compensation only, which is delivered in cash and shares (with an option to elect for shares only). Compensation of the members of the EC consists of fixed and variable compensation. Variable compensation may comprise short-term and long-term elements. Compensation may be paid in cash, shares or other benefits.

- **"Say-on-pay" vote** (Article 34): Shareholders approve the maximum aggregate amount of compensation of the Board for the following Board term and of the EC for the following financial year.

- **Supplementary amount for new EC members** (Article 35): If the maximum approved aggregate compensation amount is not sufficient to also cover the compensation of newly promoted/hired EC members, up to 30 percent of the last maximum approved aggregate amount shall be available as a supplementary amount to cover the compensation of such new EC members.

- **Loans** (Article 37): Loans may not be granted to members of the Board or of the EC.

Shareholders also have a consultative vote on the prior year's Compensation Report at the AGM. The Compensation Report describes the compensation principles and programs as well as the governance framework related to the compensation of the Board and EC. The Compensation Report also provides details of the compensation paid to the members of the Board and of the EC in the prior calendar year.

The Compensation Report is written in accordance with the Ordinance against Excessive Remuneration in Stock Listed Corporations (Ordinance), the standard relating to information on Corporate Governance of the SIX Swiss Exchange, the rules of the stock markets of Sweden and the United States where ABB's shares are also listed, and the principles of the Swiss Code of Best Practice for Corporate Governance of economiesuisse.

Authority levels in compensation matters

The CC acts in an advisory capacity while the Board retains the decision authority on compensation matters, except for the maximum aggregate compensation amounts of the Board and of the EC, which are subject to the approval of shareholders at the AGM. The authority levels of the different bodies on compensation matters are detailed in Compensation Exhibit 1.

Compensation Exhibit 1: Authority levels in compensation matters

			CEO	CC	Board	AGM
Compensation policy including incentive plans						
Maximum aggregate compensation amount EC						
CEO compensation						
Individual compensation EC members						
Performance target setting and assessment CEO						
Performance target setting and assessment EC						
Shareholding requirements CEO and EC						
Maximum aggregate compensation amount Board						
Individual compensation of Board members						
Compensation Report						Consultative vote
Proposal	Recommendation	Approval				

Activities of the CC in 2018

The CC meets as often as business requires but at least four times a year. In 2018, the CC held seven meetings and performed the activities described in Compensation Exhibit 2. Details on meeting attendance of the individual CC members are provided in the section titled "Board of Directors – Meetings and attendance" above.

Compensation Exhibit 2: CC activities during 2018

EC Compensation
Review of the EC compensation levels against external benchmarks
Recommendation of individual compensation for EC members
Review of the share ownership of EC members
Performance – relating to past performance cycle
Assessment of short-term variable compensation for 2017
Assessment of achievement of performance targets for Long Term Incentive Plan (LTIP) awards vesting in 2018
Performance – relating to forthcoming performance cycle
Setting of short-term variable compensation targets for 2018
Setting of performance targets for LTIP awards granted in 2018
TSR and EPS evaluation methodologies
Updates on achievement against performance targets for unvested LTIP awards
Compliance
Review of the Compensation Report for publication
Preparation of maximum aggregate compensation for Board to be submitted for AGM vote

Preparation of maximum aggregate compensation for EC to be submitted for AGM vote

The Chairman of the CC reports to the full Board after each CC meeting. The minutes of the meetings are available to the members of the Board. As a general rule, the CEO, the Chief Human Resources Officer (CHRO) and the Head of Compensation and Benefits attend part of the CC meetings in an advisory capacity. The Chairman of the CC may decide to invite other executives upon consultation with the CEO, as appropriate. Executives do not attend the meetings or the parts of the meetings in which their own compensation and/or performance are being discussed.

The CC may decide to consult or retain external advisors for compensation matters. In 2018, Hostettler & Company (HCM) and PricewaterhouseCoopers (PwC) were mandated to provide services related to executive compensation matters. HCM has no other mandate with ABB. Apart from its CC advisory role, PwC also provides human resources, tax and advisory services to ABB.

Total compensation overview

Compensation Exhibit 3: Board compensation (in CHF)

	Board term	
Board of Directors	**2018–2019**	**2017–2018**
Number of members	11	10
Total compensation	4,670,000	4,340,000
Maximum aggregate compensation amount approved at AGM	4,700,000	4,400,000

Compensation Exhibit 4: EC compensation (in CHF)

	Calendar year	
Executive Committee	**2018**	**2017**
Number of members	11	11
Total compensation	39,773,211	46,631,207[1]
Maximum aggregate compensation amount approved at AGM	52,000,000	50,000,000

(1) This amount includes CHF 2,553,435 for the fair value of the replacement share grant provided to the incoming CFO to compensate for benefits foregone from his previous employer. Excluding this, the total would have been CHF 44,077,772.

Board compensation

Policy and principles

The compensation system for the members of the Board is designed to attract and retain experienced people in the Board. Compensation of Board members takes into account the responsibilities, time and effort required to fulfill their roles on the Board and its committees. From time to time, the levels and mix of compensation of Board members are compared against the compensation of non-executive board members of publicly traded companies in Switzerland that are part of the Swiss Market Index.

The compensation of Board members is fixed. They do not receive variable compensation or pension benefits, underscoring their focus on corporate strategy, supervision and governance. In accordance with Swiss law, Board members may not receive ‘golden parachutes’ or other special benefits in the event of a change of control. Board members are paid for their service over a 12-month period that starts with their election at the AGM. Payment is made in semi annual installments in arrears.

In order to further align the interests of the Board members with those of ABB’s shareholders, half of their total compensation must be paid in ABB shares, although Board members may choose to receive all of their compensation in shares. The number of shares delivered is calculated prior to each semi-annual payment by dividing the monetary amount to which the Board members are entitled by the average closing price of the ABB share over a predefined 30 day period. The shares are subject to a three-year restriction period during which they cannot be sold, transferred or pledged. Any restricted shares are unblocked when the Board member leaves the Board.

Structure of Board Compensation

The structure of Board compensation for the term of office from the 2018 AGM to the 2019 AGM is described in Compensation Exhibit 5 below

Compensation Exhibit 5: Structure of Board compensation

	Board term fee (CHF)
Chairman of the Board [(1)]	1,200,000
Vice-chairman of the Board [(1)]	450,000
Member of the Board	290,000
Additional committee fees:	
Chairman of FACC [(2)]	110,000
Chairman of CC or GNC [(2)]	60,000
Member of FACC [(2)]	40,000
Member of CC or GNC [(2)]	30,000

(1) The Chairman and the Vice-chairman do not receive any additional committee fees for their roles on the GNC.

(2) CC: Compensation Committee,

FACC: Finance, Audit & Compliance Committee,

GNC: Governance & Nomination Committee.

The compensation amounts paid to the Board members for the calendar year 2018 and for the term of office from the 2018 AGM to the 2019 AGM are disclosed in Compensation Exhibits 21 and 22, respectively, in the section “Compensation and share ownership tables.”

Compensation of the Board in 2018

In 2018, the total compensation for the Board members was CHF 4.5 million and remained unchanged compared with 2017. See Compensation Exhibit 21 in the section “Compensation and share ownership tables” below.

At the 2017 AGM, the shareholders approved a maximum aggregate compensation amount of CHF 4.4 million for the Board for the term of office 2017–2018. The compensation paid for that period amounts to CHF 4.34 million as presented in Compensation Exhibit 3 above and Compensation Exhibit 22 in the section “Compensation and share ownership tables” below, and is therefore within the approved amount.

At the 2018 AGM, the shareholders approved a maximum aggregate compensation amount of CHF 4.7 million for the Board for the term of office 2018–2019. The compensation agreed to be paid for that period amounts to CHF 4.67 million as presented in Compensation Exhibit 3 above and Compensation Exhibit 22 in the section “Compensation and share ownership tables” below, and is therefore within the approved amount.

Shareholdings of Board members

The members of the Board collectively owned less than 1 percent of ABB’s total shares outstanding at December 31, 2018.

Compensation Exhibit 23 in the section “Compensation and share ownership tables” below, shows the number of ABB shares held by each Board member at December 31, 2018 and 2017. Except as described in this Compensation Exhibit, no member of the Board and no person closely linked to a member of the Board held any shares of ABB or options in ABB shares.

In 2018, ABB did not pay any fees or compensation to the members of the Board for services rendered to ABB other than those disclosed in this report. Except as disclosed in the section titled “Board of Directors Business relationships between ABB and its Board members” above, ABB did not pay any additional fees or compensation in 2018 to persons closely linked to a member of the Board for services rendered to ABB.

Compensation of former Board members

In 2018, no payment was made to any former Board member.

Executive Committee compensation

Policy and principles

ABB's compensation system reflects the commitment to attract, motivate and retain people with the talent necessary to strengthen ABB's position as a pioneering technology leader in power grids, electrification products, industrial automation and robotics and motion, serving customers in utilities, industry and transport & infrastructure globally.

The compensation system is designed to provide competitive compensation and to encourage executives and employees to deliver outstanding results and create sustainable shareholder value without taking excessive risks. The compensation system balances:

- fixed and variable compensation elements;
- short-term and long-term incentives;
- the recognition of Group and individual performance.

ABB continues to increase the performance orientation of its compensation system to better align it to the Company's strategy by having performance metrics that support the development of earnings per share (EPS) and cash return on invested capital (CROI).

Structure of EC Compensation

Overall positioning of compensation

The compensation of EC members consists of an annual base salary, standard benefits, a short-term variable component based on annual performance objectives and a long-term variable component based on long-term performance.

The Board considers several factors when reviewing and setting the individual target compensation of each EC member:

- market value of the role (external benchmark);
- individual profile of the incumbent in terms of experience and skillset;
- individual performance and potential;
- affordability for the Company.

All EC and other senior positions of ABB have been evaluated using the job evaluation methodology of the Hay Group, which is used by more than 10,000 companies around the world. This approach provides a meaningful, transparent and consistent basis for evaluating roles and for comparing compensation levels with those of equivalent jobs at other companies.

The primary source of data to assess the EC compensation is the General Pan-European Market of Hay's annual survey "Top Executive Compensation in Europe". The EC compensation is benchmarked against the median to upper quartile values. We also use Hay's data on Swiss and U.S. peers, as well as a global industry peer group (see Compensation Exhibit 6).

Compensation Exhibit 6: Compensation benchmarks

REFERENCE	COMPOSITION	RATIONALE
Main benchmark		
Hay General Pan-European Market	360 largest European companies of the FT Europe 500 listing	Continuity and stability of data points
References to stress-test main benchmark		
Global industry group	Peer companies[1] selected based on business, geographic presence and size	Specific peer group to benchmark compensation design
Swiss market	SMI and SMIM companies that are included in Hay's General Pan-European Market data	Comparison with other multinational Swiss companies
U.S. market	U.S. peers of similar size and industry	Comparison with other multinational U.S. companies
(1) The peers for the purpose of benchmarking compensation design are: Siemens, Schneider Electric, Legrand, Alstom, Atlas Copco, CNH Industrial, ThyssenKrupp, BAE systems, Rolls Royce, Linde, BASF, EADS, Schindler, Novartis, Nestlé, Lafarge Holcim, General Electric, 3M, Honeywell, Caterpillar, Emerson Electric, Eaton, Danaher and United Technologies.		

The compensation that is ultimately paid depends on the performance of the Group and of the individual members of the EC.

Compensation structure – overview

Our compensation structure is linked to our strategy and, as illustrated in Compensation Exhibits 7 and 17, a significant portion of total compensation depends directly on performance achievement. Our fully performance oriented LTIP plan and the high shareholding requirement are aligned to shareholder interests.

Compensation Exhibit 7: Structure of EC compensation in 2018

Compensation structure	**Fixed compensation- annual base salary and benefits**	**Short term variable compensation**	**Long term variable compensation**	**Wealth at Risk/ Share Ownership**
Purpose and link to strategy	Compensates EC members for the role	Rewards annual Company and individual performance. Drives annual strategy implementation	Encourages creation of long-term, sustainable value for shareholders, and delivery of long term strategic goals	Aligns individual's personal wealth at risk directly to the ABB share price
Operation	Cash salary, benefits in kind, and pension contribution	Annual awards, payable in cash after a 1-year performance period	Annual awards in shares which vest after 3 years subject to performance conditions	Individuals required to hold ABB shares
Opportunity level (as % salary)	Based on scope of responsibilities, individual experience and skillset	CEO Target: 150% Maximum: 225% EC: Target: 100% Maximum: 150%	CEO Target at grant: 200% Max vesting: 400% EC Target at grant: 100% Max Vesting: 200%	CEO wealth at risk: 500% (net) EC wealth at risk: 400% (net)
Time period	Delivered in year	1 year	3 years	Total EC tenure
Performance measures	Changes to base salary takes into account the executive's performance in the preceding year and potential for the future	Group objectives: Revenue, Op. EBITA %, Op. net income, OCF, Cost Savings, Individual objectives	Relative TSR (50%) EPS (50%)	Direct link to ABB share price

Fixed compensation – annual base salary and benefits

Purpose and link to strategy

- Compensates the EC members for the role.

Operation

- Fixed annual base salary and benefits.

- Benefits consist mainly of retirement, insurance and healthcare plans that are designed to provide a reasonable level of support for the employees and their dependents in case of retirement, disability or death.

- Benefit plans vary in line with the local competitive and legal environment and are, at a minimum, in accordance with the legal requirements of the respective country.

- EC members may also be provided with certain benefits according to competitive local market practice. Tax equalization is provided for EC members resident outside Switzerland to the extent that they are not able to claim a tax credit in their country of residence for income taxes they paid in Switzerland.

Opportunity level

- Annual base salary based on the scope of responsibilities, individual experience and skill set.

- The monetary value of benefits is disclosed in Compensation Exhibit 24: EC compensation 2018.

Performance measures

- When considering changes in base salary, the executive's performance during the preceding year against individual objectives as well as potential for the future are taken into account.

Short-term variable compensation

Purpose and link to strategy

- The short-term variable compensation is designed to reward EC members both for the Group's results and their individual performance over a time horizon of one year. It allows the EC members to participate in the overall Company's success while also being rewarded for their individual contributions.

Operation

- Annual cash awards are based on performance assessment over the given year.

Opportunity level

Compensation Exhibit 8: Opportunity level (% salary)

	Target	Maximum
CEO	150%	225%
EC	100%	150%

Performance measures

Group objectives (see Compensation Exhibit 9) are set in connection with the annual performance management process and are mainly group financial result oriented.

Compensation Exhibit 9: Group objectives and weighting in 2018

Objective	Weighting	Nature of assessment
Revenues	25%	Income realized from executing and fulfilling customer orders, before any costs or expenses are deducted
Operational EBITA margin	15%	Operational EBITA margin is Operational EBITA (as defined in Note 23 to the Consolidated Financial Statements) as a percentage of Operational revenues, which is total revenues adjusted for foreign exchange/commodity timing differences in total revenues
Operational net income	20%	Operational net income is calculated as net income attributable to ABB after adjustments [1]
Operating cash flow (OCF)	30%	Operating cash flow is defined as the net cash provided by operating activities, reversing the cash impact of interest, taxes and restructuring related activities
Cost savings	10%	Savings generated from ABB group wide cost reduction programs including supply chain management and operational excellence that have direct impact on the Group's operational EBITA

(1) Adjustments include: the after-tax effect of acquisition-related amortization, restructuring and restructuring-related expenses, non-operational pension cost (credit), changes in obligations related to divested businesses, changes in pre-acquisition estimates, gains and losses from sale of businesses, acquisition- and divestment-related expenses and integration costs, and certain other non-operational items, foreign exchange/commodity timing differences in income from operations.

Individual objectives vary by EC member. For Division and Regional Presidents, the majority are quantifiable objectives, based on financial and operational metrics for their area of responsibility; for the CEO and Corporate Officers, they are typically strategic objectives set by the Board.

Examples of quantitative individual metrics include items such as Divisional or Regional Revenue, Operational EBITA Margin, Operating Cash flow, Service Orders, or Demand Orders. Qualitative individual metrics include items such as key project delivery, talent management succession planning, and functional effectiveness.

For each performance objective (group and individual), a target is set corresponding to the expected level of performance that will generate a 100 percent award. Further, a minimum level of performance, below which there is no award (threshold) and a maximum level of performance, above which the award is capped at 150 percent of the target (cap), are also defined. The award percentages for achievements between the threshold, the target and the cap are determined by linear interpolations between these points.

The relative weighting and composition of Group and Individual objectives are shown in Compensation Exhibit 10 below. The majority of objectives for all EC members are quantitative in nature.

Compensation Exhibit 10: Weighting and composition of objectives for EC members for 2018

	CEO	**Division and Region Presidents**	**Corporate Officers** [1]
Group objectives	80%	35%	35%
Individual objectives	20%	65%	65%
Typical composition of objectives:			
- Qualitative	*20%*	*0-20%*	*15 - 45%*
- Quantitative	*80%*	*80-100%*	*55 - 85%*

(1) CFO, CHRO and General Counsel.

Long term variable compensation

Purpose and link to strategy

- Aimed at driving long-term shareholder value –creation in a sustainable manner. It rewards the achievement of predefined performance goals over a three-year period.

Operation

- Annual Conditional Grant under the LTIP.

- Reference grant values are defined as a percentage of base salary.

Compensation Exhibit 11: Reference grant value (% of annual base salary)

	EPS measure	**TSR measure**	**Total**
CEO	100%	100%	200%
EC	50%	50%	100%

- The reference value for the grant size for EC members as a pool may be increased or decreased by the Board by up to 12.5 percent.

- The number of shares to be granted is determined by dividing the reference value by the average share price over the period 20 trading days prior, and 20 trading days after, the date of publication of ABB's full year financial results. Settlement of the LTIP is three years after grant, subject to achievement of performance conditions, defined prior to grant.

- The actual settlement value of awards will vary between zero and 200 percent of the reference grant according to achievement against two equally weighted performance measures, one tied to ABB's EPS and one to ABB's TSR (see performance measures section below).

- Delivery is 65 percent in shares and the remainder in cash, in order to facilitate the settlement of appropriate taxes, with the possibility to elect to receive 100 percent in shares.

- Subject to malus and clawback rules if a plan participant has been involved in any illegal activity. This means that the Board of Directors may decide not to pay any unpaid or unvested incentive compensation (malus), or may seek to recover incentive compensation that has been paid in the past (clawback).

Performance measures

TSR

- Achievement against this measure is determined by ABB's Total Shareholder Return (TSR) performance against a defined peer group.

- The constituents of the peer group and the appropriate threshold (zero), target (100 percent) and maximum (200 percent) award points are reviewed by the CC on an annual basis.

- The TSR calculations are made for the reference period beginning in the year of the Conditional Grant and ending three years later. The evaluation is performed by an independent third party.

EPS

- Achievement against this measure is determined by ABB's average Earnings Per Share (EPS) over a three year period.

- The average EPS result is calculated from the EPS for each of the three relevant years, divided by three.

- EPS is defined as 'Diluted earnings per share attributable to ABB shareholders, calculated using Income from continuing operations, net of taxes, unless the Board elects to calculate using Net Income for a particular year'.

- Appropriate threshold (zero), target (100 percent) and maximum (200 percent) award points are reviewed by the CC on an annual basis.

- Performance points are set using an 'outside-in' view, taking into account the growth expectations, risk profile, investment levels and profitability levels that are typical for the industry.

- This 'outside-in' approach is provided by external advisors and assumes that investors expect a risk adjusted return on their investment, which is based on market value (and not book value) and translates such expected returns over a three year period into EPS targets.

Total Wealth at Risk

Purpose and link to strategy

- To align EC members' interests with those of shareholders in order to maintain focus on the long-term success of the Company.

- Wealth at Risk is broadly defined as two components – namely personal share ownership and unvested shares arising from the Company's share grants, e.g. LTIP's.

Share Ownership Programme

- EC members are required to retain all shares vested from the Company's LTIP programs and any other share based compensation until his or her share ownership requirement is met.

- The share ownership requirement is equivalent to a multiple of their annual base salary, net of tax (see Compensation Exhibit 12).

- These shareholding requirements are significantly above market practice and result in a wealth at risk for each EC member which is aligned with shareholder interests.

Compensation Exhibit 12: Share ownership requirement

CEO	5 × annual base salary, net of tax
Other EC members	4 × annual base salary, net of tax

- Only shares owned by an EC member and the member's spouse are included in the share ownership calculation. Vested and unvested stock options are not considered for this purpose.

- The CC reviews the status of EC share ownership on an annual basis. It also reviews the required shareholding amounts annually, based on salary and expected share price developments.

- Two thirds of the EC members have achieved and exceeded their share ownership requirement. See Compensation Exhibits 28 and 29 for further details.

Notice period, severance provisions and non-competition clauses

Operation

Employment contracts for EC members include a notice period of 12 months, during which they are entitled to their base salary, benefits and short-term variable compensation. In accordance with Swiss law and ABB's Articles of Incorporation, the contracts for the EC members do not allow for any severance payment.

Non-compete agreements have been entered into with the CEO and all EC members for a period of 12 months after their employment. Compensation for such agreements, if any, may not exceed the EC member's last total annual compensation.

Compensation of the Executive Committee in 2018

Compensation Exhibit 13: Total compensation of EC members (in CHF million)

	2018	**2017**
Base salaries	9.9	10.0
Pension benefits	4.7	4.7
Other benefits	5.5	5.1
Total fixed compensation	**20.1**	**19.8**
Short-term variable compensation	9.1	10.4
Long-term variable compensation	10.6	13.8
Replacement Share Grant	0.0	2.6
Total variable compensation	**19.7**	**26.8**
Total compensation	**39.8**	**46.6**

For an overview of compensation by individual and component, please refer to Compensation Exhibit 24 and Compensation Exhibit 25 in "Compensation and share ownership tables" below.

Overall positioning of compensation

The ratio of fixed to variable components in any given year depends on the performance of the individuals and of the Company against predefined performance objectives.

In 2018, as shown in Compensation Exhibit 14 below, the CEO's variable compensation represented 61 percent of his total compensation (previous year: 65 percent) and an average of 46 percent for the other EC members (previous year: 55 percent). This again illustrates the significant emphasis placed on performance related compensation.

EC members received total compensation of CHF 39.8 million in 2018 compared with CHF 46.6 million in 2017, as presented in Compensation Exhibits 23 and 24. The change in total compensation in 2018 was principally due to the lower grant fair value of the 2018 LTIP, the non-repeating one-time replacement share grant for the CFO in 2017, representing compensation for foregone benefits from his previous employer and the lower short-term Incentive (STI) achievement level.

At the 2017 AGM, the shareholders approved a maximum aggregate compensation amount of CHF 52 million for the EC for the year 2018. The EC compensation for 2018 amounted to CHF 39.8 million and is within the approved amount.

Compensation Exhibit 14: Ratios of fixed and variable compensation components of EC members in 2018

Compensation Exhibit 15: Compensation components under various scenarios

Base salary

There were no increases to base salary for Executive Committee members in 2018.

2018 short-term variable compensation

2018 has been another strong year for revenues in ABB. Revenues, with a weight of 25 percent, were broadly in line with the challenging target set by the Board, with significant contributions from the Robotics and Motion and Industrial Automation Divisions. The award under this parameter amounted to 99.3 percent of target.

Operating cash flow, with a weighting of 30 percent, was below target. The award under this parameter accordingly amounted to 56.6 percent of target.

The Group continued to deliver very strong operational cost savings, which were well above target. The cost savings parameter, weighted at 10 percent, achieved a maximum 150.0 percent award.

Operational EBITA margin, with a weighting of 15 percent, and operational net income, with a weighting of 20 percent, were below targets for both measures. The award under the Operational EBITA margin parameter was 81.1 percent and the award of the operational net income parameter was 82.6 percent.

The combined achievement of these performance measures resulted in a 85.5 percent (2017: 91.9 percent) achievement level for the group scorecard in 2018.

With respect to individual/team objectives for each EC member, the achievement ranges between 35 percent and 112 percent of target, reflecting the financial results of their respective areas of responsibility as well as their achievements on operational performance, strategic initiatives and leadership performance.

The overall average award of short-term incentives for the entire EC was 85.1 percent of target, with a range from 52.3 percent (lowest achievement) to 102.4 percent of target (highest achievement), which reflected, for certain executives, the material weakness in controls as outlined in "Item 15. Controls and Procedures". See Compensation Exhibit 16 below.

Compensation Exhibit 16: 'At a Glance' table of 2018 STI variable compensation

	2018	**2017**
	(% of target)	**(% of target)**
Group Objectives	85.5%	91.9%
Individual objectives		
EC (range of outcomes):	35.0 – 112.0%	74.9 – 122.4%
Overall Average:	87.6%	99.5%
Overall outcome		
EC (range of outcomes):	52.3 – 102.4%	80.9 – 107.2%
Overall Average:	85.1%	95.4%

2018 long-term variable compensation

The estimated value of the share-based grants to EC members under the 2018 LTIP award was CHF 10.6 million, compared with CHF 13.8 million in 2017.

The 2018 LTIP comprises of two equally weighted performance factors, a three year average EPS and relative Total Shareholder Return (TSR), designed to be fully aligned with our Strategy, which focuses on EPS delivery and attractive shareholder returns, both on an absolute and relative basis.

The companies approved by the Board to determine ABB's relative TSR performance for the 2018 LTIP were: 3M, Danaher, Eaton, Emerson Electric, Honeywell Intl., United Technologies, General Electric, Rockwell, Rolls Royce, Schneider Electric, Siemens, ThyssenKrupp, Legrand, Yokogawa and Mitsubishi Electric. These were selected to provide an appropriate and very challenging set of peers, and influenced the payment point setting accordingly (see Compensation Exhibit 17 below).

The 2018 LTIP award curves are illustrated in the charts below.

Compensation Exhibit 17: 2018 LTIP Targets

Threshold point: no award; target point: 100% award; maximum point: capped at 200% award; linear award between points.

The actual EPS target is not disclosed for reasons of commercial sensitivity.

Threshold point: TSR performance within the lower (0-25%) quartile: no award

Target point: TSR performance at the median performing company: 100% award

Maximum point: TSR performance within the upper (75-100%) quartile: 200% award

Linear award between points

2015 LTIP outcome

The 2015 LTIP was comprised of two measures - P1 (net income) and P2 (cumulative weighted EPS) measures, that further strengthened the performance orientation of the LTIP.

The net income measure fully vested at 100 per cent. The cumulative weighted EPS measure vested at 61 percent (previous year: 37 percent) out of a potential 200 percent.

Historical Vesting outcomes

The historic vesting percentages for the prior four years are shown in the table below.

Compensation Exhibit 18: LTIP historical actual vesting percentages[1]

	Plan Year Of Award			
	2012	**2013**	**2014**	**2015**
Vesting in % of target award (target award)	80.4%	77.2%	74.8%	80.5%
Vesting in % of maximum award (max. potential award)	57.4%	55.1%	53.4%	53.7%

(1) Average of P1 (e.g. net income) and P2 (EPS) components

Shareholdings of EC members

The EC members owned collectively less than 1 percent of ABB's total shares outstanding at December 31, 2018.

At December 31, 2018, members of the EC held ABB shares and conditional rights to receive shares, as shown in Compensation Exhibit 28 in the section "Compensation and share ownership tables" below. Their holdings at December 31, 2017, are shown in Compensation Exhibit 29 in the section "Compensation and share ownership tables" below.

Members of the EC cannot participate in the Management Incentive Plan (MIP). Any MIP instruments held by EC members were awarded to them as part of the compensation they received in previous roles they held at ABB. For a more detailed description of MIP, please refer to "Note 18 Share-based payment arrangements" to our Consolidated Financial Statements.

Except as described in Compensation Exhibits 28 and 29, no member of the EC and no person closely linked to a member of the EC held any shares of ABB or options on ABB shares at December 31, 2018 and 2017.

Other compensation

Members of the EC are eligible to participate in the Employee Share Acquisition Plan (ESAP), a savings plan based on stock options, which is open to employees around the world. Six members of the EC participated in the 15th annual launch of the plan in 2018. EC members who participated will, upon vesting, each be entitled to acquire up to 490 ABB shares at CHF 20.38 per share, the market share price at the start of the 2018 launch.

For a more detailed description of ESAP, please refer to "Note 18 Share based payment arrangements" to our Consolidated Financial Statements.

In 2018, ABB did not pay any fees or compensation to the members of the EC for services rendered to ABB other than those disclosed in this report. Except as disclosed in the section titled "Board of Directors Business relations between ABB and its EC members" above, ABB did not pay any additional fees or compensation in 2018 to persons closely linked to a member of the EC for services rendered to ABB.

Compensation of former EC members

In 2018, certain former EC members received contractual compensation for the period after leaving the EC, as shown in Compensation Exhibit 24, footnote (5).

Votes on compensation at the 2019 AGM

As illustrated in Compensation Exhibit 19, the Board's proposals to shareholders at the 2019 AGM will relate to Board compensation for the 2019–2020 term of office and EC compensation for the calendar year 2020. There will also be a non-binding vote on the 2018 Compensation Report.

Compensation Exhibit 19: Shareholders will have three separate votes on compensation at the 2019 AGM

In determining the proposed maximum aggregate EC compensation, the Board takes into consideration the criteria illustrated in Compensation Exhibit 20. Given the variable nature of a major portion of the compensation components, the proposed maximum aggregate EC compensation will almost always be higher than the actual award, as it must cover the potential maximum value of each component of compensation.

Compensation Exhibit 20: Overview of key factors affecting the determination of maximum aggregate EC compensation

Compensation and share ownership tables

Compensation Exhibit 21: Board compensation in 2018 and 2017

	Paid in 2018					Paid in 2017				
	November		May			November		May		
	Board term 2018-2019		Board term 2017-2018			Board term 2017-2018		Board term 2016-2017		
Name	Settled in cash[1] CHF	Settled in shares - number of shares received[2]	Settled in cash[1] CHF	Settled in shares - number of shares received[2]	Total compensation paid in 2018[3] CHF	Settled in cash[1] CHF	Settled in shares - number of shares received[2]	Settled in cash[1] CHF	Settled in shares - number of shares received[2]	Total compensation paid in 2017[3] CHF
Peter Voser, Chairman[4]	—	24,777	—	25,133	1,200,000	—	24,427	—	24,602	1,200,000
Jacob Wallenberg[5]	112,500	3,737	112,500	3,789	450,000	112,500	3,684	112,500	3,709	450,000
Matti Alahuhta[6]	80,000	2,657	80,000	2,694	320,000	80,000	2,619	80,000	2,637	320,000
Gunnar Brock[7]	82,500	2,740	—	—	165,000	—	—	—	—	—
David Constable[8]	87,500	2,906	87,500	2,947	350,000	87,500	2,865	80,000	2,637	335,000
Frederico Curado[9]	80,000	2,457	80,000	2,495	320,000	80,000	2,423	80,000	2,443	320,000
Robyn Denholm[10]	—	—	—	—	—	—	—	82,500	2,397	165,000
Lars Förberg[11]	—	6,590	—	6,690	320,000	—	6,494	—	—	160,000
Louis R. Hughes[12]	—	—	100,000	3,099	200,000	100,000	3,274	100,000	3,297	400,000
Jennifer Xin-Zhe Li[13]	80,000	2,454	—	—	160,000					
Geraldine Matchett[14]	82,500	3,380	—	—	165,000					
David Meline[15]	100,000	3,321	82,500	2,779	365,000	82,500	2,701	82,500	2,720	330,000
Satish Pai[16]	82,500	2,535	82,500	2,574	330,000	82,500	2,499	82,500	2,519	330,000
Michel de Rosen[17]	—	—	—	—	—	—	—	87,500	2,642	175,000
Ying Yeh[18]	—	—	80,000	2,281	160,000	80,000	2,462	80,000	2,475	320,000
Total	**787,500**	**57,554**	**705,000**	**54,481**	**4,505,000**	**705,000**	**53,448**	**867,500**	**52,078**	**4,505,000**

(1) Represents gross amounts paid, prior to deductions for social security, withholding tax etc.
(2) Number of shares per Board member is calculated based on net amount due after deductions for social security, withholding tax etc.
(3) In addition to the Board remuneration stated in the above table, the Company paid in 2017 and 2018 CHF 347,691 and CHF 288,408 respectively, in related social security payments.
(4) Chairman of the ABB Ltd Board and Chairman of the Governance & Nomination Committee for the 2016-2017, 2017-2018 and 2018-2019 board terms; is receiving 100% of his compensation in the form of ABB shares.
(5) Vice-Chairman of the ABB Ltd Board and member of the Governance & Nomination Committee for the 2016-2017, 2017-2018 and 2018-2019 board terms; is receiving 50 percent of his compensation in the form of ABB shares.
(6) Member of the Governance & Nomination Committee for the 2016-2017, 2017-2018 and 2018-2019 board terms; is receiving 50% of his compensation in the form of ABB shares.
(7) Elected as new Board member at the ABB Ltd 2018 AGM; Member of the Finance, Audit & Compliance Committee for the 2018-2019 board term; is receiving 50% of his compensation in the form of ABB shares.
(8) Chairman of the Compensation Committee for the 2017-2018 and 2018-2019 board terms; Member of the Compensation Committee for the 2016-2017 board term; is receiving 50% of his compensation in the form of ABB shares.
(9)

Member of the Compensation Committee for the 2016-2017, 2017-2018 and 2018-2019 board terms; is receiving 50% of his compensation in the form of ABB shares.

(10) Did not stand for re-election at the ABB Ltd 2017 AGM; Member of the Finance, Audit & Compliance Committee for the 2016-2017 board term; received 50% of her compensation in the form of ABB shares.

(11) Member of the Governance & Nomination Committee for the 2017-2018 and 2018-2019 board terms; is receiving 100% of his compensation in the form of ABB shares.

(12) Did not stand for re-election at the ABB Ltd 2018 AGM; Chairman of the Finance, Audit & Compliance Committee for the 2016-2017 and 2017-2018 board terms; received 50% of his compensation in the form of ABB shares.

(13) Elected as new Board member at the ABB Ltd 2018 AGM; Member of the Compensation Committee for the 2018-2019 board term; is receiving 50% of her compensation in the form of ABB shares.

(14) Elected as new Board member at the ABB Ltd 2018 AGM; Member of the Finance, Audit & Compliance Committee for the 2018-2019 board term; is receiving 50% of her compensation in the form of ABB shares.

(15) Chairman of the Finance, Audit & Compliance Committee for 2018-2019 board term; Member of the Finance, Audit & Compliance Committee for the 2016-2017 and 2017-2018 board terms; is receiving 50% of his compensation in the form of ABB shares.

(16) Member of the Finance, Audit & Compliance Committee for the 2016-2017, 2017-2018 and 2018-2019 board terms; is receiving 50% of his compensation in the form of ABB shares.

(17) Did not stand for re-election at the ABB Ltd 2017 AGM; Chairman of the Compensation Committee for the 2016-2017 board term; received 50% of his compensation in the form of ABB shares.

(18) Did not stand for re-election at the ABB Ltd 2018 AGM; Member of the Compensation Committee for the 2016-2017 and 2017-2018 board terms; received 50% of her compensation in the form of ABB shares.

Compensation Exhibit 22: Board compensation for the Board terms 2018-2019 and 2017-2018

Name	Specific Board Roles	Board term 2018-2019 CHF	Board term 2017-2018 CHF
Peter Voser	Chairman of the Board, Chairman of GNC	1,200,000	1,200,000
Jacob Wallenberg	Vice-Chairman of the Board, Member GNC	450,000	450,000
Matti Alahuhta	Member GNC	320,000	320,000
Gunnar Brock (1)	Member FACC	330,000	—
David Constable	Chairman CC	350,000	350,000
Frederico Curado	Member CC	320,000	320,000
Lars Förberg	Member GNC	320,000	320,000
Louis R. Hughes	Chairman of FACC (until 29 March 2018, did not stand for re-election)	—	400,000
Jennifer Xin-Zhe Li (1)	Member CC	320,000	—
Geraldine Matchett (1)	Member FACC	330,000	—
David Meline	Chairman of FACC (as of April 2018), Member FACC	400,000	330,000
Satish Pai	Member FACC	330,000	330,000
Ying Yeh	Member CC (until 29 March 2018, did not stand for re-election)	—	320,000
Total		**4,670,000**	**4,340,000**

(1) Joined the Board at the 2018 ABB Ltd AGM.

Key:
CC: Compensation Committee
FACC: Finance, Audit & Compliance Committee
GNC: Governance & Nomination Committee

Compensation Exhibit 23: Board ownership of ABB shares

	Total number of shares held	
Name	**December 31, 2018**	**December 31, 2017**
Peter Voser [1]	201,076	151,166
Jacob Wallenberg	217,109	209,583
Matti Alahuhta	41,872	36,521
Gunnar Brock	4,740	—
David Constable	20,650	14,797
Frederico Curado	12,391	7,439
Lars Förberg	19,774	6,494
Louis R. Hughes	—	35,716
Jennifer Xin-Zhe Li	2,454	—
Geraldine Matchett	3,380	—
David Meline [2]	17,542	11,442
Satish Pai	12,998	7,889
Ying Yeh	—	35,455
Total	**553,986**	**516,502**

(1) Includes 2,000 shares held by spouse.
(2) Includes 3,150 shares held by spouse.

Compensation Exhibit 24: EC compensation in 2018

	Cash Compensation						
Name	**Base salary CHF**	**Short−term variable compensation[1] CHF**	**Pension benefits CHF**	**Other benefits[2] CHF**	**2018 Total cash−based compensation[3] CHF**	**Estimated value of share−based grants under the LTIP in 2018[4] CHF**	**2018 Total (incl. conditional share−based grants)[5] CHF**
Ulrich Spiesshofer	1,685,010	2,082,660	631,775	989,918	**5,389,363**	3,153,750	**8,543,113**
Timo Ihamuotila	920,012	810,520	487,435	502,703	**2,720,670**	819,965	**3,540,635**
Jean-Christophe Deslarzes	940,007	908,980	506,036	718,111	**3,073,134**	1,005,365	**4,078,499**
Diane de Saint Victor	1,000,001	1,024,000	295,325	266,153	**2,585,479**	891,283	**3,476,762**
Frank Duggan[6]	697,573	643,163	354,222	569,854	**2,264,812**	699,649	**2,964,461**
Greg Scheu[7]	806,634	713,065	291,077	118,426	**1,929,202**	559,393	**2,488,595**
Chunyuan Gu[8]	715,357	688,888	263,125	499,338	**2,166,708**	748,669	**2,915,377**
Sami Atiya	720,008	576,720	441,235	427,729	**2,165,692**	513,368	**2,679,060**
Tarak Mehta	860,004	540,940	472,097	566,773	**2,439,814**	766,494	**3,206,308**
Claudio Facchin	810,006	423,630	462,386	463,666	**2,159,688**	577,548	**2,737,236**
Peter Terwiesch	770,006	726,110	446,435	377,080	**2,319,631**	823,534	**3,143,165**
Total Executive Committee members	9,924,618	9,138,676	4,651,148	5,499,751	29,214,193	10,559,018	39,773,211

(1) Represents accrued short-term variable compensation for the year 2018 for all current EC members, which will be paid in 2019, after the publication of ABB's financial results. Short-term variable compensation is linked to the objectives defined in each EC member's scorecard. Upon full achievement of these objectives, the short-term variable compensation of the CEO corresponds to 150 percent of his base salary, while for each other EC member it represents 100 percent of their respective base salary.

(2) Other benefits comprise payments related to social security, health insurance, children's education, transportation, tax advice and certain other items.

(3) Prepared on an accruals basis.

(4) On the day of vesting (April 6, 2021), the value of the share-based awards granted under the LTIP may vary from the above amounts due to changes in ABB's share price and the outcome of the performance factors. The estimated value of the share- based grants are based on a Monte Carlo simulation and the price of ABB shares on the grant date, adjusted for EPS factor for the expected foregone dividends during the vesting period.

(5) Payments totaling CHF 23,558 were made in 2018 on behalf of certain other former EC members.

(6) Frank Duggan received 20 percent of his base salary in AED and 80 percent in EUR. The company purchased EUR with AED to meet this obligation. All AED amounts were converted into Swiss francs using a rate of CHF 0.2678411 per AED.

(7) Greg Scheu received 100 percent of his base salary in USD. All USD amounts were converted into Swiss francs using a rate of CHF 0.9837 per USD.

(8) Chunyuan Gu received 100 percent of his base salary in CNY. All CNY amounts were converted into Swiss francs using a rate of CHF 0.1430712 per CNY.

Compensation Exhibit 25: EC compensation in 2017

	Cash Compensation							
Name	**Base salary CHF**	**Short–term variable compensation[1] CHF**	**Pension benefits CHF**	**Other benefits[2] CHF**	**2017 Total cash–based compensation[3] CHF**	**Estimated value of share–based grants under the LTIP in 2017[4] CHF**	**Estimated value of replacement share grant[5] CHF**	**2017 Total (incl. conditional share–based grants)[6] CHF**
Ulrich Spiesshofer	1,679,176	2,413,763	626,074	916,140	**5,635,153**	3,671,675	—	**9,306,828**
Timo Ihamuotila (EC member as of April 1, 2017)[5]	690,009	655,278	362,201	473,848	**2,181,336**	998,965	2,553,435	**5,733,736**
Jean-Christophe Deslarzes[7]	936,674	1,007,680	500,652	500,493	**2,945,499**	1,103,374	—	**4,048,873**
Diane de Saint Victor	1,000,001	1,005,000	295,325	279,321	**2,579,647**	979,231	—	**3,558,878**
Frank Duggan[8]	664,042	651,425	348,494	433,783	**2,097,744**	852,386	—	**2,950,130**
Greg Scheu[9]	801,386	648,322	265,877	94,270	**1,809,855**	800,177	—	**2,610,032**
Chunyuan Gu (EC member as of July 1, 2017)[10]	374,893	385,765	131,563	203,488	**1,095,709**	743,963	—	**1,839,672**
Sami Atiya[7]	716,673	686,160	435,786	416,816	**2,255,435**	845,147	—	**3,100,582**
Tarak Mehta	860,004	823,880	467,597	578,054	**2,729,535**	842,145	—	**3,571,680**
Claudio Facchin	805,006	680,400	456,410	474,153	**2,415,969**	950,768	—	**3,366,737**
Peter Terwiesch[7]	764,173	714,560	440,272	337,623	**2,256,628**	903,833	—	**3,160,461**
Eric Elzvik (EC member until March 31, 2017)[6]	212,502	212,500	69,847	26,789	**521,638**	—	—	**521,638**
Bernhard Jucker (EC member until June 30, 2017)	520,006	525,000	277,663	399,154	**1,721,823**	1,140,137	—	**2,861,960**
Total Executive Committee members	**10,024,545**	**10,409,733**	**4,677,761**	**5,133,932**	**30,245,971**	**13,831,801**	**2,553,435**	**46,631,207**

(1) Represents accrued short-term variable compensation for the year 2017 for all current EC members, which will be paid in 2018, after the publication of ABB's audited consolidated financial statements. Short-term variable compensation is linked to the objectives defined in each EC member's scorecard. Upon full achievement of these objectives, the short-term variable compensation of the CEO corresponds to 150 percent of his base salary, while for each other EC member it represents 100 percent of their respective base salary. Bernhard Jucker and Eric Elzvik both received a pro-rata short-term variable compensation payment for their period of service as an EC member, in accordance with the contractual obligations of ABB.

(2) Other benefits comprise payments related to social security, health insurance, children's education, transportation, tax advice and certain other items.

(3) Prepared on an accruals basis.

(4) On the day of vesting (June 13, 2020), the value of the share-based awards granted under the LTIP may vary from the above amounts due to changes in ABB's share price and the outcome of the performance parameters. The LTIP is also subject to service conditions. The estimated value of the share based grants are computed using a Monte Carlo simulation and the price of the ABB shares on the grant date, adjusted for expected foregone dividends during the vesting period.

(5) Timo Ihamuotila received a replacement grant of 119,200 shares for foregone benefits from his previous employer, having a grant date fair value of CHF 2,553,435. Of the total, 42,572 shares will vest on April 1, 2019, while 76,628 shares will vest on April 1, 2020.

(6) In addition to the total compensation of EC members, Eric Elzvik received CHF 1,389,860 representing contractual obligations of ABB for the period April - October 2017. Payments totaling CHF 113,273 were made in 2017 on behalf of certain other former EC members for the coverage of social security premium obligations and tax advice.

(7) The increase in pension benefits is the result of a review of the EC's pension arrangements during 2015.

(8) Frank Duggan received 20 percent of his base salary in AED and 80 percent in EUR. The company purchased EUR with AED to meet this obligation. All AED amounts were converted into Swiss francs using a rate of CHF 0.2660876 per AED.

(9) Greg Scheu received 100 percent of his base salary in USD. All USD amounts were converted into Swiss francs using a rate of CHF 0.9773 per USD.

(10) Chunyuan Gu received 100 percent of his base salary in CNY. All CNY amounts were converted into Swiss francs using a rate of CHF 0.149957 per CNY.

Compensation Exhibit 26: LTIP grants in 2018

Name	Reference number of shares under the EPS performance factor of the 2018 launch of the LTIP [1]	Total estimated value of share-based grants under the EPS performance factor of the 2018 launch of the LTIP [2],[3]	Reference number of shares under the TSR performance factor of the 2018 launch of the LTIP [1]	Total estimated value of share-based grants under the TSR performance factor of the 2018 launch of the LTIP [2],[3]	Total number of shares granted under the 2018 launch of the LTIP [1],[2]	Total estimated value of share-based grants under the LTIP in 2018 [2],[3]
		CHF		CHF		CHF
Ulrich Spiesshofer	71,572	1,646,443	71,572	1,507,307	**143,144**	**3,153,750**
Timo Ihamuotila[4]	18,608	428,059	18,609	391,906	**37,217**	**819,965**
Jean-Christophe Deslarzes[4]	22,816	524,860	22,816	480,505	**45,632**	**1,005,365**
Diane de Saint Victor[4]	20,227	465,302	20,227	425,981	**40,454**	**891,283**
Frank Duggan[4]	15,878	365,258	15,878	334,391	**31,756**	**699,649**
Greg Scheu	12,695	292,036	12,695	267,357	**25,390**	**559,393**
Chunyuan Gu	16,990	390,838	16,991	357,831	**33,981**	**748,669**
Sami Atiya	11,650	267,997	11,651	245,371	**23,301**	**513,368**
Tarak Mehta[4]	17,395	400,155	17,395	366,339	**34,790**	**766,494**
Claudio Facchin	13,107	301,514	13,107	276,034	**26,214**	**577,548**
Peter Terwiesch[4]	18,689	429,922	18,690	393,612	**37,379**	**823,534**
Total Executive Committee members at Dec. 31, 2018	**239,627**	**5,512,384**	**239,631**	**5,046,634**	**479,258**	**10,559,018**

(1) Vesting date April 6, 2021.

(2) The reference number of shares of the EPS and TSR performance factors are valued using the fair value of the ABB shares on the grant date and the Monte Carlo simulation model.

(3) The LTIP foresees delivering 65 percent of the value of vested performance shares (both performance factors EPS and TSR), if any, in shares and the remainder in cash. However, upon vesting participants have the possibility to elect to receive 100 percent of the vested award in shares. The plan foresees a maximum payout of 200 percent of the number of reference shares granted based on the achievement against the pre-defined average EPS and relative TSR targets.

(4) In addition to the above awards, six members of the EC participated in the 15th launch of the ESAP in 2018, which will allow them to save over a 12-month period and, in November 2019, use their savings to acquire ABB shares under the ESAP. Each EC member who participated in ESAP will be entitled to acquire up to 490 ABB shares at an exercise price of CHF 20.38 per share.

Compensation Exhibit 27: LTIP grants in 2017

Name	Reference number of shares under the performance component P1 of the 2017 launch of the LTIP[1]	Total estimated value of share–based grants under the performance component P1 of the 2017 launch of the LTIP[2],[3]	Reference number of shares under the performance component P2 of the 2017 launch of the LTIP[1]	Total estimated value of share–based grants under the performance component P2 of the 2017 launch of the LTIP[2],[3]	Total number of shares granted under the 2017 launch of the LTIP[1]	Total estimated value of share–based grants under the LTIP in 2017[2],[3]
		CHF		CHF		CHF
Ulrich Spiesshofer[4]	80,706	1,930,649	70,180	1,741,026	**150,886**	**3,671,675**
Timo Ihamuotila (EC member as of April 1, 2017)[4]	20,500	490,401	20,500	508,564	**41,000**	**998,965**
Jean-Christophe Deslarzes[4]	24,402	583,745	20,946	519,629	**45,348**	**1,103,374**
Diane de Saint Victor[4]	17,826	426,434	22,283	552,797	**40,109**	**979,231**
Frank Duggan[4]	17,492	418,444	17,492	433,942	**34,984**	**852,386**
Greg Scheu	14,567	348,472	18,208	451,705	**32,775**	**800,177**
Bernhard Jucker (EC member until June 30, 2017)	23,397	559,704	23,397	580,433	**46,794**	**1,140,137**
Sami Atiya	18,691	447,127	16,044	398,020	**34,735**	**845,147**
Tarak Mehta[4]	15,331	366,749	19,163	475,396	**34,494**	**842,145**
Chunyuan Gu (EC member as of July 1, 2017)	15,598	365,218	15,598	378,745	**31,196**	**743,963**
Claudio Facchin	21,027	503,008	18,049	447,760	**39,076**	**950,768**
Peter Terwiesch[4]	19,989	478,177	17,158	425,656	**37,147**	**903,833**
Total Executive Committee members at Dec. 31, 2017	**289,526**	**6,918,128**	**279,018**	**6,913,673**	**568,544**	**13,831,801**

(1) Vesting date June 13, 2020.

(2) The total estimated value of the performance components (P1 and P2) is computed using a Monte Carlo simulation and the price of the ABB shares on the grant date, adjusted for expected foregone dividends during the vesting period.

(3) It is expected that upon vesting 70 percent of the performance shares will be settled in shares while the value of the remaining 30 percent will be settled in cash for both performance components (P1 and P2). However, upon vesting participants have the possibility to elect to receive 100 percent of the vested award in shares.

(4) In addition to the above awards, seven members of the EC participated in the 14th launch of the ESAP in 2017, which will allow them to save over a 12–month period and, in November 2018, use their savings to acquire ABB shares under the ESAP. Each EC member who participated in ESAP will be entitled to acquire up to 380 ABB shares at an exercise price of CHF 26.26 per share.

Compensation Exhibit 28: EC shareholding overview at December 31, 2018

Name	Total number of shares held at December 31, 2018	Unvested at December 31, 2018			Replacement share grant for foregone benefits from former employer[3] (vesting 2019 and 2020)
		Reference number of shares deliverable under the 2016 performance components (P1 and P2) of the LTIP[1] (vesting 2019)	Reference number of shares deliverable under the 2017 performance components (P1 and P2) of the LTIP[1] (vesting 2020)	Reference number of shares deliverable under the 2018 performance factors (EPS and TSR) of the LTIP[2] (vesting 2021)	
Ulrich Spiesshofer	509,970	175,881	150,886	143,144	—
Timo Ihamuotila	22,000	—	41,000	37,217	119,200
Jean-Christophe Deslarzes	172,487	56,287	45,348	45,632	—
Diane de Saint Victor	569,132	47,745	40,109	40,454	—
Frank Duggan	224,941	48,028	34,984	31,756	—
Greg Scheu	146,130	43,144	32,775	25,390	—
Chunyuan Gu	28,722	25,799	31,196	33,981	—
Sami Atiya	—	37,693	34,735	23,301	—
Tarak Mehta	183,328	45,624	34,494	34,790	—
Claudio Facchin	131,987	47,722	39,076	26,214	—
Peter Terwiesch	92,811	44,969	37,147	37,379	—
Total Executive Committee members as of Dec. 31, 2018	**2,081,508**	**572,892**	**521,750**	**479,258**	**119,200**

(1) It is expected that upon vesting, the LTIP 2016 and 2017 will be settled 70 percent in shares and 30 percent in cash for the performance components (P1 and P2). However, participants have the possibility to elect to receive 100 percent of the vested award in shares.

(2) It is expected that the LTIP 2018 will be settled 65 percent in shares and 35 percent in cash for the performance factors (EPS and TSR). However, the participants have the possibility to elect to receive 100 percent of the vested award in shares.

(3) It is expected that the replacement share grant will be settled 70 percent in shares and 30 percent in cash. However, the participant has the possibility to elect to receive 100 percent of the vested award in shares.

Compensation Exhibit 29: EC shareholding overview at December 31, 2017

Name	Total number of shares held at December 31, 2017	Unvested at December 31, 2017				
		Reference number of shares deliverable under the 2015 performance components (P1 and P2) of the LTIP[1] (vesting 2018)	Reference number of shares deliverable under the 2016 performance components (P1 and P2) of the LTIP[1] (vesting 2019)	Reference number of shares deliverable under the 2017 performance components (P1 and P2) of the LTIP[1] (vesting 2020)	Replacement share grant for foregone benefits from former employer[2] (vesting 2018)	Replacement share grant for foregone benefits from former employer[2] (vesting 2019 and 2020)
Ulrich Spiesshofer	410,646	172,465	175,881	150,886	—	—
Timo Ihamuotila (EC member as of April 1, 2017)	22,000	—	—	41,000	—	119,200
Jean-Christophe Deslarzes	96,651	51,413	56,287	45,348	65,819	—
Diane de Saint Victor	533,482	45,873	47,745	40,109	—	—
Frank Duggan	186,576	46,390	48,028	34,984	—	—
Greg Scheu	119,561	45,896	43,144	32,775	—	—
Sami Atiya	—	—	37,693	34,735	—	—
Tarak Mehta	159,222	42,780	45,624	34,494	—	—
Chunyuan Gu (EC member as of July 1, 2017)	13,570	25,937	25,799	31,196	—	—
Claudio Facchin	85,553	42,845	47,722	39,076	—	—
Peter Terwiesch	63,269	36,698	44,969	37,147	—	—
Total Executive Committee members as of Dec. 31, 2017	**1,690,530**	**510,297**	**572,892**	**521,750**	**65,819**	**119,200**

(1) It is expected that upon vesting, the LTIP will be settled 70 percent in shares and 30 percent in cash for the performance components (P1 and P2). However, participants have the possibility to elect to receive 100 percent of the vested award in shares.

(2) It is expected that the replacement share grants will be settled 70 percent in shares and 30 percent in cash. However, the participants have the possibility to elect to receive 100 percent of the vested award in shares.

EMPLOYEES

A breakdown of our employees by geographic region is as follows:

	December 31,		
	2018	2017	2016
Europe	68,300	63,000	61,400
The Americas	35,600	28,800	29,000
Asia, Middle East and Africa	42,700	43,000	41,900
Total	**146,600**	**134,800**	**132,300**

The proportion of our employees that are represented by labor unions or are the subject of collective bargaining agreements varies based on the labor practices of each country in which we operate.

Item 7. Major Shareholders and Related Party Transactions

MAJOR SHAREHOLDERS

At December 31, 2018, we had approximately 478,000 shareholders. Approximately 241,000 were U.S. holders, of which approximately 460 were record holders. Based on the share register, U.S. holders (including holders of ADSs) held approximately 10 percent of the total share capital and voting rights as registered in the Commercial Register on that date.

For information on major shareholders see “Item 6. Directors, Senior Management and Employees—Shareholders—Significant shareholders”.

RELATED PARTY TRANSACTIONS

Affiliates and associates

In the normal course of our business, we purchase products from, sell products to and engage in other transactions with entities in which we hold an equity interest. The amounts involved in these transactions are not material to ABB Ltd. Also, in the normal course of our business, we engage in transactions with businesses that we have divested. We believe that the terms of the transactions we conduct with these companies are negotiated on an arm’s length basis.

Key management personnel

For information on important business relationships between ABB and its Board and EC members, or companies and organizations represented by them, see “Item 6. Directors, Senior Management and Employees” sections entitled “Board of Directors–Business Relationships between ABB and its Board members” and “Executive Committee–Business Relationships between ABB and its EC members”.

Item 8. Financial Information

CONSOLIDATED STATEMENTS AND OTHER FINANCIAL INFORMATION

See “Item 18. Financial Statements”.

LEGAL PROCEEDINGS

Regulatory

In April 2014, the European Commission announced its decision regarding its investigation of anticompetitive practices in the cables industry and granted ABB full immunity from fines under the its leniency program.

In February 2019, the Brazilian Antitrust Authority (CADE) announced its decision regarding its investigation of anticompetitive practices in certain power businesses of ABB, including flexible alternating current transmission systems (FACTS) and power transformers, and granted ABB full immunity from fines under its leniency program.

As a result of an internal investigation, ABB self-reported to the Securities and Exchange Commission (SEC) and the Department of Justice (DoJ) in the United States as well as to the Serious Fraud Office (SFO) in the United Kingdom concerning certain of its past dealings with Unaoil and its subsidiaries, including alleged improper payments made by these entities to third parties. The SFO has commenced an investigation into this matter. We are cooperating fully with the authorities. At this time, it is not possible for us to make an informed judgment about the outcome of these matters.

Based on findings during an internal investigation, ABB self-reported to the SEC and the DoJ, to various authorities in South Africa and other countries as well as to certain multilateral financial institutions potential suspect payments and other compliance concerns in connection with some of the Company's dealings with Eskom and related persons. Many of those parties have expressed an interest in, or commenced an investigation into, these matters and we are cooperating fully with them. At this time, it is not possible for us to make an informed judgment about the outcome of these matters.

General

The Company is aware of proceedings, or the threat of proceedings, against us and others in respect of private claims by customers and other third parties with regard to certain actual or alleged anticompetitive practices. Also, we are subject to other claims and legal proceedings, as well as investigations carried out by various law enforcement authorities. With respect to the above-mentioned claims, regulatory matters, and any related proceedings, we will bear the related costs including costs necessary to resolve them.

Liabilities recognized

At December 31, 2018 and 2017, we had aggregate liabilities of $221 million and $229 million, respectively, included in "Other provisions" and "Other non-current liabilities", for the above regulatory, compliance and legal contingencies, and none of the individual liabilities recognized was significant. As it is not possible to make an informed judgment on, or reasonably predict, the outcome of certain matters and as it is not possible, based on information currently available to management, to estimate the maximum potential liability on other matters, there could be material adverse outcomes beyond the amounts accrued.

DIVIDENDS AND DIVIDEND POLICY

See "Item 3. Key Information—Dividends and Dividend Policy" and "Item 6. Directors, Senior Management and Employees—Shareholders—Shareholders' rights—Shareholders' dividend rights".

SIGNIFICANT CHANGES

Except as otherwise described in this Annual Report, there has been no significant change in our financial position since December 31, 2018.

Item 9. The Offer and Listing

MARKETS

The shares of ABB Ltd are principally traded on the SIX Swiss Exchange (under the symbol "ABBN") and on the NASDAQ OMX Stockholm Exchange (under the symbol "ABB"). ADSs of ABB Ltd have been traded on the New York Stock Exchange under the symbol "ABB" since April 6, 2001. ABB Ltd's ADSs are issued under the Amended and Restated Deposit Agreement, dated May 7, 2001, with Citibank, N.A. as depositary. Each ADS represents one share.

There were no suspensions in the trading of our shares in 2018, 2017 or 2016.

Item 10. Additional Information

DESCRIPTION OF SHARE CAPITAL AND ARTICLES OF INCORPORATION

This section summarizes the material provisions of ABB Ltd's Articles of Incorporation and the Swiss Code of Obligations relating to the shares of ABB Ltd. The description is only a summary and is qualified in its entirety by ABB Ltd's Articles of Incorporation, a copy of which has been filed as Exhibit 1.1 to this Annual Report, ABB Ltd's filings with the commercial register of the Canton of Zurich (Switzerland) and Swiss statutory law.

Registration and Business Purpose

ABB Ltd was registered as a corporation (*Aktiengesellschaft*) in the commercial register of the Canton of Zurich (Switzerland) on March 5, 1999, under the name of "New ABB Ltd" and its name was subsequently changed to "ABB Ltd". Its commercial register number is CHE 101.049.653.

ABB Ltd's purpose, as set forth in Article 2 of its Articles of Incorporation, is to hold interests in business enterprises, particularly in enterprises active in the areas of industry, trade and services. It may acquire, encumber, exploit or sell real estate and intellectual property rights in Switzerland and abroad and may also finance other companies. It may engage in all types of transactions and may take all measures that appear appropriate to promote, or that are related to, its purpose. Finally, in pursuing its purpose, ABB Ltd shall strive for long-term sustainable value creation.

Our Shares

ABB Ltd's shares are registered shares (*Namenaktien*) with a par value of CHF 0.12 each. The shares are fully paid and non assessable. The shares rank pari passu in all respects with each other, including in respect of entitlements to dividends, to a share of the liquidation proceeds in the case of a liquidation of ABB Ltd, to advance subscription rights and to pre emptive rights.

Each share carries one vote in ABB Ltd's general shareholders' meeting. Voting rights may be exercised only after a shareholder has been recorded in ABB Ltd's share register (*Aktienbuch*) as a shareholder with voting rights, or with Euroclear Sweden AB in Sweden, which maintains a subregister of ABB Ltd's share register. Euroclear Sweden AB is an authorized central securities depository under the Swedish Act on Registration of Financial Instruments and carries out, among other things, the duties of registrar for Swedish companies listed on the NASDAQ OMX Stockholm Exchange. Registration with voting rights is subject to the restrictions described in "Transfer of Shares".

The shares are not issued in certificated form and are held in collective custody at SIX SIS AG. Shareholders do not have the right to request printing and delivery of share certificates (*aufgehobener Titeldruck*), but may at any time request ABB Ltd to issue a confirmation of the number of registered shares held.

Capital Structure

For a description of ABB Ltd's capital structure (including issued shares, contingent share capital and authorized share capital) and its dividend policy, see "Item 6. Directors, Senior Management and Employees—Shares" and "Item 3. Key Information—Dividends and Dividend Policy".

Transfer of Shares

The transfer of shares is effected by corresponding entry in the books of a bank or depository institution. An acquirer of shares must file a share registration form in order to be registered in ABB Ltd's share register as a shareholder with voting rights. Failing such registration, the acquirer will not be able to participate in or vote at shareholders' meetings, but will be entitled to dividends, pre emptive and advanced subscription rights, and liquidation proceeds.

An acquirer of shares will be recorded in ABB Ltd's share register with voting rights upon disclosure of its name and address. However, ABB Ltd may decline a registration with voting rights if the shareholder does not declare that it has acquired the shares in its own name and for its own account. If the shareholder refuses to make such declaration, it will be registered as a shareholder without voting rights. A person failing to declare in its registration application that it holds shares for its own account (a nominee), will be entered in the share register with voting rights, provided that such nominee has entered into an agreement with ABB concerning its status, and further provided that the nominee is subject to recognized bank or financial market supervision.

After having given the registered shareholder or nominee the right to be heard, the Board of Directors may cancel registrations in the share register retroactive to the date of registration if such registrations were made on the basis of incorrect information. The relevant shareholder or nominee will be informed promptly as to the cancellation. The Board of Directors will oversee the details and issue the instructions necessary for compliance with the preceding regulations. In special cases, it may grant exemptions from the rule concerning nominees.

Acquirers of registered shares who have chosen to have their shares registered in the share register with Euroclear Sweden AB are not requested to file a share registration form or declare that they have acquired the shares in their own name and for their own account in order to be registered as a shareholder with voting rights. However, in order to be entitled to vote at a shareholders' meeting those acquirers need to be entered in the Euroclear Sweden AB share register in their own name no later than six business days prior to the shareholders' meeting. Holders of such shares are also able to attend shareholders' meetings. Uncertificated shares registered with Euroclear Sweden AB may be pledged in accordance with Swedish law.

Except as described in this subsection, neither the Swiss Code of Obligations nor ABB Ltd's Articles of Incorporation limit any right to own ABB Ltd's shares, or any rights of non resident or foreign shareholders to exercise voting rights of ABB Ltd's shares.

Shareholders' Meetings

Under Swiss law, the annual general meeting of shareholders must be held within six months after the end of ABB Ltd's fiscal year. Annual general meetings of shareholders are convened by the board of directors, liquidators or representatives of bondholders or, if necessary, by the statutory auditors. The board of directors is further required to convene an extraordinary general meeting of shareholders if so resolved by the shareholders in a general meeting of shareholders or if so requested by one or more shareholders holding in aggregate at least 10 percent of ABB Ltd's share capital. A general meeting of shareholders is convened by publishing a notice in the Swiss Official Gazette of Commerce (*Schweizerisches Handelsamtsblatt*) at least 20 days prior to the meeting date. In addition, ABB publishes notices for its general meetings in certain newspapers as well as on its website. Such notices contain information as to procedures to be followed by shareholders in order to participate and exercise voting rights at the shareholders' meetings.

One or more shareholders whose combined holdings represent an aggregate par value of at least CHF 48,000 may require, in the form of a written request, 40 calendar days prior to a general meeting of shareholders that specific items and proposals be included on the agenda and voted on at the next general meeting of shareholders.

The following powers are vested exclusively in the general meeting of the shareholders:

- adoption and amendment of the Articles of Incorporation,
- election of members of the Board of Directors, the Chairman of the Board, the members of the Compensation Committee, the auditors and the independent proxy,
- approval of the annual management report and the consolidated financial statements,
- approval of the annual financial statements and decision on the allocation of profits shown on the balance sheet, in particular with regard to dividends,

- approval of the compensation of the Board of Directors and of the Executive Committee pursuant to ABB Ltd's Articles of Incorporation,

- granting discharge to the members of the Board of Directors and the persons entrusted with management, and

- passing resolutions as to all matters reserved to the authority of the shareholders' meeting by law or under ABB Ltd's Articles of Incorporation or that are submitted to the shareholders' meeting by the Board of Directors to the extent permitted by law.

There is no provision in ABB Ltd's Articles of Incorporation requiring a quorum for the holding of shareholders' meetings.

Resolutions and elections usually require the approval of an "absolute majority" of the shares represented at a shareholders' meeting (i.e. a majority of the shares represented at the shareholders' meeting with abstentions having the effect of votes against the resolution). If the first ballot fails to result in an election and more than one candidate is standing for election, the presiding officer will order a second ballot in which a relative majority (i.e. a majority of the votes) shall be decisive.

A resolution passed with a qualified majority (at least two thirds) of the shares represented at a shareholders' meeting is required for:

- a modification of the purpose of ABB Ltd,

- the creation of shares with increased voting powers,

- restrictions on the transfer of registered shares and the removal of those restrictions,

- restrictions on the exercise of the right to vote and the removal of those restrictions,

- an authorized or conditional increase in share capital,

- an increase in share capital through the conversion of capital surplus, through an in kind contribution or in exchange for an acquisition of property, and the grant of special benefits,

- the restriction or denial of pre emptive rights,

- a transfer of ABB Ltd's place of incorporation, and

- ABB Ltd's dissolution.

In addition, the introduction of any provision in ABB Ltd's Articles of Incorporation providing for a qualified majority must be resolved in accordance with such qualified majority voting requirements.

Pursuant to the Swiss Federal Merger Act, special quorum rules apply by law to a merger (*Fusion*) (including a possible squeeze out merger), de merger (*Spaltung*), or conversion (*Umwandlung*) of ABB Ltd.

At shareholders' meetings, shareholders can be represented by proxy, but only by their legal representative, another shareholder with the right to vote, or the independent proxy elected by the shareholders (*unabhängiger Stimmrechtsvertreter*). All shares held by one shareholder may be represented by only one representative. Votes are taken on a show of hands unless a secret ballot is required by the general meeting of shareholders or the presiding officer. The presiding officer may arrange for resolutions and elections to be carried out by electronic means. As a result, resolutions and elections carried out by electronic means will be deemed to have the same effect as secret ballots. The presiding officer may at any time order that a resolution or election decided by a show of hands be repeated through a secret ballot if, in his view, the results of the vote are in doubt. In this case, the preceding decision by a show of hands shall be deemed to have not occurred.

Only shareholders registered in ABB Ltd's share register with the right to vote are entitled to participate at shareholders' meetings. See "—Transfer of Shares". For practical reasons, shareholders must be registered in the share register with the right to vote no later than six business days prior to a shareholders' meeting in order to be entitled to participate and vote at such shareholders' meeting.

Holders of Euroclear Sweden AB registered shares are provided with financial and other information on ABB Ltd in the Swedish language in accordance with regulatory requirements and market practice. For shares that are registered in the system of Euroclear Sweden AB in the name of a nominee, such information is to be provided by the nominee.

Pre emptive Rights

Shareholders of a Swiss corporation have certain pre emptive rights to subscribe for new shares issued in connection with capital increases in proportion to the nominal amount of their shares held. A resolution adopted at a shareholders' meeting with a supermajority of two thirds of the shares represented may, however, repeal, limit or suspend (or authorize the board of directors to repeal, limit or suspend) pre emptive rights for cause. Cause includes an acquisition of a business or a part thereof, an acquisition of a participation in a company or the grant of shares to employees. In addition, based on Article 4bis para. 1 and para. 4 of ABB Ltd's Articles of Incorporation, pre emptive rights of the shareholders are excluded in connection with the issuance of convertible or warrant bearing bonds or other financial market instruments, shares to employees of ABB issued out of ABB Ltd's contingent share capital or the grant of warrant rights to shareholders, or may be restricted or denied by the Board of Directors of ABB Ltd under certain circumstances as set forth in Article 4ter of ABB Ltd's Articles of Incorporation. See "Item 6. Directors, Senior Management and Employees—Shares".

Advance Subscription Rights

Shareholders of a Swiss corporation may have an advance subscription right with respect to bonds and other instruments issued in connection with options or conversion rights for shares if such option or conversion rights are based on the corporation's conditional capital. However, the shareholders' meeting can, with a supermajority of two thirds of the shares represented at the meeting, exclude or restrict (or authorize the board of directors to exclude or restrict) such advance subscription rights for cause. See "Item 6. Directors, Senior Management and Employees—Shares—Contingent share capital".

Borrowing Power

Neither Swiss law nor ABB Ltd's Articles of Incorporation restrict in any way ABB Ltd's power to borrow and raise funds. The decision to borrow funds is taken by or under the direction of the Board of Directors or the Executive Committee, and no shareholders' resolution is required.

Repurchase of Shares

Swiss law limits a corporation's ability to repurchase or hold its own shares. ABB Ltd and its subsidiaries may only repurchase shares if ABB Ltd has sufficient freely distributable reserves to pay the purchase price, and the aggregate nominal value of such shares does not exceed 10 percent of ABB Ltd's total share capital. Furthermore, ABB Ltd must create a special reserve on its balance sheet in the amount of the purchase price of the acquired shares. Such shares held by ABB Ltd or its subsidiaries do not carry any rights to vote at shareholders' meetings, but are entitled to the economic benefits applicable to the shares generally and are considered to be "outstanding" under Swiss law.

Notices

Written communication by ABB Ltd to its shareholders will be sent by ordinary mail to the last address of the shareholder or authorized recipient entered in the share register. To the extent that personal notification is not mandated by law, all communications to the shareholders are validly made by publication in the Swiss Official Gazette of Commerce (*Schweizerisches Handelsamtsblatt*). To the extent required by the listing rules of the SIX Swiss Exchange, the NASDAQ OMX Stockholm Exchange, or the New York Stock Exchange, notices will be published in accordance with the rules of those exchanges. All such shareholder notices will also be published on ABB's website.

Duration, Liquidation and Merger

The duration of ABB Ltd as a legal entity is unlimited. It may be dissolved at any time by a shareholders' resolution which must be approved by a supermajority of two thirds of the shares represented at the general meeting of shareholders (this supermajority requirement applies in the event of a dissolution by way of liquidation or a merger where ABB Ltd is not the surviving entity). Dissolution by court order is possible if it becomes bankrupt or if holders of at least 10 percent of its share capital registered in the commercial register can establish cause for dissolution.

Under Swiss law, any surplus arising out of a liquidation of a corporation (after the settlement of all claims of all creditors) is distributed to the shareholders in proportion to the paid up par value of shares held, but this surplus is subject to Swiss withholding tax of 35 percent (see "—Taxation" below).

Disclosure of Major Shareholders

Under the Swiss Stock Exchange Act, shareholders and groups of shareholders acting in concert who directly or indirectly acquire or sell shares of a listed Swiss corporation or rights based thereon and thereby reach, exceed or fall below the thresholds of 3 percent, 5 percent, 10 percent, 15 percent, 20 percent, 25 percent, $33^{1}/_{3}$ percent, 50 percent or $66^{2}/_{3}$ percent of the voting rights of the corporation must notify the corporation and the exchange(s) in Switzerland on which such shares are listed of such holdings in writing within four trading days, whether or not the voting rights can be exercised. Following receipt of such a notification, the corporation must inform the public within two trading days.

An additional disclosure requirement exists under the Swiss Code of Obligations, according to which ABB Ltd must disclose individual shareholders and groups of shareholders acting in concert and their shareholdings if they hold more than 5 percent of all voting rights and ABB Ltd knows or has reason to know of such major shareholders. Such disclosures must be made once a year in the notes to the financial statements as published in its annual report. For a list of our major shareholders, see "Item 7. Major Shareholders and Related Party Transactions—Major Shareholders".

Mandatory Offering Rules

Under the Swiss Financial Market Infrastructure Act, shareholders and groups of shareholders acting in concert who acquire more than $33^1/_3$ percent of the voting rights (whether exercisable or not) of a listed Swiss company have to submit a takeover bid to all remaining shareholders unless the articles of incorporation of the company provide for an alteration of this obligation. ABB Ltd's Articles of Incorporation do not provide for any alterations of the acquiror's obligations under the Swiss Financial Market Infrastructure Act. The mandatory offer obligation may be waived under certain circumstances, for example if another shareholder owns a higher percentage of voting rights than the acquiror. A waiver from the mandatory bid rules may be granted by the Swiss Takeover Board. If no waiver is granted, the mandatory takeover bid must be made pursuant to the procedural rules set forth in the Swiss Financial Market Infrastructure Act and the implementing ordinances.

Other than the rules discussed in this section and in the section above entitled "—Duration, Liquidation and Merger" and "—Shareholders' Meetings" (which reflect mandatory provisions of Swiss law), no provision of ABB Ltd's Articles of Incorporation would operate only with respect to a merger, acquisition or corporate restructuring of ABB (or any of its subsidiaries) and have the effect of delaying, deferring or preventing a change in control of ABB.

Cancellation of Remaining Equity Securities

Under Swiss law, any offeror who has made a tender offer for the shares of a Swiss target company and who, as a result of such offer, holds more than 98 percent of the voting rights of the target company, may petition the court to cancel the remaining equity securities. The corresponding petition must be filed against the target company within three months after the lapse of the offer period. The remaining shareholders may join in the proceedings. If the court orders cancellation of the remaining equity securities, the target company will reissue the equity securities and deliver such securities to the offeror against performance of the offer for the benefit of the holders of the cancelled equity securities.

Directors and Officers

For further information regarding the material provisions of ABB Ltd's Articles of Incorporation and the Swiss Code of Obligations regarding directors and officers, see "Item 6. Directors, Senior Management and Employees— Board Of Directors—Board governance".

Auditors

The auditors are elected by the shareholders at the Annual General Meeting. Pursuant to ABB Ltd's Articles of Incorporation, their term of office is one year.

KPMG AG, Switzerland, assumed the sole auditing mandate of the consolidated financial statements of the ABB Group beginning in the year ended December 31, 2018. The auditor in charge and responsible for the mandate, Hans-Dieter Krauss, began serving in this capacity in respect of the financial year ended December 31, 2018.

See "Item 16C. Principal Accountant Fees and Services" for information regarding the fees paid to KPMG AG.

MATERIAL CONTRACTS

The following descriptions of the material provisions of the referenced agreements do not purport to be complete and are subject to, and qualified in their entirety by reference to, the agreements which have been filed as exhibits to this Annual Report.

Sale and Purchase agreement relating to the planned divestment of the Power Grids business

On December 17, 2018, ABB Ltd (the Seller) entered into a Sale and Purchase Agreement with Hitachi Ltd (the Purchaser) for the sale and purchase of 80.1% of the shares of ABB Management Holding AG (or such other entity as agreed between the Seller and the Purchaser). See Exhibit 4.6 to this Annual Report.

Revolving Credit Facility

On May 23, 2014, ABB entered into a syndicated $2 billion five year revolving credit facility with the right to extend for up to two additional years in accordance with its terms. For a description of the facility, see “Item 5. Operating and Financial Review and Prospects—Liquidity and Capital Resources—Credit Facility” and “Note 12 Debt” to our Consolidated Financial Statements. See Exhibit 4.1 to this Annual Report.

2012 Notes Indenture

On May 8, 2012, ABB’s subsidiary, ABB Finance (USA) Inc., issued $500,000,000 aggregate principal amount of 1.625% notes due 2017, $1,250,000,000 aggregate principal amount of 2.875% notes due 2022 and $750,000,000 aggregate principal amount of 4.375% notes due 2042 under an Indenture and a First Supplemental Indenture, dated as of May 8, 2012, among ABB Finance (USA) Inc., ABB and Deutsche Bank Trust Company Americas (the “2012 Indenture”). The notes due in 2017 were repaid at maturity. Pursuant to the terms of the 2012 Indenture, ABB has fully and unconditionally guaranteed payment of principal, premium, if any, and interest in respect of the outstanding notes. See Exhibits 4.2 and 4.3 to this Annual Report.

2018 Notes Indenture

On April 3, 2018, ABB’s subsidiary, ABB Finance (USA) Inc., issued (i) $300,000,000 aggregate principal amount of 2.8% notes due 2020 (ii) $450,000,000 aggregate principal amount of 3.375% notes, due 2023, and (iii) $750,000,000 million aggregate principal amount of 3.8% notes under an Indenture and a First Supplemental Indenture dated, dated as of April 3, 2018, among ABB Finance (USA) Inc., ABB and Deutsche Bank Trust Company Americas (the “2018 Indenture”). Pursuant to the terms of the 2018 Indenture, ABB has fully and unconditionally guaranteed payment of principal, premium, if any, and interest in respect of the outstanding notes. See Exhibits 4.4 and 4.5 to this Annual Report.

EXCHANGE CONTROLS

Other than in connection with Swiss government sanctions imposed on Belarus, the Republic of Burundi, the Central African Republic, the Democratic Republic of the Congo, Guinea, the Islamic Republic of Iran, the Republic of Iraq, Lebanon, Libya, the Republic of Mali, Myanmar (Burma), the Democratic People's Republic of Korea (North Korea), the Republic of Guinea Bissau, Somalia, the Republic of South Sudan, Sudan, Syria, Venezuela, Yemen, Zimbabwe, persons and organizations with connection to the late Osama bin Laden, the “al Qaeda” group or the Taliban, certain persons connected with the assassination of Rafik Hariri and certain measures in connection with the prevention of circumvention of international sanctions in connection with the situation in the Ukraine, there are currently no laws, decrees or regulations in Switzerland that restrict the export or import of capital, including, but not limited to, Swiss foreign exchange controls on payment of dividends, interest or liquidation proceeds, if any, to non Swiss resident holders of shares. In addition, there are no limitations imposed by Swiss law or ABB Ltd’s Articles of Incorporation on the rights of non Swiss residents or non Swiss citizens as shareholders to hold shares or to vote.

TAXATION

Swiss Taxation

Withholding Tax on Dividends and Other Distributions

Dividends paid and similar cash or in kind distributions that we make to a holder of shares or ADSs (including dividends on liquidation proceeds and stock dividends and taxable income resulting from partial liquidation) are subject to a Swiss federal withholding tax at a rate of 35 percent. A repurchase of shares by us for the purpose of a capital reduction is defined as a partial liquidation of the Company. In this case, the difference between the nominal value of the shares and their repurchase price is qualified as taxable income. The same would be true upon a repurchase of shares if we were not to dispose of the repurchased shares within six years after the repurchase, or if 10 percent of outstanding shares were exceeded. We must withhold the tax from the gross distribution and pay it to the Swiss Federal Tax Administration.

Obtaining a Refund of Swiss Withholding Tax for U.S. Residents

The Convention between the Swiss Confederation and the United States of America for the Avoidance of Double Taxation with Respect to Taxes on Income, which entered into force on December 19, 1997 and which we will refer to in the following discussion as the Treaty, allows U.S. resident individuals or U.S. corporations to seek a refund of the Swiss withholding tax paid in respect of our shares or ADSs if they qualify for benefits under the Treaty. U.S. resident individuals and U.S. corporations holding less than 10 percent of the voting rights in respect of our shares or ADSs are entitled to seek a refund of withholding tax to the extent the tax withheld exceeds 15 percent of the gross dividend or other distribution. U.S. corporations holding 10 percent or more of the voting rights of our shares or ADSs are entitled to seek a refund of withholding tax to the extent the tax withheld exceeds 5 percent of the gross dividend or other distribution. Qualifying U.S. pension or other retirement arrangements that do not control the Company are entitled to seek a full refund of withholding tax.

Claims for refunds must be filed with the Swiss Federal Tax Administration, Eigerstrasse 65, 3003 Bern, Switzerland, no later than December 31 of the third year following the calendar year in which the dividend or similar distribution became payable. The form used for obtaining a refund is Swiss Tax Form 82 (82C for companies; 82E for other entities; 82I for individuals; 82R for regulated investment companies (RICs)). This form may be obtained from any Swiss Consulate General in the United States, from the Swiss Federal Tax Administration at the address above or under www.estv.admin.ch .. The form must be filled out in triplicate with each copy duly completed and signed before a notary public in the United States. The form must be accompanied by evidence of the deduction of withholding tax withheld at the source (including tax voucher issued by the custodian bank).

Stamp Duties upon Transfer of Securities

The sale of shares or ADSs, whether by Swiss resident or non resident holders, may be subject to a Swiss securities transfer stamp duty of up to 0.15 percent calculated on the sale proceeds if it occurs through or with a Swiss bank or other Swiss securities dealer as defined in the Swiss Federal Stamp Tax Act. In addition to the stamp duty, the sale of shares or ADSs by or through a member of the SIX Swiss Exchange may be subject to a stock exchange levy.

United States Taxes

The following is a summary of the material U.S. federal income tax consequences of the ownership by U.S. holders (defined below) of shares or ADSs. This summary does not purport to address all of the tax considerations that may be relevant to a decision to purchase, own or dispose of shares or ADSs. This summary assumes that U.S. holders hold shares or ADSs as capital assets for U.S. federal income tax purposes. This summary does not address tax considerations applicable to holders that may be subject to special tax rules, such as U.S. expatriates, dealers or traders in securities or currencies, partnerships owning shares or ADSs, tax exempt entities, banks and other financial institutions, regulated investment companies, traders in securities that elect to apply a mark to market method of accounting, insurance companies, holders that own (or are deemed to own) at least 10 percent or more (by voting power or value) of the stock of ABB, investors whose functional currency is not the U.S. dollar, persons subject to the alternative minimum tax, persons subject to special tax accounting rules as a result of any item of gross income with respect to the shares or ADSs being taken into account in an applicable financial statement, persons that will hold shares or ADSs as part of a position in a straddle or as part of a hedging or conversion transaction for U.S. tax purposes and persons who are not U.S. holders. This discussion does not address aspects of U.S. taxation other than U.S. federal income taxation, nor does it address state, local or foreign tax consequences of an investment in shares or ADSs.

This summary is based (i) on the Internal Revenue Code of 1986, as amended, U.S. Treasury Regulations and judicial and administrative interpretations thereof, in each case as in effect and available on the date of this registration statement and (ii) in part, on representations of the depositary and the assumption that each obligation in the deposit agreement and any related agreement will be performed in accordance with its terms. The U.S. tax laws and regulations and the interpretation thereof are subject to change, which change could apply retroactively and could affect the tax consequences described below.

For purposes of this summary, a U.S. holder is a beneficial owner of shares or ADSs that, for U.S. federal income tax purposes, is:

- a citizen or individual resident of the United States,
- a corporation (or other entity treated as a corporation for U.S. federal income tax purposes) created or organized in or under the laws of the United States or any state, including the District of Columbia,
- an estate if its income is subject to U.S. federal income taxation regardless of its source, or
- a trust if such trust validly has elected to be treated as a U.S. person for U.S. federal income tax purposes or if (i) a U.S. court can exercise primary supervision over its administration and (ii) one or more U.S. persons have the authority to control all of its substantial decisions.

If a partnership (including any entity or arrangement treated as a partnership for U.S. federal income tax purposes) is a beneficial owner of shares or ADSs, the treatment of a partner in the partnership will generally depend on the status of the partner and the activities of the partnership. If you are a partner in a partnership that holds shares or ADSs you should consult your tax advisor.

Each prospective purchaser should consult the purchaser's tax advisor with respect to the U.S. federal, state, local and foreign tax consequences of acquiring, owning or disposing of shares or ADSs.

Ownership of ADSs in General, and Exchange of ADSs for Shares

For U.S. federal income tax purposes, a holder of ADSs generally will be treated as the owner of the shares represented by the ADSs, and the following discussion assumes that such treatment will be respected. If so, no gain or loss will be recognized upon an exchange of shares for ADSs or an exchange of ADSs for shares. The U.S. Treasury has expressed concerns that intermediaries in the chain of ownership between the holder of an ADS and the issuer of the security underlying the ADS may be taking actions that are inconsistent with the beneficial ownership of the underlying shares. Accordingly, the creditability of foreign taxes and the availability of the reduced tax rate for dividends received by certain non-corporate U.S. holders, if any, as described below, could be affected by actions taken by intermediaries in the chain of ownership between the holder of an ADS and ABB.

Distributions

In general, for U.S. federal income tax purposes, the gross amount of any distribution (other than certain distributions, if any, of shares distributed to all shareholders of ABB, including holders of ADSs) made to you with respect to shares or ADSs, including the amount of any Swiss taxes withheld from the distribution, will constitute dividends and be includible in gross income in the year received to the extent of ABB's current and accumulated earnings and profits (as determined under U.S. federal income tax principles).

Non corporate U.S. holders generally will be taxed on such distributions at the lower rates applicable to long term capital gains (i.e., gains from the sale of capital assets held for more than one year) with respect to distributions during 2018, provided that the U.S. holder meets certain holding period and other requirements and provided that such distributions constitute "qualified dividends" for U.S. federal income tax purposes. Distributions treated as dividends will not be treated as "qualified dividends" if we were to be treated as a "passive foreign investment company" (PFIC) for U.S. federal income tax purposes in the year that the dividend is paid or in the year prior to the year that the dividend is paid. Based on certain estimates of its gross income and gross assets and the nature of its business, ABB believes that it will not be classified as a PFIC for the taxable year ended December 31, 2018 and does not expect to be classified as a PFIC for the taxable year ending December 31, 2019. ABB's status in the current year and in future years will depend on its assets and activities in those years. ABB has no reason to believe that its assets or activities will change in a manner that would cause it to be classified as a PFIC. However, as PFIC status is a factual matter that depends on, among other things, the composition of the income and assets, and the market value of the assets as reflected in market capitalization, of ABB and its subsidiaries that must be determined annually at the close of each taxable year, there can be no certainty regarding ABB's PFIC status in any particular year until the end of that year. U.S. holders are urged to consult their own tax advisors regarding the availability to them of the reduced dividend rate in light of their own particular circumstances and the consequences to them if ABB were to be treated as a PFIC with respect to any taxable year.

Dividends paid to U.S. corporate holders will not be eligible for the dividends received deduction generally allowed to corporate U.S. holders.

If you are a U.S. holder and distributions with respect to shares or ADSs exceed ABB's current and accumulated earnings and profits as determined under U.S. federal income tax principles, then the excess generally would be treated first as a tax free return of capital to the extent of your adjusted tax basis in the shares or ADSs. Any amount in excess of the amount of the dividend and the return of capital generally would be treated as capital gain. ABB does not maintain calculations of its earnings and profits under U.S. federal income tax principles, so a U.S. holder should expect all cash distributions to be reported as dividends for U.S. federal income tax purposes.

If you are a U.S. holder, then dividends paid in Swiss francs, including the amount of any Swiss taxes withheld from the dividends, will be included in your gross income in an amount equal to the U.S. dollar value of the Swiss francs calculated by reference to the spot exchange rate in effect on the day the dividends are includible in income. In the case of ADSs, dividends generally are includible in income on the date they are received by the depositary, regardless of whether the payment is in fact converted into U.S. dollars at that time. If dividends paid in Swiss francs are converted into U.S. dollars on the day they are includible in income, then you generally should not be required to recognize foreign currency gain or loss with respect to the conversion. However, any gains or losses resulting from the conversion of Swiss francs between the time of the receipt of dividends paid in Swiss francs and the time the Swiss francs are converted into U.S. dollars will be treated as ordinary income or loss to you, as the case may be. The amount of any distribution of property other than cash will be the fair market value of the property on the date of distribution.

If you are a U.S. holder, then dividends received by you with respect to shares or ADSs will be treated as foreign source income, which may be relevant in calculating your foreign tax credit limitation. Subject to certain conditions and limitations, Swiss tax withheld on dividends may be deducted from your taxable income or credited against your U.S. federal income tax liability. However, to the extent that you would be entitled to a refund of Swiss withholding taxes pursuant to the U.S. Switzerland tax treaty, you may not be eligible for a U.S. foreign tax credit with respect to the amount of such withholding taxes which may be refunded, even if you fail to claim the refund. See "—Swiss Taxation—Obtaining a Refund of Swiss Withholding Tax for U.S. Residents". The limitation on foreign taxes eligible for credit is calculated separately with respect to specific classes of income. For this purpose, dividends distributed by ABB generally will constitute passive income. The rules relating to the determination of the U.S. foreign tax credit are complex, and you should consult your tax advisor to determine whether and to what extent you would be entitled to this credit.

Sale, Exchange or other Taxable Disposition of Shares or ADSs

If you are a U.S. holder that holds shares or ADSs as capital assets, then you generally will recognize capital gain or loss for U.S. federal income tax purposes upon a sale, exchange or other taxable disposition of your shares or ADSs in an amount equal to the difference between your adjusted tax basis in the shares or ADSs and the amount realized on their disposition. If you are a non corporate U.S. holder, the maximum marginal U.S. federal income tax rate applicable to the gain is generally lower than the maximum marginal U.S. federal income tax rate applicable to ordinary income (other than certain dividends) if your holding period for the shares or ADSs exceeds one year (i.e., long term capital gains). If you are a U.S. holder, then the gain or loss, if any, recognized by you generally will be treated as U.S. source income or loss, as the case may be, for U.S. foreign tax credit purposes.

If you are a U.S. holder and you receive any foreign currency on the disposition of shares or ADSs, the amount realized will be the U.S. dollar value of the payment received, translated at the spot rate of exchange on the date of taxable disposition. If the shares are treated as traded on an established securities market, a cash basis U.S. holder and an accrual basis U.S. holder who has made a special election (which must be applied consistently from year to year and cannot be changed without the consent of the U.S. Internal Revenue Service) will determine the U.S. dollar value of the amount realized in foreign currency by translating the amount received at the spot rate of exchange on the settlement date of the disposition. An accrual basis U.S. holder that does not make the special election will recognize U.S. source ordinary income or loss as a result of currency fluctuations between the trade date and the settlement date of the disposition of the shares or ADSs, as the case may be.

Medicare Tax

For taxable years beginning after December 31, 2012, certain U.S. holders who are individuals, estates or trusts must pay a 3.8 percent tax on the lesser of (i) the U.S. holder's "net investment income" for the relevant taxable year and (ii) the excess of the U.S. holder's modified adjusted gross income for the taxable year over a certain threshold (which in the case of individuals will be between $125,000 and $250,000, depending on the individual's circumstances). A U.S. holder's net investment income will generally include its dividend income and its net gains from the disposition of shares or ADSs, unless such income or net gains are derived in the ordinary course of the conduct of a trade or business (other than a trade or business that consists of certain passive or trading activities). If you are a U.S. holder that is an individual, estate or trust, you are urged to consult your tax advisor regarding the applicability of the Medicare tax to your income and gains in respect of your investment in shares or ADSs.

Information with Respect to Foreign Financial Assets

Certain U.S. holders who are individuals (and certain entities) that hold an interest in "specified foreign financial assets" (which may include the shares) are required to report information relating to such assets, subject to certain exceptions (including an exception for shares held in accounts maintained by certain financial institutions). Penalties can apply if U.S. holders fail to satisfy such reporting requirements. U.S. holders should consult their tax advisors regarding the effect, if any, of this requirement on their ownership and disposition of the shares.

Backup Withholding and Information Reporting

U.S. backup withholding tax and information reporting requirements generally apply to certain payments to certain non corporate holders of stock. Information reporting generally will apply to payments of dividends on, and to proceeds from the sale or redemption of, shares or ADSs made within the United States to a holder of shares or ADSs (other than an exempt recipient, including a corporation, a payee that is not a U.S. holder that provides an appropriate certification, and certain other persons).

A payor will be required to withhold backup withholding tax from any payments of dividends on, or the proceeds from the sale or redemption of, shares or ADSs within the United States to you, unless you are an exempt recipient, if you fail to furnish your correct taxpayer identification number or otherwise fail to establish an exception from backup withholding tax requirements. U.S. holders who are required to establish their exempt status may be required to provide such certification on U.S. Internal Revenue Service Form W 9. Backup withholding is not an additional tax. The amount of any backup withholding from a payment to you may be allowed as a credit against your U.S. federal income tax liability and may entitle you to a refund, provided that the required information is furnished timely to the U.S. Internal Revenue Service.

THE ABOVE SUMMARIES ARE NOT INTENDED TO CONSTITUTE A COMPLETE ANALYSIS OF ALL TAX CONSEQUENCES RELATING TO THE OWNERSHIP OF SHARES OR ADSs. PROSPECTIVE PURCHASERS OF SHARES OR ADSs SHOULD CONSULT THEIR TAX ADVISORS CONCERNING THE TAX CONSEQUENCES OF THEIR PARTICULAR SITUATIONS.

DOCUMENTS ON DISPLAY

We are subject to the informational requirements of the Exchange Act. In accordance with these requirements, we file reports and other information with the SEC. The SEC maintains a Web site at *www.sec.gov* that contains reports, including this Annual report and the exhibits thereto, and other information regarding registrants that file electronically with the SEC. Our annual reports on Form 20-F, reports on Form 6-K and some of the other information we submit to the SEC may be accessed through this Web site. In addition, material that we file can be inspected at the offices of the New York Stock Exchange at 11 Wall Street, New York, New York 10005.

Item 11. Quantitative and Qualitative Disclosures about Market Risk

Market Risk Disclosure

The continuously evolving financial markets and the dynamic business environment expose us to changes in foreign exchange, interest rate and other market price risks. We have developed and implemented comprehensive policies, procedures, and controls to identify, mitigate, and monitor financial risk on a company wide basis. To efficiently aggregate and manage financial risks that could impact our financial performance, we operate a Group Treasury Operations function. Our Group Treasury Operations provides an efficient source of liquidity, financing, risk management and other global financial services to the ABB Group companies. Our policies do not allow our Group Treasury Operations or ABB Group companies to perform speculative trading. Market risk management activities are focused on mitigating material financial risks resulting from our global operating and financing activities.

Group Treasury Operations maintains risk management control systems to monitor foreign exchange and interest rate risks and exposures arising from our underlying business, as well as the associated hedge positions. Our written policies govern how such exposures are managed. Financial risks are monitored using a number of analytical techniques including market value and sensitivity analysis. The following quantitative analyses are based on sensitivity analysis tests, which assume parallel shifts of interest rate yield curves, and foreign exchange rates and equity prices.

Currency Fluctuations and Foreign Exchange Risk

It is our policy to identify and manage all transactional foreign exchange exposures to minimize risk. With the exception of certain financing subsidiaries and to the extent certain operating subsidiaries are domiciled in high inflation environments, the functional currency of each of our companies is considered to be its local currency. Our policies require our subsidiaries to hedge all contracted foreign exchange exposures, as well as a portion of their forecast exposures, against their local currency. These transactions are undertaken mainly with our Group Treasury Operations.

We have foreign exchange transaction exposures related to our global operating and financing activities in currencies other than the functional currency in which our entities operate. Specifically, we are exposed to foreign exchange risk related to future earnings, assets or liabilities denominated in foreign currencies. The most significant currency exposures relate to operations in the Eurozone area, Sweden and Switzerland. In addition, we are exposed to currency risk associated with translating our functional currency financial statements into our reporting currency, which is the U.S. dollar.

Our operating companies are responsible for identifying their foreign currency exposures and entering into intercompany derivative contracts with Group Treasury Operations, where legally possible, to hedge their exposures. Where local laws restrict our operating companies from entering into intercompany derivatives with Group Treasury Operations, derivative contracts are entered into locally with third party financial institutions. The intercompany transactions have the effect of transferring the operating companies' currency risk to Group Treasury Operations, but create no additional market risks on a consolidated basis. Group Treasury Operations then manages this risk by entering into offsetting transactions with third party financial institutions. According to our policy, material net currency exposures are required to be hedged and are primarily hedged with forward foreign exchange contracts. The majority of the foreign exchange hedge instruments have, on average, a maturity of less than twelve months. Group Treasury Operations also hedges currency risks arising from monetary intercompany balances, primarily loans receivable from other ABB companies.

At December 31, 2018 and 2017, the net fair value of financial instruments with exposure to foreign currency rate movements was an asset of $2,150 million and $700 million, respectively. The potential loss in fair value of such financial instruments from a hypothetical 10 percent move in foreign exchange rates against our position would be approximately $405 million and $387 million for December 31, 2018 and 2017, respectively. The analysis reflects the aggregate adverse foreign exchange impact associated with transaction exposures, as well as translation exposures where appropriate. Our sensitivity analysis assumes a simultaneous shift in exchange rates against our positions exposed to foreign exchange risk and as such assumes an unlikely adverse case scenario. Exchange rates rarely move in the same direction. Therefore, the assumption of a simultaneous shift may overstate the impact of changing rates on assets and liabilities denominated in foreign currencies. The underlying trade related transaction exposures of the industrial companies are not included in the quantitative analysis. If these underlying transaction exposures were included, they would tend to have an offsetting effect on the potential loss in fair value detailed above.

Interest Rate Risk

We are exposed to interest rate risk due to our financing, investing, and liquidity management activities. Our operating companies primarily invest excess cash with, and receive funding from, our Group Treasury Operations on an arm's length basis. It is our policy that the primary third party funding and investing activities, as well as the monitoring and management of the resulting interest rate risk, are the responsibility of Group Treasury Operations. Group Treasury Operations adjusts the duration of the overall funding portfolio through derivative instruments in order to better match underlying assets and liabilities, as well as minimize the cost of capital.

At December 31, 2018 and 2017, the net fair value of instruments subject to Interest Rate Risk was a liability of $4,792 million and $2,021 million, respectively. The potential loss in fair value for such instruments from a hypothetical 100 basis points parallel shift in interest rates against our position (or a multiple of 100 basis points where 100 basis points is less than 10 percent of the interest rate) would be approximately $251 million and $221 million, for December 31, 2018 and 2017, respectively.

Equity Risk

Certain of our entities have equity investments that expose us to equity price risk. At December 31, 2018 and 2017, the net fair value of equity risk sensitive instruments was an asset of $7 million and $42 million, respectively. The potential loss in fair value of such financial instruments from a hypothetical 10 percent move in the underlying equity prices against our position would be approximately $2 million and $15 million, for December 31, 2018 and 2017, respectively.

Commodity Risk

We enter into commodity derivatives to hedge certain of our raw material exposures. At December 31, 2018 and 2017, the net fair value of commodity derivatives was a liability of $18 million and an asset of $35 million, respectively. The potential loss in fair value for such commodity hedging derivatives from a hypothetical adverse 10 percent move against our position in the underlying commodity prices would be approximately $45 million and $36 million for December 31, 2018 and 2017, respectively. A portion of our commodity derivatives are denominated in euro. The foreign exchange risk arising on such contracts has been excluded from the calculation of the potential loss in fair value from a hypothetical 10 percent move in the underlying commodity prices as discussed above.

Item 12. Description of Securities Other Than Equity Securities

American Depositary Shares

Depositary fees payable upon the issuance and cancellation of ADSs are typically paid to the depositary bank by the brokers (on behalf of their clients) receiving the newly issued ADSs from the depositary bank and by the brokers (on behalf of their clients) delivering the ADSs to the depositary bank for cancellation. The brokers in turn may charge these transaction fees to their clients.

Depositary fees payable in connection with distributions of cash or securities to ADS holders and the depositary services fee are charged by the depositary bank to the holders of record of ADSs as of the applicable ADS record date. The depositary fees payable for cash distributions are generally deducted from the cash being distributed. In the case of distributions other than cash (i.e., stock dividends, rights offerings), the depositary bank charges the applicable fee to the ADS record date holders concurrent with the distribution. In the case of ADSs registered in the name of the investor (whether certificated or un certificated in direct registration), the depositary bank sends invoices to the applicable record date ADS holders. In the case of ADSs held in brokerage and custodian accounts via the central clearing and settlement system, The Depository Trust Company (DTC), the depositary bank, generally collects its fees through the systems provided by DTC (whose nominee is the registered holder of the ADSs held in DTC) from the brokers and custodians holding ADSs in their DTC accounts. The brokers and custodians who hold their clients' ADSs in DTC accounts in turn charge their clients' accounts the amount of the fees paid to the depositary banks.

In the event of refusal to pay the depositary fees, the depositary bank may, under the terms of the deposit agreement, refuse the requested service until payment is received or may set off the amount of the depositary fees from any distribution to be made to the ADS holder.

Depositary fees are as follows:

Depositary Service	Fee
Issuance of ADSs upon deposit of shares	Up to $5.00 per 100 ADSs (or fraction thereof) issued.
Delivery of deposited security against surrender of ADSs	Up to $5.00 per 100 ADSs (or fraction thereof) surrendered.
Distribution of dividend	Up to $2.00 per 100 ADSs (or fraction thereof) held.
Distribution of cash proceeds	Up to $2.00 per 100 ADSs (or fraction thereof) held.
Distribution of ADSs pursuant to exercise of rights	Up to $5.00 per 100 ADSs (or fraction thereof) issued.

Depositary Payments

In 2018, we received reimbursements from Citibank N.A., the Depositary Bank of our ADS program, of approximately $4 million to help cover costs related to our ADS program. Those costs, in addition to costs associated with compliance with U.S. securities laws, include expenses such as listing fees, proxy expenses, printing and distribution of reports, and other investor relations related activities.

PART II

Item 13. Defaults, Dividend Arrearages and Delinquencies

None

Item 14. Material Modifications to the Rights of Security Holders and Use of Proceeds

None

Item 15. Controls and Procedures

Disclosure controls and procedures

In designing and evaluating our disclosure controls and procedures, management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable, not absolute, assurance of achieving the desired control objectives. In addition, the design of disclosure controls and procedures must reflect the fact that there are resource constraints and that management is required to apply judgment in evaluating the benefits of possible controls and procedures relative to their costs.

Our Chief Executive Officer, Ulrich Spiesshofer, and Chief Financial Officer, Timo Ihamuotila, with the participation of key corporate senior management and management of key corporate functions, performed an evaluation of our disclosure controls and procedures (as defined in Rule 13a-15(e) of the Exchange Act) as of December 31, 2018. Based on that evaluation, management, including the Chief Executive Officer and Chief Financial Officer, has concluded that, as of December 31, 2018, as a result of the material weakness related to information technology controls described below, our disclosure controls and procedures were not effective to provide reasonable assurance that information required to be disclosed in reports that we file or submit under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in the SEC's rules and forms and that such information has been accumulated and communicated to our management, including our Chief Executive Officer and Chief Financial Officer, as appropriate to allow timely decisions regarding required disclosure.

Management's annual report on internal control over financial reporting

The Board of Directors and management of the ABB Group are responsible for establishing and maintaining adequate internal control over financial reporting as defined in Rule 13a 15(f) of the Exchange Act.

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 conducted an assessment of the effectiveness of internal control over financial reporting as of December 31, 2018. In making this assessment, management used the criteria established in Internal Control—Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework). Management's assessment of the effectiveness of internal controls over financial reporting excludes the evaluation of the internal controls over financial reporting for GE Industrial Solutions (GEIS), which was acquired on June 30, 2018. GEIS represents $3.8 billion of Total assets of the Company as of December 31, 2018, and $1.3 billion of Total revenues of the Company for the year then ended.

A material weakness is a deficiency, or a combination of deficiencies, in internal control over financial reporting, such that there is a reasonable possibility that a material misstatement of the company's financial statements will not be prevented or detected on a timely basis. We have identified a material weakness in our information technology general controls (ITGCs) based on deficiencies in selection, development and monitoring of control activities in ITGCs. We did not maintain sufficient user access or segregation of duties controls in certain applications in North America as well as for select Group applications. As a result of these deficiencies, the process level controls dependent on the affected applications, could not be relied upon.

This material weakness did not result in any misstatements in the financial statements. However, due to the existence of the material weakness, a reasonable possibility exists that material misstatements in the Company's financial statements would not have been prevented or detected on a timely basis.

We completed additional substantive procedures prior to filing this annual report to ensure that the financial statements, prepared in accordance with U.S. GAAP, were not materially misstated. Based on these procedures no adjustments to our financial statements were required.

Based on its evaluation, our management has concluded that, as of December 31, 2018, as a result of the material weakness described above, our internal control over financial reporting was not effective.

KPMG AG, the independent registered public accounting firm that audited the financial statements for the year ended December 31, 2018, included in this annual report, has issued an adverse opinion on the effectiveness of the ABB Group's internal control over financial reporting as of December 31, 2018.

Remediation plans

We are actively implementing a remediation plan to ensure that controls contributing to this material weakness are designed appropriately and will operate effectively. The remediation actions we are taking and expect to take include the following:

- improve the identification of financially relevant applications and the selection, development, and monitoring of control activities and procedures to more appropriately address user access rights and segregation of duties for affected applications,
- formalize information technology application review requirements to ensure proper identification of risks related to financial reporting and appropriately design controls, and
- enhance training of our personnel and clearly communicate control responsibilities.

Report of the independent registered public accounting firm

KPMG's opinion on the effectiveness of the ABB Group's internal control over financial reporting as of December 31, 2018, is included in "Item 18. Financial Statements".

Changes in internal control over financial reporting

In 2018, we continued consolidating and standardizing the structure of our shared service centers, mainly impacting the controls applicable to transactions within finance, human resources, information systems and supply chain management functions. The Global Business Services (GBS) and Center of Expertise (CoE) for Controlling and Planning setup has involved changes in personnel as well as changes in the location of performance for some controls; however, the basic internal control over financial reporting framework has not significantly changed.

In 2018, we also continued improving our control environment due to the changing landscape of our business that requires additional attention to maintain internal controls over financial reporting. We enhanced and elevated internal communications on the importance and understanding of internal control over financial reporting, we implemented a risk and controls accountability framework to reinforce understanding of roles and responsibilities including consequence management, and reorganized and enhanced the competency of our financial reporting group.

In 2018, in addition to the material weakness identified in select Group applications described above, we also identified control deficiencies relating to ineffective ITGCs over other Group applications. During 2018, we remediated these ITGC control deficiencies related to these other Group applications by improving the design of control activities and related procedures. We completed our testing of the operating effectiveness of these implemented controls and found them to be effective.

Except as described above, there have been no significant changes in our internal control over financial reporting that occurred during the period covered by this annual report that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Item 16A. Audit Committee Financial Expert

Our Board of Directors has determined that David Meline, Gunnar Brock, Geraldine Matchett and Satish Pai, who serve on our Finance, Audit and Compliance Committee (FACC), are independent for purposes of serving on the audit committee under Rule 10A-3 and the listing standards promulgated by the New York Stock Exchange, and are audit committee financial experts.

Item 16B. Code of Ethics

Our chief executive officer, chief financial officer, principal accounting officer and persons performing similar functions are bound to adhere to our Code of Conduct, which applies to all employees of all companies in the ABB Group. Our Board of Directors and Executive Committee members are also required to comply with the Addendum to the ABB Code of Conduct for Members of the Board of Directors and the Executive Committee. Our Code of Conduct is available on our Web site in the section "Corporate governance" at *www.abb.com/investorrelations*. ABB intends to satisfy any applicable disclosure requirement regarding amendment to, or waiver from, a provision of our Code of Conduct by posting such information on our website at the address and location specified above.

Item 16C. Principal Accountant Fees and Services

On March 29, 2018, shareholders at the Annual General Meeting of ABB Ltd, approved the appointment of KPMG AG (KPMG) to become the auditors of the Company starting on March 29, 2018. The dismissal of Ernst & Young AG (EY) and appointment of KPMG was a result of a competitive tendering process involving several accounting firms, including EY. On January 23, 2019, EY was engaged to perform audit services relating to the years 2017 and 2016 included in this Annual Report.

In the table below, The aggregate fees for services rendered by KPMG and EY along with their respective affiliates for professional services were as follows:

		2018		2017
($ in millions)	**KPMG**	**EY[1]**	**Total**	**EY**
Audit Fees	34.1	2.5	**36.6**	28.3
Audit-Related Fees	0.2	0.4	**0.6**	1.2
Tax Fees	0.4	0.6	**1.0**	1.1
Other Fees	0.0	0.0	**0.0**	0.1
Total	**34.7**	**3.5**	**38.2**	**30.7**

(1) EY fees for 2018 include all fees up to March 29, 2018, and the audit fees for the 2017 and 2016 periods included in this Annual Report

Audit Fees

Audit fees include the standard audit work performed each fiscal year necessary to allow the auditor to issue an opinion on our Consolidated Financial Statements (including the integrated audit of internal controls over financial reporting) and to issue an opinion on the local statutory financial statements of ABB Ltd and its subsidiaries. Audit fees also include services that can be provided only by the ABB Group auditor such as pre issuance reviews of quarterly financial results (no such reviews have been performed) and comfort letters delivered to underwriters in connection with debt and equity offerings. Included in the 2017 audit fees were approximately $2.4 million related to the 2016 audit, which were not agreed until after the Company had filed its annual report on Form 20-F with the SEC on March 13, 2017.

Audit Related Fees

These services consisting primarily of accounting consultations, audits of pension and benefit plans, accounting advisory services and other attest services related to financial reporting that are not required by statute or regulation.

Tax Fees

Fees for tax services represent primarily income tax and indirect tax compliance services as well as tax advisory services.

All Other Fees

Fees for other services not included in the above three categories.

Pre Approval Procedures and Policies

In accordance with the requirements of the U.S. Sarbanes Oxley Act of 2002 and rules issued by the SEC, we utilize a procedure for the review and pre approval of any services performed by KPMG and EY (prior to the appointment of KPMG). The procedure requires that all proposed engagements of KPMG for audit and permitted non audit services are submitted to the FACC for approval prior to the beginning of any such services. In accordance with this policy, all services performed by and fees paid to KPMG in 2018 and EY in the first three months of 2018 and for 2017, as discussed above in this Item 16C, were approved by the FACC.

Item 16D. Exemptions from the Listing Standards for Audit Committees

None

Item 16E. Purchase of Equity Securities by Issuer and Affiliated Purchasers

The following table sets out certain information about purchases of our own shares made by us or on our behalf or by affiliated purchasers.

Period	Total number of shares purchased[1]	Average price paid per share[2]	Total number of shares purchased as part of publicly announced program	Approximate USD-equivalent value of shares that may yet be purchased under the program
February 09 - February 21, 2018	10,000,000	$24.91	n.a	n.a
Total	**10,000,000**			

(1) The share purchases were made through open-market transactions and are not part of any publicly announced program.

(2) Represents volume weighted-average prices in CHF translated into USD using daily closing foreign exchange rates.

Item 16F. Change in Registrant's Certifying Accountant

In 2016, we commenced a tender process to select our certifying accountant and to propose to shareholders the selected audit firm for ratification. EY had been the sole auditor of the ABB Group since 2001 and, up to then, had been jointly responsible since 1994. The tender process evaluated several firms and EY also submitted a proposal. As a result of the audit tender process and the FACC's recommendation, we announced on May 22, 2017, that the Board of Directors decided to appoint KPMG, subject to the required shareholder approval. This was approved by shareholders at the 2018 Annual General Meeting of ABB Ltd. As a result, EY was dismissed and KPMG was appointed on March 29, 2018.

EY's reports with respect to the Company's financial statements prepared in accordance with U.S. GAAP for the years ended December 31, 2017 and 2016, did not contain any adverse opinion or disclaimer of opinion, nor were any of these reports qualified or modified with respect to uncertainty, audit scope or accounting principle.

In the years ended December 31, 2017 and 2016, and during the subsequent interim period through March 29, 2018, there were (i) no "disagreements," as that term is used in Item 16F(a)(1)(iv) of Form 20-F, with EY on any matters of accounting principles or practices, financial statement disclosure, or auditing scope and procedures which, if not resolved to the satisfaction of EY, would have caused EY to make reference to such disagreements in their reports, or (ii) "reportable events," as defined in Item 16F(a)(1)(v) of Form 20-F, except that, as previously disclosed in ABB's Form 20-F for the year ended December 31, 2016, a material weakness was identified regarding the lack of adequate segregation of duties in the treasury function in ABB's South Korean subsidiary and failure to identify certain inappropriate access levels to the local enterprise resource planning (ERP) system. In addition, ABB failed to safeguard physical access to the signature seals of the subsidiary in South Korea and prevent the Company from being bound to unauthorized financial contracts, resulting in undetected financial obligations. ABB also failed to provide adequate management oversight and review of the local treasury activities. As disclosed in ABB's Form 20-F for the year ended December 31, 2017, ABB determined that such material weakness was remediated as of December 31, 2017. The FACC discussed the foregoing material weakness in the Company's internal control over financial reporting with EY. ABB has authorized EY to respond fully to the inquiries of KPMG concerning such material weakness.

During the two years ended December 31, 2017, and the subsequent interim period through March 29, 2018, neither ABB nor anyone on ABB's behalf consulted with KPMG regarding either (i) the application of accounting principles to a specified transaction, either completed or proposed, or the type of audit opinion that might be rendered with respect to the consolidated financial statements of the ABB Group; or (ii) any matter that was the subject of a disagreement as that term is used in Item 16F(a)(1)(iv) of Form 20-F or a 'reportable event' as described in Item 16F(a)(1)(v) of Form 20-F.

We have provided EY with a copy of this disclosure in response to Item 16F and have requested and received a letter from EY, addressed to the Securities and Exchange Commission, stating whether EY agrees with such disclosure. A copy of EY's letter, dated March 27, 2019, is attached as Exhibit 15.3 to this Form 20-F.

Item 16G. Corporate Governance

See "Item 6. Directors, Senior Management and Employees—Other governance information—Governance differences from NYSE Standards" for significant ways in which ABB's corporate governance practices differ from the New York Stock Exchange's standards.

Item 16H. Mine Safety Disclosure

Not applicable.

PART III

Item 17. Financial Statements

We have elected to provide financial statements and the related information pursuant to Item 18.

Item 18. Financial Statements

See pages F 1 to F 86, which are incorporated herein by reference. All schedules are omitted as the required information is inapplicable or the information is presented in the Consolidated Financial Statements or notes thereto.

Item 19. Exhibits

1.1	Articles of Incorporation of ABB Ltd as amended to date.
2.1	Form of Amended and Restated Deposit Agreement, by and among ABB Ltd, Citibank, N.A., as Depositary, and the holders and beneficial owners from time to time of the American Depositary Shares issued thereunder (including as an exhibit the form of American Depositary Receipt). Incorporated by reference to Exhibit (a) to Form F-6EF (File No. 333-147488) filed by ABB Ltd on November 19, 2007.
2.2	Form of American Depositary Receipt (included in Exhibit 2.1).
4.1	$2,000,000,000 Multicurrency Revolving Credit Agreement, dated May 23, 2014, and as amended on June 13, 2014, entered into between ABB Ltd, certain subsidiaries of ABB Ltd as borrowers, 27 banks as mandated lead arrangers, Citibank International PLC, as facility agent and euro swingline agent and Citibank N.A. as dollar swingline agent. Incorporated by reference to Exhibit 4.1 to the Form 20-F filed by ABB Ltd on March 5, 2015.
4.2	Indenture dated as of May 8, 2012, among ABB Finance (USA) Inc., ABB and Deutsche Bank Trust Company Americas, pursuant to which ABB has fully and unconditionally guaranteed payment of principal, premium, if any, and interest in respect of any notes issued thereunder. On May 8, 2012, ABB's subsidiary, ABB Finance (USA) Inc., issued $500,000,000 aggregate principal amount of 1.625% notes due 2017, $1,250,000,000 aggregate principal amount of 2.875% notes due 2022 and $750,000,000 aggregate principal amount of 4.375% notes due 2042 under the Indenture. Incorporated by reference to Exhibit 1 to the Form 6-K filed by ABB Ltd on March 9, 2018.
4.3	First Supplemental Indenture, dated as of May 8, 2012, among ABB Finance (USA) Inc., as Issuer, ABB Ltd, as Guarantor, and Deutsche Bank Trust Company Americas, as Trustee. Incorporated by reference to Exhibit 2 to the Form 6-K filed by ABB Ltd on March 9, 2018.
4.4	Indenture dated as of April 3, 2018, among ABB Finance (USA) Inc., ABB Ltd. and Deutsche Bank Trust Company Americas, pursuant to which ABB has fully and unconditionally guaranteed payment of principal, premium, if any, and interest in respect of any notes issued thereunder. On March 26, 2018, ABB's subsidiary, ABB Finance (USA) Inc., issued $300,000,000 aggregate principal amount of 2.8% notes due 2020, $450,000,000 aggregate principal amount of 3.375% notes due 2023 and $750,000,000 aggregate principal amount of 3.8% notes due 2028 under the Indenture. Incorporated by reference to Exhibit 4.1 to the Form 6-K filed by ABB Ltd on April 3, 2018.
4.5	First Supplemental Indenture dated April 3, 2018, among ABB Finance (USA) Inc., ABB Ltd and Deutsche Bank Trust Company Americas, as Trustee (including the form of the 2.800% Notes due 2020, the form of the 3.375% Notes due 2023 and the form of the 3.800% Notes due 2028). Incorporated by reference to Exhibit 4.2 to the Form 6-K filed by ABB Ltd on April 3, 2018
4.6	Sale and Purchase Agreement dated December 17, 2018, between ABB Ltd (the Seller) and Hitachi Ltd (the Purchaser) for the sale and purchase of 80.1% of the shares in ABB Management Holding AG (or such other entity as agreed between the Seller and the Purchaser).
8.1	Subsidiaries of ABB Ltd as of December 31, 2018.
12.1	Certification of the chief executive officer pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
12.2	Certification of the chief financial officer pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
13.1	Certification by the chief executive officer of ABB Ltd pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.*
13.2	Certification by the chief financial officer of ABB Ltd pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.*
15.1	Consent of KPMG AG.
15.2	Consent of Ernst & Young AG.
15.3	Letter regarding change in certifying accountant.

101	The following financial information from this Annual Report formatted in XBRL (Extensible Business Reporting Language) includes (i) Consolidated Income Statements, (ii) Consolidated Statements of Comprehensive Income, (iii) Consolidated Balance Sheets, (iv) Consolidated Statements of Cash Flows, (v) Consolidated Statements of Changes in Stockholders' Equity, (vi) Notes to the Consolidated Financial Statements, tagged as blocks of text, (vii) each significant accounting policy within "Note 2 Significant accounting policies", tagged as a single block of text, (viii) each table in the Notes to the Consolidated Financial Statements, tagged as a separate block of text and, (ix) each amount in the Notes to the Consolidated Financial Statements, tagged separately. ***Furnished electronically herewith.***

* This document is being furnished in accordance with SEC Release Nos. 33 8212 and 34 74551.

SIGNATURES

The registrant hereby certifies that it meets all of the requirements for filing on Form 20 F and that it has duly caused and authorized the undersigned to sign this Annual Report on its behalf.

ABB LTD

	By:	/s/ Timo Ihamuotila	
Date: March 27, 2019		Name:	Timo Ihamuotila
		Title:	*Executive Vice President and Chief Financial Officer*
	By:	/s/ Richard A. Brown	
Date: March 27, 2019		Name:	Richard A. Brown
		Title:	*Group Senior Vice President and Chief Counsel Corporate & Finance*

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Report of management on internal control over financial reporting

The Board of Directors and Management of ABB Ltd and its consolidated subsidiaries ("ABB") are responsible for establishing and maintaining adequate internal control over financial reporting. ABB's internal control over financial reporting is designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation and fair presentation of the published Consolidated Financial Statements in accordance with U.S. 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 ABB's policies and procedures may deteriorate.

Management conducted an assessment of the effectiveness of internal control over financial reporting as of December 31, 2018. In making this assessment, management used the criteria established in Internal Control—Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework). Management's assessment of the effectiveness of internal controls over financial reporting excludes the evaluation of the internal controls over financial reporting for GE Industrial Solutions (GEIS), which was acquired on June 30, 2018. GEIS represents $3.8 billion of Total assets of the Company as of December 31, 2018, and $1.3 billion of Total revenues of the Company for the year then ended.

A material weakness is a deficiency, or a combination of deficiencies, in internal control over financial reporting, such that there is a reasonable possibility that a material misstatement of the company's financial statements will not be prevented or detected on a timely basis. We have identified a material weakness in our information technology general controls (ITGCs) based on deficiencies in selection, development, and monitoring of control activities in ITGCs. We did not maintain sufficient user access or segregation of duties controls in certain applications in North America as well as for select Group applications. As a result of these deficiencies, the process level controls dependent on the affected applications, could not be relied upon.

This material weakness did not result in any misstatements in the financial statements. However, due to the existence of the material weakness, a reasonable possibility exists that material misstatements in the Company's financial statements would not have been prevented or detected on a timely basis.

We completed additional substantive procedures prior to filing this annual report to ensure that the financial statements, prepared in accordance with U.S. GAAP, were not materially misstated. Based on these procedures no adjustments to our financial statements were required.

Based on its evaluation, our management has concluded that, as of December 31, 2018, as a result of the material weakness described above, our internal control over financial reporting was not effective.

KPMG AG, the independent registered public accounting firm who audited the Company's consolidated financial statements included in this Form 20-F, has issued an adverse opinion on the effectiveness of ABB's internal control over financial reporting as of December 31, 2018, which is included on pages F-4 to F-5 of this Annual Report.

/s/ Ulrich Spiesshofer

Chief Executive Officer

/s/ Timo Ihamuotila

Chief Financial Officer
Zurich, March 27, 2019

Report of Independent Registered Public Accounting Firm

To the Board of Directors and Stockholders of ABB Ltd

Opinion on the Consolidated Financial Statements

We have audited the accompanying consolidated balance sheet of ABB Ltd (the Company) as of December 31, 2018, the related consolidated income statement, statements of comprehensive income, cash flows and changes in stockholders' equity for the year ended December 31, 2018, and the related notes (collectively, the consolidated financial statements). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2018, and the results of its operations and its cash flows for the year ended December 31, 2018, in conformity with U.S. generally accepted accounting principles.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), 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), and our report dated March 27, 2019 expressed an adverse opinion on the effectiveness of the Company's internal control over financial reporting.

The consolidated financial statements of the Company for the years ended December 31, 2017 and 2016 were audited by other auditors who expressed an unmodified opinion on those statements on February 22, 2018, except for Note 3 for which the date is March 27, 2019.

Basis for Opinion

The consolidated financial statements are the responsibility of the Company's Board of Directors and management. Our responsibility is to express an opinion on the consolidated financial statements based on our audit. We are a public accounting firm registered with the 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 audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud. Our audit 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 audit 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. We believe that our audit provides a reasonable basis for our opinion.

/s/ KPMG AG

We have served as the Company's auditor since 2018.

Zurich, Switzerland

March 27, 2019

Report of Independent Registered Public Accounting Firm

To the Board of Directors and Stockholders of ABB Ltd

Opinion on Internal Control Over Financial Reporting

We have audited ABB Ltd's (the Company) 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, because of the effect of the material weakness, described below, on the achievement of the objectives of the control criteria, the Company has not maintained effective internal control over financial reporting as of December 31, 2018, based on criteria established in COSO.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated balance sheet of the Company as of December 31, 2018, the related consolidated income statement, statements of comprehensive income, cash flows and changes in stockholders' equity for the year ended December 31, 2018, and the related notes (collectively, the consolidated financial statements), and our report dated March 27, 2019 expressed an unqualified opinion on those consolidated financial statements.

A material weakness is a deficiency, or a combination of deficiencies, in internal control over financial reporting, such that there is a reasonable possibility that a material misstatement of the company's annual or interim financial statements will not be prevented or detected on a timely basis. The following material weakness has been identified and included in management's assessment:

A material weakness has been identified in the Company's information technology general controls (ITGCs) based on deficiencies in selection, development, and monitoring of control activities in ITGCs. The Company did not maintain sufficient user access or segregation of duties controls in certain applications in North America as well as for select Group applications. As a result of these deficiencies, the process level controls dependent on the affected applications, could not be relied upon.

The material weakness was considered in determining the nature, timing, and extent of audit tests applied in our audit of the 2018 consolidated financial statements, and this report does not affect our report on those consolidated financial statements.

The Company acquired General Electric Industrial Solutions (GEIS) during 2018, and management excluded from its assessment of the effectiveness of the Company's internal control over financial reporting as of December 31, 2018, GEIS's internal control over financial reporting associated with total assets of $3.8 billion and total revenues of $1.3 billion included in the consolidated financial statements of the Company as of and for the year ended December 31, 2018. Our audit of internal control over financial reporting of the Company also excluded an evaluation of the internal control over financial reporting of GEIS.

Basis for Opinion

The Company's Board of Directors and management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Report of management on internal control over financial reporting. Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit. We are a public accounting firm registered with the 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 audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. 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 audit also included performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

Definition and Limitations of Internal Control Over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

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

/s/ KPMG AG

Zurich, Switzerland

March 27, 2019

Report of Independent Registered Public Accounting Firm

To the Board of Directors and Stockholders of ABB Ltd

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheet of ABB Ltd (the Company) as of December 31, 2017, and the related consolidated statements of income, comprehensive income, cash flows and changes in stockholders' equity for each of the two years in the period ended December 31, 2017, and the related notes (collectively referred to as the "financial statements"). In our opinion, the financial statements present fairly, in all material respects, the consolidated financial position of the Company at December 31, 2017, and the consolidated results of its operations and its cash flows for each of the two years in the period ended December 31, 2017, in conformity with U.S. generally accepted accounting principles.

Basis for Opinion

These financial statements are the responsibility of the Company's Board of Directors and management. Our responsibility is to express an opinion on the Company's financial statements based on our audits. We are a public accounting firm registered with the 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 audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the 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 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 financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ Ernst & Young AG

We served as the Company's auditor from 1994 to 2018.

Zurich, Switzerland

February 22, 2018

Except for Note 3 for the aforementioned periods, as to which the date is

March 27, 2019

ABB Ltd

Consolidated Income Statements

Year ended December 31 ($ in millions, except per share data in $)

	2018	2017	2016
Sales of products	22,366	20,438	20,327
Sales of services and other	5,296	4,758	4,602
Total revenues	**27,662**	**25,196**	**24,929**
Cost of sales of products	(15,961)	(14,485)	(14,629)
Cost of services and other	(3,157)	(2,865)	(2,767)
Total cost of sales	**(19,118)**	**(17,350)**	**(17,396)**
Gross profit	**8,544**	**7,846**	**7,533**
Selling, general and administrative expenses	(5,295)	(4,765)	(4,532)
Non-order related research and development expenses	(1,147)	(1,013)	(967)
Other income (expense), net	124	162	(105)
Income from operations	**2,226**	**2,230**	**1,929**
Interest and dividend income	72	73	71
Interest and other finance expense	(262)	(234)	(201)
Non-operational pension (cost) credit	83	33	(38)
Income from continuing operations before taxes	**2,119**	**2,102**	**1,761**
Provision for taxes	(544)	(583)	(526)
Income from continuing operations, net of tax	**1,575**	**1,519**	**1,235**
Income from discontinued operations, net of tax	723	846	799
Net income	**2,298**	**2,365**	**2,034**
Net income attributable to noncontrolling interests	(125)	(152)	(135)
Net income attributable to ABB	**2,173**	**2,213**	**1,899**
Amounts attributable to ABB shareholders:			
Income from continuing operations, net of tax	1,514	1,441	1,172
Income from discontinued operations, net of tax	659	772	727
Net income	2,173	2,213	1,899
Basic earnings per share attributable to ABB shareholders:			
Income from continuing operations, net of tax	0.71	0.67	0.54
Income from discontinued operations, net of tax	0.31	0.36	0.34
Net income	1.02	1.04	0.88
Diluted earnings per share attributable to ABB shareholders:			
Income from continuing operations, net of tax	0.71	0.67	0.54
Income from discontinued operations, net of tax	0.31	0.36	0.34
Net income	1.02	1.03	0.88
Weighted-average number of shares outstanding (in millions) used to compute:			
Basic earnings per share attributable to ABB shareholders	2,132	2,138	2,151
Diluted earnings per share attributable to ABB shareholders	2,139	2,148	2,154

Due to rounding, numbers presented may not add to the totals provided.

See accompanying Notes to the Consolidated Financial Statements

ABB Ltd

Consolidated Statements of Comprehensive Income

Year ended December 31 ($ in millions)

	2018	2017	2016
Net income	**2,298**	**2,365**	**2,034**
Other comprehensive income (loss), net of tax:			
Foreign currency translation adjustments:			
Foreign currency translation adjustments	(627)	912	(481)
Gain on liquidation of foreign subsidiary	(31)	—	—
Changes attributable to divestments	12	12	7
Foreign currency translation adjustments	**(646)**	**924**	**(474)**
Available-for-sale securities:			
Net unrealized gains (losses) arising during the year	(4)	1	—
Reclassification adjustments for net losses included in net income	1	—	—
Unrealized gains (losses) on available-for-sale securities	**(3)**	**1**	**—**
Pension and other postretirement plans:			
Prior service costs arising during the year	(7)	(16)	(40)
Net actuarial gains (losses) arising during the year	(352)	(139)	44
Amortization of prior service cost (credit) included in net income	(24)	6	26
Amortization of net actuarial loss included in net income	69	63	62
Net losses from pension settlements included in net income	19	9	26
Changes attributable to divestments	—	6	—
Pension and other postretirement plan adjustments	**(295)**	**(71)**	**118**
Cash flow hedge derivatives:			
Net unrealized gains (losses) arising during the year	(49)	38	16
Reclassification adjustments for net (gains) losses included in net income	21	(22)	(6)
Changes attributable to divestments	—	(3)	—
Unrealized gains (losses) of cash flow hedge derivatives	**(28)**	**13**	**10**
Total other comprehensive income (loss), net of tax	**(972)**	**867**	**(346)**
Total comprehensive income, net of tax	**1,326**	**3,232**	**1,688**
Comprehensive income attributable to noncontrolling interests, net of tax	(110)	(177)	(118)
Total comprehensive income, net of tax, attributable to ABB	**1,216**	**3,055**	**1,570**

Due to rounding, numbers presented may not add to the totals provided.

See accompanying Notes to the Consolidated Financial Statements

ABB Ltd

Consolidated Balance Sheets

December 31 ($ in millions, except share data)

	2018	2017
Cash and equivalents	3,445	4,526
Marketable securities and short-term investments	712	1,083
Receivables, net	6,386	5,861
Contract assets	1,082	1,141
Inventories, net	4,284	3,737
Prepaid expenses	176	159
Other current assets	616	585
Current assets held for sale	5,164	5,043
Total current assets	**21,865**	**22,135**
Property, plant and equipment, net	4,133	3,804
Goodwill	10,764	9,536
Other intangible assets, net	2,607	2,425
Prepaid pension and other employee benefits	83	143
Investments in equity-accounted companies	87	72
Deferred taxes	1,006	1,212
Other non-current assets	469	571
Non-current assets held for sale	3,427	3,560
Total assets	**44,441**	**43,458**
Accounts payable, trade	4,424	3,736
Contract liabilities	1,707	1,792
Short-term debt and current maturities of long-term debt	2,031	726
Provisions for warranties	948	909
Other provisions	1,372	1,277
Other current liabilities	3,780	3,509
Current liabilities held for sale	4,185	4,520
Total current liabilities	**18,447**	**16,469**
Long-term debt	6,587	6,682
Pension and other employee benefits	1,828	1,589
Deferred taxes	927	1,050
Other non-current liabilities	1,689	1,849
Non-current liabilities held for sale	429	470
Total liabilities	**29,907**	**28,109**
Commitments and contingencies		
Stockholders' equity:		
Common stock, CHF 0.12 par value		
(2,168,148,264 issued shares at December 31, 2018 and 2017)	188	188
Additional paid-in capital	56	29
Retained earnings	19,839	19,594
Accumulated other comprehensive loss	(5,311)	(4,345)
Treasury stock, at cost		
(36,185,858 and 29,541,775 shares at December 31, 2018 and 2017, respectively)	(820)	(647)
Total ABB stockholders' equity	**13,952**	**14,819**
Noncontrolling interests	582	530
Total stockholders' equity	**14,534**	**15,349**
Total liabilities and stockholders' equity	**44,441**	**43,458**

Due to rounding, numbers presented may not add to the totals provided.

See accompanying Notes to the Consolidated Financial Statements

ABB Ltd

Consolidated Statements of Cash Flows

Year ended December 31 ($ in millions)

	2018	2017	2016
Operating activities:			
Net income	2,298	2,365	2,034
Less: Income from discontinued operations, net of tax	(723)	(846)	(799)
Adjustments to reconcile net income to net cash provided by operating activities:			
Depreciation and amortization	916	836	870
Deferred taxes	(142)	(199)	(145)
Net loss (gain) from derivatives and foreign exchange	93	29	(10)
Net gain from sale of property, plant and equipment	(57)	(37)	(37)
Net loss (gain) from sale of businesses	(57)	(252)	10
Share-based payment arrangements	50	49	45
Other	(76)	4	111
Changes in operating assets and liabilities:			
Trade receivables, net	(144)	(178)	(118)
Contract assets and liabilities	(18)	6	(38)
Inventories, net	(336)	(66)	185
Trade payables	454	474	186
Accrued liabilities	252	99	52
Provisions, net	87	(4)	40
Income taxes payable and receivable	(102)	202	115
Other assets and liabilities, net	(143)	106	106
Net cash provided by operating activities — continuing operations	2,352	2,588	2,607
Net cash provided by operating activities — discontinued operations	572	1,211	1,236
Net cash provided by operating activities	**2,924**	**3,799**	**3,843**
Investing activities:			
Purchases of investments	(322)	(666)	(4,299)
Purchases of property, plant and equipment and intangible assets	(772)	(752)	(632)
Acquisition of businesses (net of cash acquired) and increases in cost- and equity-accounted companies	(2,664)	(2,011)	(26)
Proceeds from sales of investments	567	1,443	3,295
Proceeds from maturity of investments	160	100	539
Proceeds from sales of property, plant and equipment	72	61	59
Proceeds from sales of businesses (net of transaction costs and cash disposed) and cost- and equity-accounted companies	113	607	(1)
Net cash from settlement of foreign currency derivatives	(30)	63	(57)
Other investing activities	(32)	37	14
Net cash used in investing activities — continuing operations	(2,908)	(1,118)	(1,108)
Net cash used in investing activities — discontinued operations	(177)	(332)	(197)
Net cash used in investing activities	**(3,085)**	**(1,450)**	**(1,305)**
Financing activities:			
Net changes in debt with maturities of 90 days or less	221	204	(144)
Increase in debt	1,914	920	911
Repayment of debt	(830)	(1,000)	(1,242)
Delivery of shares	42	163	192
Purchase of treasury stock	(250)	(251)	(1,299)
Dividends paid	(1,717)	(1,635)	—
Reduction in nominal value of common shares paid to shareholders	—	—	(1,610)
Dividends paid to noncontrolling shareholders	(86)	(83)	(89)
Other financing activities	(35)	(6)	(27)
Net cash used in financing activities — continuing operations	(741)	(1,688)	(3,308)
Net cash used in financing activities — discontinued operations	(48)	(47)	(47)
Net cash used in financing activities	**(789)**	**(1,735)**	**(3,355)**
Effects of exchange rate changes on cash and equivalents	(131)	268	(104)
Net change in cash and equivalents	**(1,081)**	**882**	**(921)**
Cash and equivalents, beginning of period	4,526	3,644	4,565
Cash and equivalents, end of period	**3,445**	**4,526**	**3,644**
Supplementary disclosure of cash flow information:			
Interest paid	243	205	213
Income taxes paid	1,026	894	814

Due to rounding, numbers presented may not add to the totals provided.

See accompanying Notes to the Consolidated Financial Statements

ABB Ltd

Consolidated Statements of Changes in Stockholders' Equity

Years ended December 31, 2018, 2017 and 2016 ($ in millions)

	Common stock	Additional paid-in capital	Retained earnings	Accumulated other comprehensive loss	Treasury stock	Total ABB stockholders' equity	Non-controlling interests	Total stockholders' equity
Balance at January 1, 2016	**1,440**	**4**	**20,476**	**(4,858)**	**(2,581)**	**14,481**	**507**	**14,988**
Comprehensive income:								
Net income			1,899			**1,899**	135	**2,034**
Foreign currency translation adjustments, net of tax				(457)		**(457)**	(17)	**(474)**
Effect of change in fair value of available-for-sale securities, net of tax				—		**—**		—
Unrecognized income (expense) related to pensions and other postretirement plans, net of tax				118		**118**		**118**
Change in derivatives qualifying as cash flow hedges, net of tax				10		**10**		**10**
Total comprehensive income						**1,570**	**118**	**1,688**
Changes in noncontrolling interests						**—**	(1)	**(1)**
Dividends to noncontrolling shareholders						**—**	(122)	**(122)**
Share-based payment arrangements		54				**54**		**54**
Reduction in nominal value of common shares paid to shareholders	(1,239)	15	(402)			**(1,626)**		**(1,626)**
Cancellation of treasury shares	(9)	(31)	(2,007)		2,047	**—**		—
Purchase of treasury stock					(1,280)	**(1,280)**		**(1,280)**
Delivery of shares		(22)	(41)		255	**192**		**192**
Call options		4				**4**		**4**
Balance at December 31, 2016	**192**	**24**	**19,925**	**(5,187)**	**(1,559)**	**13,395**	**502**	**13,897**
Comprehensive income:								
Net income			2,213			**2,213**	152	**2,365**
Foreign currency translation adjustments, net of tax				899		**899**	25	**924**
Effect of change in fair value of available-for-sale securities, net of tax				1		**1**		**1**
Unrecognized income (expense) related to pensions and other postretirement plans, net of tax				(71)		**(71)**		**(71)**
Change in derivatives qualifying as								

cash flow hedges, net of tax				13		**13**		**13**
Total comprehensive income						**3,055**	**177**	**3,232**
Changes in noncontrolling interests		17				**17**	(14)	**3**
Dividends to noncontrolling shareholders						**—**	(134)	**(134)**
Dividends paid to shareholders			(1,622)			**(1,622)**		**(1,622)**
Share-based payment arrangements		58				**58**		**58**
Cancellation of treasury shares	(4)	(27)	(922)		953	**—**		**—**
Purchase of treasury stock					(251)	**(251)**		**(251)**
Delivery of shares		(46)			209	**163**		**163**
Call options		4				**4**		**4**
Balance at December 31, 2017	**188**	**29**	**19,594**	**(4,345)**	**(647)**	**14,819**	**530**	**15,349**
Cumulative effect of changes in accounting principles			(192)	(9)		**(201)**		**(201)**
Comprehensive income:								
Net income			2,173			**2,173**	125	**2,298**
Foreign currency translation adjustments, net of tax				(631)		**(631)**	(15)	**(646)**
Effect of change in fair value of available-for-sale securities, net of tax				(3)		**(3)**		**(3)**
Unrecognized income (expense) related to pensions and other postretirement plans, net of tax				(295)		**(295)**		**(295)**
Change in derivatives qualifying as cash flow hedges, net of tax				(28)		**(28)**		**(28)**
Total comprehensive income						**1,216**	**110**	**1,326**
Changes in noncontrolling interests		(4)				**(4)**	(19)	**(23)**
Noncontrolling interests recognized in connection with business combination						**—**	107	**107**
Dividends to noncontrolling shareholders						**—**	(146)	**(146)**
Dividends paid to shareholders			(1,736)			**(1,736)**		**(1,736)**
Share-based payment arrangements		60				**60**		**60**
Purchase of treasury stock					(249)	**(249)**		**(249)**
Delivery of shares		(35)			77	**42**		**42**
Call options		5				**5**		**5**
Balance at December 31, 2018	**188**	**56**	**19,839**	**(5,311)**	**(820)**	**13,952**	**582**	**14,534**

Due to rounding, numbers presented may not add to the totals provided.

See accompanying Notes to the Consolidated Financial Statements

Note 1—The Company

ABB Ltd and its subsidiaries (collectively, the Company) together form a pioneering technology leader in power grids, electrification products, industrial automation and robotics and motion, serving customers in utilities, industry and transport & infrastructure globally.

Note 2—Significant accounting policies

The following is a summary of significant accounting policies followed in the preparation of these Consolidated Financial Statements.

Basis of presentation

The Consolidated Financial Statements are prepared in accordance with United States of America (United States or U.S.) generally accepted accounting principles (U.S. GAAP) and are presented in United States dollars ($ or USD) unless otherwise stated. Due to rounding, numbers presented may not add to the totals provided. The par value of capital stock is denominated in Swiss francs. See Note 3 for a summary of changes in presentation and other reclassifications affecting these financial statements compared to the previous year.

Scope of consolidation

The Consolidated Financial Statements include the accounts of ABB Ltd and companies which are directly or indirectly controlled by ABB Ltd. Additionally, the Company consolidates variable interest entities if it has determined that it is the primary beneficiary. Intercompany accounts and transactions are eliminated. Investments in joint ventures and affiliated companies in which the Company has the ability to exercise significant influence over operating and financial policies (generally through direct or indirect ownership of 20 percent to 50 percent of the voting rights), are recorded in the Consolidated Financial Statements using the equity method of accounting.

Discontinued operations

The Company reports a disposal, or planned disposal, of a component or a group of components as a discontinued operation if the disposal represents a strategic shift that has or will have a major effect on the Company's operations and financial results. A strategic shift could include a disposal of a major geographical area, a major line of business or other major parts of the Company. A component may be a reportable segment or an operating segment, a reporting unit, a subsidiary, or an asset group.

Assets and liabilities of a component reported as a discontinued operation are presented separately as held for sale in the Company's Consolidated Balance Sheets.

Interest that is not directly attributable to or related to the Company's continuing business or discontinued business is allocated to discontinued operations based on the ratio of net assets to be sold less debt that is required to be paid as a result of the planned disposal transaction to the sum of total net assets of the Company plus consolidated debt. General corporate overhead is not allocated to discontinued operations (see Note 3).

Operating cycle

A portion of the Company's activities (primarily long term system integration activities) has an operating cycle that exceeds one year. For classification of current assets and liabilities related to such activities, the Company elected to use the duration of the individual contracts as its operating cycle. Accordingly, there are accounts receivable, inventories and provisions related to these contracts which will not be realized within one year that have been classified as current.

Use of estimates

The preparation of financial statements in conformity with U.S. GAAP requires management to make assumptions and estimates that directly affect the amounts reported in the Consolidated Financial Statements and the accompanying Notes. The most significant, difficult and subjective of such accounting assumptions and estimates include:

- estimates and assumptions used in determining the fair values of assets and liabilities assumed in business combinations,
- assumptions used in the determination of corporate costs directly attributable to discontinued operations,
- assumptions used in determining inventory obsolescence and net realizable value,
- estimates used to record expected costs for employee severance in connection with restructuring programs,
- assumptions and projections, principally related to future material, labor and project related overhead costs, used in determining the percentage of completion on projects, as well as the amount of variable consideration the Company expects to be entitled to,
- estimates of loss contingencies associated with litigation or threatened litigation and other claims and inquiries, environmental damages, product warranties, self insurance reserves, regulatory and other proceedings,
- assumptions used in the calculation of pension and postretirement benefits and the fair value of pension plan assets,
- estimates to determine valuation allowances for deferred tax assets and amounts recorded for uncertain tax positions,
- growth rates, discount rates and other assumptions used to determine impairment of long lived assets and in testing goodwill for impairment, and
- assessment of the allowance for doubtful accounts.

The actual results and outcomes may differ from the Company's estimates and assumptions.

Cash and equivalents

Cash and equivalents include highly liquid investments with maturities of three months or less at the date of acquisition.

Currency and other local regulatory limitations related to the transfer of funds exist in a number of countries where the Company operates. Funds, other than regular dividends, fees or loan repayments, cannot be readily transferred abroad from these countries and are therefore deposited and used for working capital needs locally. These funds are included in cash and equivalents as they are not considered restricted.

Marketable securities and short term investments

Management determines the appropriate classification of held to maturity and available for sale debt securities at the time of purchase. Debt securities are classified as held to maturity when the Company has the positive intent and ability to hold the securities to maturity. Held to maturity debt securities are carried at amortized cost, adjusted for accretion of discounts or amortization of premiums to maturity computed under the effective interest method. Such accretion or amortization is included in “Interest and dividend income”. Marketable debt securities not classified as held to maturity are classified as available for sale and reported at fair value.

Unrealized gains and losses on available for sale debt securities are excluded from the determination of earnings and are instead recognized in the “Accumulated other comprehensive loss” component of stockholders’ equity, net of tax, until realized. Realized gains and losses on available for sale debt securities are computed based upon the historical cost of these securities, using the specific identification method.

Marketable debt securities are classified as either “Cash and equivalents” or “Marketable securities and short term investments” according to their maturity at the time of acquisition.

Marketable equity securities are generally classified as “Marketable securities and short term investments”, however any marketable securities held as a long term investment rather than as an investment of excess liquidity, are classified as “Other non current assets”. Equity securities are measured at fair value with fair value changes reported in net income. Fair value changes for equity securities are reported in “Interest and other finance expense”.

The Company performs a periodic review of its debt securities to determine whether an other than temporary impairment has occurred. Generally, when an individual security has been in an unrealized loss position for an extended period of time, the Company evaluates whether an impairment has occurred. The evaluation is based on specific facts and circumstances at the time of assessment, which include general market conditions, and the duration and extent to which the fair value is below cost.

If the fair value of a debt security is less than its amortized cost, then an other than temporary impairment for the difference is recognized if (i) the Company has the intent to sell the security, (ii) it is more likely than not that the Company will be required to sell the security before recovery of its amortized cost base or (iii) a credit loss exists insofar as the Company does not expect to recover the entire recognized amortized cost of the security. Such impairment charges are generally recognized in “Interest and other finance expense”. If the impairment is due to factors other than credit losses, and the Company does not intend to sell the security and it is not more likely than not that it will be required to sell the security before recovery of the security’s amortized cost, such impairment charges are recorded in “Accumulated other comprehensive loss”.

In addition, equity securities without readily determinable fair value are written down to fair value if a qualitative assessment indicates that the investment is impaired and the fair value of the investment is less than carrying amount. The impairment charge is recorded in “Interest and other finance expense”.

Accounts receivable and allowance for doubtful accounts

Accounts receivable are recorded at the invoiced amount. The Company has a group wide policy on the management of credit risk. The policy includes a credit assessment methodology to assess the creditworthiness of customers and assign to those customers a risk category. Third party agencies’ ratings are considered, if available. For customers where agency ratings are not available, the customer’s most recent financial statements, payment history and other relevant information are considered in the assignment to a risk category. Customers are assessed at least annually or more frequently when information on significant changes in the customers’ financial position becomes known. In addition to the assignment to a risk category, a credit limit per customer is set.

The allowance for doubtful accounts is the Company's best estimate of the amount of probable credit losses in existing accounts receivable. The Company determines the allowance based on historical write off experience and customer specific data. If an amount has not been settled within its contractual payment term then it is considered past due. The Company reviews the allowance for doubtful accounts regularly and past due balances are reviewed for collectability. Account balances are charged off against the related allowance when the Company believes that the amount will not be recovered.

The Company, in its normal course of business, transfers receivables to third parties, generally without recourse. The transfer is accounted for as a sale when the Company has surrendered control over the receivables. Control is deemed to have been surrendered when (i) the transferred receivables have been put presumptively beyond the reach of the Company and its creditors, even in bankruptcy or other receivership, (ii) the third party transferees have the right to pledge or exchange the transferred receivables, and (iii) the Company has relinquished effective control over the transferred receivables and does not retain the ability or obligation to repurchase or redeem the transferred receivables. At the time of sale, the sold receivables are removed from the Consolidated Balance Sheets and the related cash inflows are classified as operating activities in the Consolidated Statements of Cash Flows. Costs associated with the sale of receivables, including the related gains and losses from the sales, are included in "Interest and other finance expense". Transfers of receivables that do not meet the requirements for treatment as sales are accounted for as secured borrowings and the related cash flows are classified as financing activities in the Consolidated Statements of Cash Flows.

Concentrations of credit risk

The Company sells a broad range of products, systems, services and software to a wide range of industrial, commercial and utility customers as well as various government agencies and quasi governmental agencies throughout the world. Concentrations of credit risk with respect to accounts receivable are limited, as the Company's customer base is comprised of a large number of individual customers. Ongoing credit evaluations of customers' financial positions are performed to determine whether the use of credit support instruments such as guarantees, letters of credit or credit insurance are necessary; collateral is not generally required. The Company maintains reserves for potential credit losses as discussed above in "Accounts receivable and allowance for doubtful accounts". Such losses, in the aggregate, are in line with the Company's expectations.

It is the Company's policy to invest cash in deposits with banks throughout the world with certain minimum credit ratings and in high quality, low risk, liquid investments. The Company actively manages its credit risk by routinely reviewing the creditworthiness of the banks and the investments held. The Company has not incurred significant credit losses related to such investments.

The Company's exposure to credit risk on derivative financial instruments is the risk that the counterparty will fail to meet its obligations. To reduce this risk, the Company has credit policies that require the establishment and periodic review of credit limits for individual counterparties. In addition, the Company has entered into close out netting agreements with most derivative counterparties. Close out netting agreements provide for the termination, valuation and net settlement of some or all outstanding transactions between two counterparties on the occurrence of one or more pre defined trigger events. In the Consolidated Financial Statements derivative transactions are presented on a gross basis.

Revenue recognition

A customer contract exists if collectability under the contract is considered probable, the contract has commercial substance, contains payment terms, as well as the rights and commitments of both parties, and has been approved.

The Company offers arrangements with multiple performance obligations to meet its customers' needs. These arrangements may involve the delivery of multiple products and/or performance of services (such as installation and training) and the delivery and/or performance may occur at different points in time or over different periods of time. Goods and services under such arrangements are evaluated to determine whether they form distinct performance obligations and should be accounted for as separate revenue transactions. The Company allocates the sales price to each distinct performance obligation based on the price of each item sold in separate transactions at the inception of the arrangement.

The Company generally recognizes revenues for the sale of non customized products including switchgear, circuit breakers, modular substation packages, control products, motors, generators, drives, robots, turbochargers, measurement and analytical instrumentation, and other goods which are manufactured on a standardized basis at a point in time. Revenues are recognized at the point in time that the customer obtains control of the good which is when it has taken title to the products and assumed the risks and rewards of ownership of the products specified in the purchase order or sales agreement. Generally, the transfer of title and risks and rewards of ownership are governed by the contractually defined shipping terms. The Company uses various International Commercial shipping terms (as promulgated by the International Chamber of Commerce) in its sales of products to third party customers, such as Ex Works (EXW), Free Carrier (FCA) and Delivered Duty Paid (DDP).

Billing terms for these point in time contracts vary but generally coincide with delivery to the customer. Payment is generally due upon receipt of the invoice, payable within 90 days or less.

The Company generally recognizes revenues for the sale of customized products, including integrated automation and electrification systems and solutions, on an over time basis using the percentage of completion method of accounting. These systems are generally accounted for as a single performance obligation as the Company is required to integrate equipment and services into one deliverable for the customer. Revenues are recognized as the systems are customized during the manufacturing or integration process and as control is transferred to the customer as evidenced by the Company's right to payment for work performed or by the customer's ownership of the work in process. The Company principally uses the cost to cost method to measure progress towards completion on contracts. Under this method, progress of contracts is measured by actual costs incurred in relation to the Company's best estimate of total estimated costs based on the Company's history of manufacturing or constructing similar assets for customers. Estimated costs are reviewed and updated routinely for contracts in progress to reflect changes in quantity or pricing of the inputs. The cumulative effect of any change in estimate is recorded in the period when the change in estimate is determined. Contract costs include all direct materials, labor and subcontract costs and indirect costs related to contract performance, such as indirect labor, supplies, tools and depreciation costs.

The nature of the Company's contracts for the sale of customized products gives rise to several types of variable consideration, including claims, unpriced change orders, liquidated damages and penalties. These amounts are estimated based upon the most likely amount of consideration to which the customer or the Company will be entitled. The estimated amounts are included in the sales price to the extent it is probable that a significant reversal of cumulative revenues recognized will not occur when the uncertainty associated with the variable consideration is resolved. All estimates of variable consideration are reassessed periodically. Back charges to suppliers or subcontractors are recognized as a reduction of cost when it is determined that recovery of such cost is probable and the amounts can be reliably estimated.

Billing terms for these over time contracts vary but are generally based on achieving specified milestones. The differences between the timing of revenues recognized and customer billings result in changes to contract assets and contract liabilities. Payment is generally due upon receipt of the invoice, payable within 90 days or less. Contractual retention amounts billed to customers are generally due upon expiration of the contractual warranty period.

Service revenues reflect revenues earned from the Company's activities in providing services to customers primarily subsequent to the sale and delivery of a product or complete system. Such revenues consist of maintenance type contracts, repair services, equipment upgrades, field service activities that include personnel and accompanying spare parts, training, and installation and commissioning of products as a stand alone service or as part of a service contract. The Company generally recognizes revenues from service transactions as services are performed or at the point in time that the customer obtains control of the spare parts. For long-term service contracts including monitoring and maintenance services, revenues are recognized on a straight line basis over the term of the contract consistent with the nature, timing and extent of the services or, if the performance pattern is other than straight line, as the services are provided based on costs incurred relative to total expected costs.

In limited circumstances the Company sells extended warranties that extend the warranty coverage beyond the standard coverage offered on specific products. Revenues for these warranties are recorded over the length of the warranty period based on their stand alone selling price.

Billing terms for service contracts vary but are generally based on the occurrence of a service event. Payment is generally due upon receipt of the invoice, payable within 90 days or less.

Revenues are reported net of customer rebates, early settlement discounts, and similar incentives. Rebates are estimated based on sales terms, historical experience and trend analysis. The most common incentives relate to amounts paid or credited to customers for achieving defined volume levels.

Taxes assessed by a governmental authority that are directly imposed on revenue-producing transactions between the Company and its customers, such as sales, use, value added and some excise taxes, are excluded from revenues.

The Company does not adjust the contract price for the effects of a financing component if the Company expects, at contract inception, that the time between control transfer and cash receipt is less than 12 months.

Sales commissions are expensed immediately when the amortization period for the costs to obtain the contract is less than a year.

Contract loss provisions

Losses on contracts are recognized in the period when they are identified and are based upon the anticipated excess of contract costs over the related contract revenues.

Shipping and handling costs

Shipping and handling costs are recorded as a component of cost of sales.

Inventories

Inventories are stated at the lower of cost or net realizable value. Cost is determined using the first in, first out method, the weighted average cost method, or the specific identification method. Inventoried costs are stated at acquisition cost or actual production cost, including direct material and labor and applicable manufacturing overheads. Adjustments to reduce the cost of inventory to its net realizable value are made, if required, for decreases in sales prices, obsolescence or similar reductions in value.

Impairment of long lived assets

Long lived assets that are held and used are assessed for impairment when events or circumstances indicate that the carrying amount of the asset may not be recoverable. If the asset's net carrying value exceeds the asset's net undiscounted cash flows expected to be generated over its remaining useful life including net proceeds expected from disposition of the asset, if any, the carrying amount of the asset is reduced to its estimated fair value. The estimated fair value is determined using a market, income and/or cost approach.

Property, plant and equipment

Property, plant and equipment is stated at cost, less accumulated depreciation and is depreciated using the straight line method. The estimated useful lives of the assets are generally as follows:

- factories and office buildings: 30 to 40 years,
- other facilities: 15 years,
- machinery and equipment: 3 to 15 years,
- furniture and office equipment: 3 to 8 years, and
- leasehold improvements are depreciated over their estimated useful life or, for operating leases, over the lease term, if shorter.

Goodwill and other intangible assets

Goodwill is reviewed for impairment annually as of October 1, or more frequently if events or circumstances indicate that the carrying value may not be recoverable.

Goodwill is evaluated for impairment at the reporting unit level. A reporting unit is an operating segment or one level below an operating segment. For the annual impairment review performed in 2018, the reporting units were the same as the operating segments for Electrification Products and Robotics and Motion, while for the Industrial Automation operating segment the reporting units were determined to be one level below the operating segment.

When evaluating goodwill for impairment, the Company uses either a qualitative or quantitative assessment method for each reporting unit. The qualitative assessment involves determining, based on an evaluation of qualitative factors, if it is more likely than not that the fair value of a reporting unit is less than its carrying value. If, based on this qualitative assessment, it is determined to be more likely than not that the reporting unit's fair value is less than its carrying value, a quantitative impairment test (described below) is performed, otherwise no further analysis is required. If the Company elects not to perform the qualitative assessment for a reporting unit, then a quantitative impairment test is performed.

The quantitative impairment test calculates the fair value of a reporting unit (based on the income approach whereby the fair value of a reporting unit is calculated based on the present value of future cash flows) and compares it to the reporting unit's carrying value. If the carrying value of the net assets of a reporting unit exceeds the fair value of the reporting unit then the Company records an impairment charge equal to the difference, provided that the loss recognized does not exceed the total amount of goodwill allocated to that reporting unit.

The cost of acquired intangible assets with a finite life is amortized using a method of amortization that reflects the pattern of intangible assets' expected contributions to future cash flows. If that pattern cannot be reliably determined, the straight line method is used. The amortization periods range from 3 to 5 years for software and from 5 to 20 years for customer , technology and marketing related intangibles. Intangible assets with a finite life are tested for impairment upon the occurrence of certain triggering events.

Capitalized software costs

Software for internal use

Costs incurred in the application development stage until the software is substantially complete are capitalized and are amortized on a straight line basis over the estimated useful life of the software, typically ranging from 3 to 5 years.

Derivative financial instruments and hedging activities

The Company uses derivative financial instruments to manage currency, commodity, interest rate and equity exposures, arising from its global operating, financing and investing activities (see Note 6).

The Company recognizes all derivatives, other than certain derivatives indexed to the Company's own stock, at fair value in the Consolidated Balance Sheets. Derivatives that are not designated as hedging instruments are reported at fair value with derivative gains and losses reported through earnings and classified consistent with the nature of the underlying transaction.

If the derivatives are designated as a hedge, depending on the nature of the hedge, changes in the fair value of the derivatives will either be offset against the change in fair value of the hedged item attributable to the risk being hedged through earnings (in the case of a fair value hedge) or recognized in "Accumulated other comprehensive loss" until the hedged item is recognized in earnings (in the case of a cash flow hedge). The ineffective portion of a derivative's change in fair value is immediately recognized in earnings consistent with the classification of the hedged item. Where derivative financial instruments have been designated as cash flow hedges of forecasted transactions and such forecasted transactions are no longer probable of occurring, hedge accounting is discontinued and any derivative gain or loss previously included in "Accumulated other comprehensive loss" is reclassified into earnings consistent with the nature of the original forecasted transaction. Gains or losses from derivatives designated as hedging instruments in a fair value hedge are reported through earnings and classified consistent with the nature of the underlying hedged transaction.

Certain commercial contracts may grant rights to the Company or the counterparties, or contain other provisions that are considered to be derivatives. Such embedded derivatives are assessed at inception of the contract and depending on their characteristics, accounted for as separate derivative instruments and shown at their fair value in the balance sheet with changes in their fair value reported in earnings consistent with the nature of the commercial contract to which they relate.

Derivatives are classified in the Consolidated Statements of Cash Flows in the same section as the underlying item. Cash flows from the settlement of undesignated derivatives used to manage the risks of different underlying items on a net basis, are classified within "Net cash provided by operating activities", as the underlying items are primarily operational in nature. Other cash flows on the settlement of derivatives are recorded within "Net cash used in investing activities".

Leases

The Company leases primarily real estate, vehicles and machinery. Rental expense for operating leases is recorded on a straight line basis over the life of the lease term. Lease transactions where substantially all risks and rewards incident to ownership are transferred from the lessor to the lessee are accounted for as capital leases. All other leases are accounted for as operating leases. Amounts due under capital leases are recorded as a liability. The interest in assets acquired under capital leases is recorded as property, plant and equipment. Depreciation and amortization of assets recorded under capital leases is included in depreciation and amortization expense.

Translation of foreign currencies and foreign exchange transactions

The functional currency for most of the Company's subsidiaries is the applicable local currency. The translation from the applicable functional currencies into the Company's reporting currency is performed for balance sheet accounts using exchange rates in effect at the balance sheet date and for income statement accounts using average exchange rates prevailing during the year. The resulting translation adjustments are excluded from the determination of earnings and are recognized in "Accumulated other comprehensive loss" until the subsidiary is sold, substantially liquidated or evaluated for impairment in anticipation of disposal.

Foreign currency exchange gains and losses, such as those resulting from foreign currency denominated receivables or payables, are included in the determination of earnings, except as they relate to intercompany loans that are equity like in nature with no reasonable expectation of repayment, which are recognized in “Accumulated other comprehensive loss”. Exchange gains and losses recognized in earnings are included in “Total revenues”, “Total cost of sales”, “Selling, general and administrative expenses” or “Interest and other finance expense” consistent with the nature of the underlying item.

Income taxes

The Company uses the asset and liability method to account for deferred taxes. Under this method, deferred tax assets and liabilities are determined based on temporary differences between the financial reporting and the tax bases of assets and liabilities. Deferred tax assets and liabilities are measured using enacted tax rates and laws that are expected to be in effect when the differences are expected to reverse. The Company records a deferred tax asset when it determines that it is more likely than not that the deduction will be sustained based upon the deduction’s technical merit. Deferred tax assets and liabilities that can be offset against each other are reported on a net basis. A valuation allowance is recorded to reduce deferred tax assets to the amount that is more likely than not to be realized.

Deferred taxes are provided on unredeemed retained earnings of the Company’s subsidiaries. However, deferred taxes are not provided on such unredeemed retained earnings to the extent it is expected that the earnings are permanently reinvested. Such earnings may become taxable upon the sale or liquidation of these subsidiaries or upon the remittance of dividends.

The Company operates in numerous tax jurisdictions and, as a result, is regularly subject to audit by tax authorities. The Company provides for tax contingencies whenever it is deemed more likely than not that a tax asset has been impaired or a tax liability has been incurred. Contingency provisions are recorded based on the technical merits of the Company’s filing position, considering the applicable tax laws and Organisation for Economic Co operation and Development (OECD) guidelines and are based on its evaluations of the facts and circumstances as of the end of each reporting period.

The Company applies a two step approach to recognize and measure uncertainty in income taxes. The first step is to evaluate the tax position for recognition by determining if the weight of available evidence indicates that it is more likely than not that the position will be sustained on audit, including resolution of related appeals or litigation processes, if any. The second step is to measure the tax benefit as the largest amount which is more than 50 percent likely of being realized upon ultimate settlement. Uncertain tax positions that could be settled against existing loss carryforwards or income tax credits are reported net.

Expenses related to tax penalties are classified in the Consolidated Income Statements as “Provision for taxes”, while interest thereon is classified as “Interest and other finance expense”.

Research and development

Research and development costs not related to specific customer orders are generally expensed as incurred.

Earnings per share

Basic earnings per share is calculated by dividing income by the weighted average number of shares outstanding during the year. Diluted earnings per share is calculated by dividing income by the weighted average number of shares outstanding during the year, assuming that all potentially dilutive securities were exercised, if dilutive. Potentially dilutive securities include: outstanding written call options, outstanding options and shares granted subject to certain conditions under the Company’s share based payment arrangements. See further discussion related to earnings per share in Note 20 and of potentially dilutive securities in Note 18.

Share based payment arrangements

The Company has various share based payment arrangements for its employees, which are described more fully in Note 18. Such arrangements are accounted for under the fair value method. For awards that are equity settled, total compensation is measured at grant date, based on the fair value of the award at that date, and recorded in earnings over the period the employees are required to render service. For awards that are cash settled, compensation is initially measured at grant date and subsequently remeasured at each reporting period, based on the fair value and vesting percentage of the award at each of those dates, with changes in the liability recorded in earnings.

Fair value measures

The Company uses fair value measurement principles to record certain financial assets and liabilities on a recurring basis and, when necessary, to record certain non financial assets at fair value on a non recurring basis, as well as to determine fair value disclosures for certain financial instruments carried at amortized cost in the financial statements. Financial assets and liabilities recorded at fair value on a recurring basis include foreign currency, commodity and interest rate derivatives, as well as cash settled call options and available for sale securities. Non financial assets recorded at fair value on a non recurring basis include long lived assets that are reduced to their estimated fair value due to impairments.

Fair value is the price that would be received when selling an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. In determining fair value, the Company uses various valuation techniques including the market approach (using observable market data for identical or similar assets and liabilities), the income approach (discounted cash flow models) and the cost approach (using costs a market participant would incur to develop a comparable asset). Inputs used to determine the fair value of assets and liabilities are defined by a three level hierarchy, depending on the nature of those inputs. The Company has categorized its financial assets and liabilities and non financial assets measured at fair value within this hierarchy based on whether the inputs to the valuation technique are observable or unobservable. An observable input is based on market data obtained from independent sources, while an unobservable input reflects the Company's assumptions about market data.

The levels of the fair value hierarchy are as follows:

Level 1: Valuation inputs consist of quoted prices in an active market for identical assets or liabilities (observable quoted prices). Assets and liabilities valued using Level 1 inputs include exchange traded equity securities, listed derivatives which are actively traded such as commodity futures, interest rate futures and certain actively traded debt securities.

Level 2: Valuation inputs consist of observable inputs (other than Level 1 inputs) such as actively quoted prices for similar assets, quoted prices in inactive markets and inputs other than quoted prices such as interest rate yield curves, credit spreads, or inputs derived from other observable data by interpolation, correlation, regression or other means. The adjustments applied to quoted prices or the inputs used in valuation models may be both observable and unobservable. In these cases, the fair value measurement is classified as Level 2 unless the unobservable portion of the adjustment or the unobservable input to the valuation model is significant, in which case the fair value measurement would be classified as Level 3. Assets and liabilities valued or disclosed using Level 2 inputs include investments in certain funds, reverse repurchase agreements, certain debt securities that are not actively traded, interest rate swaps, commodity swaps, cash settled call options, forward foreign exchange contracts, foreign exchange swaps and forward rate agreements, time deposits, as well as financing receivables and debt.

Level 3: Valuation inputs are based on the Company's assumptions of relevant market data (unobservable input).

Investments in private equity, real estate and collective funds held within the Company's pension plans, are generally valued using the net asset value (NAV) per share as a practical expedient for fair value provided certain criteria are met. The NAVs are determined based on the fair values of the underlying investments in the funds. These assets are not classified in the fair value hierarchy but are separately disclosed.

Whenever quoted prices involve bid ask spreads, the Company ordinarily determines fair values based on mid market quotes. However, for the purpose of determining the fair value of cash settled call options serving as hedges of the Company's management incentive plan (MIP), bid prices are used.

When determining fair values based on quoted prices in an active market, the Company considers if the level of transaction activity for the financial instrument has significantly decreased, or would not be considered orderly. In such cases, the resulting changes in valuation techniques would be disclosed. If the market is considered disorderly or if quoted prices are not available, the Company is required to use another valuation technique, such as an income approach.

Disclosures about the Company's fair value measurements of assets and liabilities are included in Note 7.

Contingencies

The Company is subject to proceedings, litigation or threatened litigation and other claims and inquiries, related to environmental, labor, product, regulatory, tax (other than income tax) and other matters, and is required to assess the likelihood of any adverse judgments or outcomes to these matters, as well as potential ranges of probable losses. A determination of the provision required, if any, for these contingencies is made after analysis of each individual issue, often with assistance from both internal and external legal counsel and technical experts. The required amount of a provision for a contingency of any type may change in the future due to new developments in the particular matter, including changes in the approach to its resolution.

The Company records a provision for its contingent obligations when it is probable that a loss will be incurred and the amount can be reasonably estimated. Any such provision is generally recognized on an undiscounted basis using the Company's best estimate of the amount of loss incurred or at the lower end of an estimated range when a single best estimate is not determinable. In some cases, the Company may be able to recover a portion of the costs relating to these obligations from insurers or other third parties; however, the Company records such amounts only when it is probable that they will be collected.

The Company provides for anticipated costs for warranties when it recognizes revenues on the related products or contracts. Warranty costs include calculated costs arising from imperfections in design, material and workmanship in the Company's products. The Company makes individual assessments on contracts with risks resulting from order specific conditions or guarantees and assessments on an overall, statistical basis for similar products sold in larger quantities.

The Company may have legal obligations to perform environmental clean up activities related to land and buildings as a result of the normal operations of its business. In some cases, the timing or the method of settlement, or both, are conditional upon a future event that may or may not be within the control of the Company, but the underlying obligation itself is unconditional and certain. The Company recognizes a provision for these obligations when it is probable that a liability for the clean up activity has been incurred and a reasonable estimate of its fair value can be made. In some cases, a portion of the costs expected to be incurred to settle these matters may be recoverable. An asset is recorded when it is probable that such amounts are recoverable. Provisions for environmental obligations are not discounted to their present value when the timing of payments cannot be reasonably estimated.

Pensions and other postretirement benefits

The Company has a number of defined benefit pension and other postretirement plans. The Company recognizes an asset for such a plan's overfunded status or a liability for such a plan's underfunded status in its Consolidated Balance Sheets. Additionally, the Company measures such a plan's assets and obligations that determine its funded status as of the end of the year and recognizes the changes in the funded status in the year in which the changes occur. Those changes are reported in "Accumulated other comprehensive loss".

The Company uses actuarial valuations to determine its pension and postretirement benefit costs and credits. The amounts calculated depend on a variety of key assumptions, including discount rates and expected return on plan assets. Current market conditions are considered in selecting these assumptions.

The Company's various pension plan assets are assigned to their respective levels in the fair value hierarchy in accordance with the valuation principles described in the "Fair value measures" section above.

See Note 17 for further discussion of the Company's employee benefit plans.

Business combinations

The Company accounts for assets acquired and liabilities assumed in business combinations using the acquisition method and records these at their respective fair values. Contingent consideration is recorded at fair value as an element of purchase price with subsequent adjustments recognized in income.

Identifiable intangibles consist of intellectual property such as trademarks and trade names, customer relationships, patented and unpatented technology, in process research and development, order backlog and capitalized software; these are amortized over their estimated useful lives. Such intangibles are subsequently subject to evaluation for potential impairment if events or circumstances indicate the carrying amount may not be recoverable. See "Goodwill and other intangible assets" above. Acquisition related costs are recognized separately from the acquisition and expensed as incurred. Upon gaining control of an entity in which an equity method or cost basis investment was held by the Company, the carrying value of that investment is adjusted to fair value with the related gain or loss recorded in income.

Deferred tax assets and liabilities based on temporary differences between the financial reporting and the tax base of assets and liabilities as well as uncertain tax positions and valuation allowances on acquired deferred tax assets assumed in connection with a business combination are initially estimated as of the acquisition date based on facts and circumstances that existed at the acquisition date. These estimates are subject to change within the measurement period (a period of up to 12 months after the acquisition date during which the acquirer may adjust the provisional acquisition amounts) with any adjustments to the preliminary estimates being recorded to goodwill. Changes in deferred taxes, uncertain tax positions and valuation allowances on acquired deferred tax assets that occur after the measurement period are recognized in income.

New accounting pronouncements

Applicable for current period

Revenue from contracts with customers

As of January 1, 2018, the Company adopted a new accounting standard for recognizing revenues from contracts with customers. The new standard, which supersedes substantially all previously existing revenue recognition guidance, provides a single comprehensive model for recognizing revenues on the transfer of promised goods or services to customers in an amount that reflects the consideration that is expected to be received for those goods or services. The adoption of this standard resulted in only insignificant differences between the identification of performance obligations and the current unit of accounting determination. Therefore, the cumulative effect on retained earnings of applying this standard on a modified retrospective basis was not material. However, total assets and total liabilities increased by $196 million, of which $50 million relate to held for sale, due to the reclassification of certain advances from customers, previously reported as a reduction in inventories, to liabilities.

While comparative information has not been restated and continues to be measured and reported under the accounting standards in effect for those periods presented, other than the additional disclosure requirements, the impact of the adoption on the Company's 2018 consolidated financial statements, was not significant.

Income taxes – Intra entity transfers of assets other than inventory

In January 2018, the Company adopted an accounting standard update requiring it to recognize the income tax consequences of an intra-entity transfer of an asset other than inventory when the transfer occurs instead of when the asset has been sold to an outside party. This update was applied on a modified retrospective basis and resulted in a net reduction in deferred tax assets of $201 million with a corresponding reduction in retained earnings.

Improving the presentation of net periodic pension cost and net periodic postretirement benefit cost

In January 2018, the Company adopted an accounting standard update which changes how employers that sponsor defined benefit pension plans and other postretirement plans present the net periodic benefit cost in the income statement. Under this standard, the Company is required to report the service cost component in the same line item or items as other compensation costs arising from services rendered by the pertinent employees during the period. Other components of net periodic benefit cost are required to be presented in the income statement separately from the service cost component and outside the subtotal of income from operations. Under the amendment only the current service cost component is allowed to be capitalized as a cost of internally manufactured inventory or a self constructed asset. This update was applied retrospectively for the presentation requirements, and prospectively for the capitalization of the current service cost component requirements. The Company has used the practical expedient, as the amount of other components of net periodic benefit cost capitalized in inventory for prior periods is not significant.

For 2017 and 2016, the Company reclassified income of $42 million and expenses of $38 million, respectively, and presented it outside of income from operations relating to net periodic pension costs. Of these amounts, $9 million and $0 million, respectively, relate to discontinued operations.

Recognition and measurement of financial assets and financial liabilities

In January 2018, the Company adopted two accounting standard updates enhancing the reporting model for financial instruments, which include amendments to address aspects of recognition, measurement, presentation and disclosure. The Company is required to measure equity investments (except those accounted for under the equity method) at fair value with changes in fair value recognized in net income. The adoption of this update resulted in the reclassification of the net cumulative unrealized gains on available-for-sale equity securities of $9 million (net of tax) at December 31, 2017 from Total accumulated comprehensive loss to Retained earnings on January 1, 2018.

Disclosure Framework — Changes to the disclosure requirements for defined benefit plans

In December 2018, the Company early adopted an accounting standard update which modifies the disclosure requirements for defined benefit pension or other postretirement benefit plans. The update removes certain disclosures relating to (i) amounts expected to be recognized in net periodic benefit cost over the next twelve months, (ii) plan assets expected to be returned to the Company, (iii) a one-percentage-point change in assumed health care costs, and (iv) related parties, including insurance and annuity contracts. It clarifies the disclosure requirements for both the projected and accumulated benefit obligations, as well as requiring additional disclosures for cash balance plans and explanations for significant gains and losses related to changes in the benefit obligations. This update was applied on a retrospective basis and did not have a significant impact on the consolidated financial statements.

Classification of certain cash receipts and cash payments in the statement of cash flows

In January 2018, the Company adopted an accounting standard update which clarifies how certain cash receipts and cash payments, including debt prepayment or extinguishment costs, the settlement of zero coupon debt instruments, contingent consideration paid after a business combination, proceeds from insurance settlements, distributions from certain equity method investees and beneficial interests obtained in a financial asset securitization, should be presented and classified in the statement of cash flows. This update was applied retrospectively and did not have a significant impact on the consolidated financial statements.

Statement of cash flows — Restricted cash

In January 2018, the Company adopted an accounting standard update which clarifies the classification and presentation of changes in restricted cash on the statement of cash flows. It requires the inclusion of cash and cash equivalents that have restrictions on withdrawal or use in total cash and cash equivalents on the statement of cash flows. This update did not have a significant impact on the consolidated financial statements.

Clarifying the definition of a business

In January 2018, the Company adopted an accounting standard update which narrows the definition of a business. It also provides a framework for determining whether a set of transferred assets and activities involves a business. This update was applied prospectively and did not have a significant impact on the consolidated financial statements.

Clarifying the scope of asset derecognition guidance and accounting for partial sales of nonfinancial assets

In January 2018, the Company adopted an accounting standard update which clarifies the scope of asset derecognition guidance, adds guidance for partial sales of nonfinancial assets and clarifies recognizing gains and losses from the transfer of nonfinancial assets in contracts with noncustomers. This update was applied retrospectively and did not have a significant impact on the consolidated financial statements.

Compensation — Stock compensation

In January 2018, the Company adopted an accounting standard update which clarifies when to account for a change to the terms or conditions of a share based payment award as a modification. Under this update, modification accounting is required only if the fair value, the vesting conditions, or the classification of the award (as equity or liability) changes as a result of the change in terms or conditions. This update was applied prospectively and did not have a significant impact on the consolidated financial statements.

Applicable for future periods

Leases

In February 2016, an accounting standard update was issued that requires lessees to recognize lease assets and corresponding lease liabilities on the balance sheet for all leases with terms of more than twelve months with several practical expedients. The update, which supersedes existing lease guidance, will continue to classify leases as either finance or operating, with the classification determining the pattern of expense recognition in the income statement. It also requires additional disclosures about the Company's leasing activities. The Company has elected to not recognize lease assets and lease liabilities for leases with terms of less than twelve months and to not separate lease and non-lease components for leases other than real estate. This update is effective for the Company for annual and interim periods beginning January 1, 2019, and is applicable on a modified retrospective basis with various optional practical expedients.

In July 2018, a further accounting standard update was issued, allowing the Company the additional option of adopting the standard retrospectively with the cumulative-effect of initially applying the new standard recognized at the date of adoption in retained earnings. A further update was issued in December 2018 clarifying certain aspects of accounting for leases by lessors.

The Company will elect to adopt the standard using the additional option outlined above and currently expects the update will increase total assets and total liabilities by approximately $1.4 billion of which approximately $0.2 billion relate to liabilities held for sale. The Company expects that the adoption of this update will only have an insignificant impact on its results of operations and cash flows.

Measurement of credit losses on financial instruments

In June 2016, an accounting standard update was issued which replaces the existing incurred loss impairment methodology for most financial assets with a new "current expected credit loss" model. The new model will result in the immediate recognition of the estimated credit losses expected to occur over the remaining life of financial assets such as trade and other receivables, held-to-maturity debt securities, loans and other instruments. Credit losses relating to available-for-sale debt securities will be measured in a manner similar to current GAAP, except that the losses will be recorded through an allowance for credit losses rather than as a direct write-down of the security.

This update is effective for the Company for annual and interim periods beginning January 1, 2020. The Company is currently evaluating the impact of this update on its consolidated financial statements.

Derivatives and hedging—Targeted improvements to accounting for hedging activities

In August 2017, an accounting standard update was issued which expands and refines hedge accounting for both financial and non-financial risk components, aligns the recognition and presentation of the effects of hedging instruments and hedge items in the financial statements, and includes certain targeted improvements to ease the application of current guidance related to the assessment of hedge effectiveness. This update is effective for the Company for annual and interim periods beginning January 1, 2019. For cash flow and net investment hedges as of the adoption date, the guidance requires a modified retrospective approach. The amended presentation and disclosure guidance is required only prospectively. The Company will adopt this update as of January 1, 2019, and does not believe that this update will have a significant impact on its consolidated financial statements.

Reclassification of Certain Tax Effects from Accumulated Other Comprehensive Income

In February 2018, an accounting standard update was issued which allows a reclassification of the stranded tax effects in accumulated other comprehensive income resulting from the Tax Cuts and Jobs Act of 2017 to retained earnings. This update is effective for the Company for annual and interim periods beginning January 1, 2019. The updated guidance is to be applied in the period of adoption or retrospectively to each period in which the effect of the Tax Cuts and Jobs Act related to items remaining in accumulated other comprehensive income are recognized. The Company is currently evaluating the impact of this update on its consolidated financial statements.

Customer's accounting for implementation costs incurred in a cloud computing arrangement that is a service contract

In August 2018, an accounting standard update was issued which aligns the requirements for capitalizing implementation costs incurred in a hosting arrangement that is a service contract with the requirements for capitalizing implementation costs incurred to develop or obtain internal-use software. This update is effective for the Company for annual and interim periods beginning January 1, 2020, with early adoption in any interim period permitted. The Company is currently evaluating the impact of this update on its consolidated financial statements.

Disclosure Framework — Changes to the disclosure requirements for fair value measurement

In August 2018, an accounting standard update was issued which modifies the disclosure requirements for fair value measurements. The update eliminates the requirements to disclose the amount of and reasons for transfers between Level 1 and 2 of the fair value hierarchy, the timing of transfers between levels and the Level 3 valuation process, while expanding the Level 3 disclosures to include the range and weighted average used to develop significant unobservable inputs and the changes in unrealized gains and losses on recurring fair value measurements.

This update is effective for the Company for annual and interim periods beginning January 1, 2020, with early adoption permitted. The changes and modifications to the Level 3 disclosures are to be applied prospectively, while all other amendments are to be applied retrospectively. The Company is currently evaluating the impact of this update on its disclosures but does not expect that it will have a material effect on its consolidated financial statements.

Note 3—Changes in presentation of financial statements

Discontinued operations

In December 2018, the Company announced an agreement to divest 80.1 percent of its Power Grids business to Hitachi Ltd. (Hitachi) valuing the business at $11 billion. The business also includes certain real estate properties which were previously reported within Corporate and Other as the Company primarily manages real estate assets centrally as corporate assets. As a result, this business, along with the related real estate assets previously included in Corporate and Other, have been reported as discontinued operations. The divestment is expected to be completed in the first half of 2020, following the receipt of customary regulatory approvals as well as the completion of certain legal entity reorganizations expected to be completed before the sale. Assets and liabilities in the discontinued operation have maintained their existing classification as current or non current as the sale is not expected to be completed for more than 12 months.

As this planned divestment represents a strategic shift that will have a major effect on the Company's operations and financial results, the results of operations for this business have been presented as discontinued operations and the assets and liabilities are reflected as held-for-sale for all periods presented. Financial information and disclosures previously reported in 2017 and 2016 have been retroactively recast to give effect to the discontinued operations presentation. In addition, amounts relating to stranded corporate costs have been separately disclosed as a component of Corporate and Other (see Note 23). Stranded costs represent overhead and other management costs which were previously included in the measure of segment profit (Operational EBITA) for the former Power Grids operating segment but are not directly attributable to the discontinued operation and thus do not qualify to be recorded as part of income from discontinued operations.

Operating results of the discontinued operations are summarized as follows:

($ millions)	2018	2017	2016
Total revenues	9,698	10,028	9,984
Total cost of sales	(7,378)	(7,501)	(7,597)
Gross profit	**2,320**	**2,527**	**2,387**
Expenses	(1,326)	(1,376)	(1,278)
Income from operations	**994**	**1,152**	**1,108**
Net interest and other finance expense	(55)	(42)	(58)
Non-operational pension (cost) credit	12	9	—
Income from discontinued operations before taxes	**951**	**1,119**	**1,050**
Provision for taxes	(228)	(273)	(251)
Income from discontinued operations, net of tax	**723**	**846**	**799**

Of the total Income from discontinued operations before taxes in the table above, $874 million, $1,034 million and $966 million in 2018, 2017 and 2016, respectively, are attributable to the Company, while the remainder is attributable to noncontrolling interests.

Income from discontinued operations before taxes excludes the stranded costs previously allocated to the Power Grids operating segment. As a result, $297 million, $286 million and $252 million, for 2018, 2017 and 2016, respectively, of allocated overhead and other management costs which were previously included in the measure of segment profit for the Power Grids operating segment are now reported as part of Corporate and Other. In addition, in the table above, Net interest and other finance expense in 2018, 2017 and 2016 includes $43 million, $33 million and $36 million, respectively, of interest expense which has been recorded on an allocated basis in accordance with the Company's accounting policy election. In 2018, Income from discontinued operations before taxes includes $18 million for costs incurred to execute the transaction.

Included in the reported Total revenues of the Company for 2018, 2017 and 2016 are revenues for sales from the Company's operating segments to the Power Grids business of $243 million, $263 million and $300 million, respectively, which represent intercompany transactions that, prior to Power Grids being classified as a discontinued operation, were eliminated in the Company's Consolidated Financial Statements (See Note 23).

The major components of assets and liabilities held for sale and in discontinued operations in the Company's Consolidated Balance Sheets are summarized as follows:

	December 31,	
($ in millions)	**2018**	**2017**
Receivables, net	2,377	2,406
Contract assets	1,236	1,008
Inventories, net	1,457	1,518
Other current assets	94	111
Current assets held for sale	**5,164**	**5,043**
Property, plant and equipment, net	1,477	1,559
Goodwill	1,620	1,663
Other non-current assets	330	338
Non-current assets held for sale	**3,427**	**3,560**
Accounts payable, trade	1,732	1,683
Contract liabilities	998	1,116
Other current liabilities	1,455	1,721
Current liabilities held for sale	**4,185**	**4,520**
Pension and other employee benefits	268	293
Other non-current liabilities	161	177
Non-current liabilities held for sale	**429**	**470**

Reclassifications and other changes

Changes in presentation and disclosure relating to the adoption of new accounting pronouncements

Revenue from contracts with customers

In connection with the adoption of the new accounting pronouncement, Revenue from contracts with customers (see Note 2 for a description of the adoption of the policy), the Company has provided certain additional disaggregated revenue disclosures in Note 23, including the initial disclosure of amounts for 2017 and 2016.

While comparative information has not been restated due to the adoption of this standard, the separate presentation of Contract assets and Contract liabilities in the Consolidated Balance Sheets resulted in a reclassification of certain previously presented amounts. The following table presents the changes in prior period amounts which have been reclassified in the Consolidated Balance Sheets to conform to the presentation requirements of the new standard and all amounts presented give effect to the discontinued operations as described above:

	December 31, 2017				
($ in millions)	**Previous classification**	**Adjusted presentation**		**Previous classification**	**Adjusted presentation**
Consolidated Balance Sheet					
Current assets			**Current liabilities**		
Receivables, net[1]	7,002	5,861	Contract liabilities[2][3][4]	—	1,792
Contract assets[1]	—	1,141	Billings in excess of sales[2]	744	—
Inventories, net[3]	3,591	3,737	Advances from customers[2][3]	1,047	—
			Other current liabilities[4]	3,510	3,509
Total assets	**43,262**	**43,458**	**Total liabilities**	**27,913**	**28,109**

(1) $1,141 million of unbilled receivables previously included in Receivables have been reclassified to Contract assets.

(2) Amounts previously presented as Billings in excess of sales and Advances from customers have been reclassified to Contract liabilities.

(3) $146 million of advances from customers, previously recorded net within Inventories, have been reclassified to Advances from customers that are now recorded within Contract liabilities. This accounting change also increased the amounts previously reported at December 31, 2017 and 2016, for the respective Total assets for the operating segments.

(4) Certain amounts recorded as deferred revenues, totaling $1 million, have been reclassified from Other current liabilities to Contract liabilities.

In addition, new disclosures have been provided in Note 8 relating to Contract assets and Contract liabilities.

Improving the presentation of net periodic pension cost and net periodic postretirement benefit cost

As described in Note 2, the Company now presents the total Non-operational pension cost/credit as a total outside of income from operations. The components of Non-operational pension cost/credit are summarized in Note 17. The amounts disclosed for 2017 and 2016 were previously included as a component of income from operations.

Changes affecting operating segments

Effective January 1, 2018, management responsibility and oversight of certain remaining engineering, procurement and construction (EPC) businesses, previously included principally in the Robotics and Motion operating segment (EPC-RM) and the former Power Grids business (EPC-PG), were transferred to a new non-core operating business within Corporate and Other. As a result, the following amounts, which were previously reported in their respective operating segments, have been included in Corporate and Other in 2017 and 2016:

	2017		2016	
($ millions)	**EPC-RM**	**EPC-PG**	**EPC-RM**	**EPC-PG**
Third-party revenues	5	526	18	897
Operational EBITA	(82)	(55)	(9)	(13)
Total assets	18	680	13	853

Depreciation and amortization	—	2	—	6
Capital expenditure	—	—	—	3

In addition, during 2018, the Company changed the allocation of Cash and cash equivalents to the operating segments such that all amounts are attributed to Corporate and Other (see Note 23). As a result, at December 31, 2017 and 2016, $1,932 million and $2,098 million, respectively, of Cash and cash equivalents was reallocated from the Company's operating segments (including the former Power Grids segment) to Corporate and Other. Previously, these amounts were primarily reported in the total assets for the Electrification Products operating segment and the former Power Grids segment. Total assets at December 31, 2017 and 2016 for the reportable segments and Corporate and Other have been adjusted to reflect this classification.

Separate disclosure of Swiss and International employee benefit plans and other

In 2018, the Company commenced separate disclosure of Swiss and International (outside Switzerland) benefit plans and has provided a comparable presentation for 2017 and 2016 information. Certain pension plan assets previously disclosed within the fair value hierarchy at December 31, 2017, are now presented using the NAV practical expedient and not subject to leveling (see Note 17).

Note 4—Acquisitions and business divestments

Acquisitions

Acquisitions were as follows:

($ in millions, except number of acquired businesses)	2018	2017	2016
Purchase price for acquisitions (net of cash acquired)[1]	2,638	1,992	13
Aggregate excess of purchase price over fair value of net assets acquired[2]	1,472	1,267	12
Number of acquired businesses	3	4	1

(1) Excluding changes in cost and equity accounted companies.

(2) Recorded as goodwill (see Note 11).

In the table above, the "Purchase price for acquisitions" and "Aggregate excess of purchase price over fair value of net assets acquired" amounts for 2018, relate primarily to the acquisition of GE Industrial Solutions (GEIS), and for 2017, relate primarily to the acquisition of Bernecker + Rainer Industrie-Elektronik GmbH (B&R). In 2016, acquisitions were not significant.

Acquisitions of controlling interests have been accounted for under the acquisition method and have been included in the Company's Consolidated Financial Statements since the date of acquisition.

On June 30, 2018, the Company acquired through numerous share and asset purchases substantially all the assets, liabilities and business activities of GEIS, General Electric's global electrification solutions business. GEIS, headquartered in Atlanta, United States, provides technologies that distribute and control electricity and support the commercial, data center, health care, mining, renewable energy, oil and gas, water and telecommunications sectors. The resulting cash outflows for the Company amounted to $2,622 million (net of cash acquired of $192 million). The acquisition strengthens the Company's global position in electrification and expands its access to the North American market through strong customer relationships, a large installed base and extensive distribution networks. Consequently, the goodwill acquired represents expected operating synergies and cost savings as well as intangible assets that are not separable such as employee know-how and expertise.

While the Company uses its best estimates and assumptions as part of the purchase price allocation process to value assets acquired and liabilities assumed at the acquisition date, the purchase price allocation for acquisitions is preliminary for up to 12 months after the acquisition date and is subject to refinement as more detailed analyses are completed and additional information about the fair values of the acquired assets and liabilities becomes available. Given the timing and complexity of the acquisition of GEIS, the purchase price allocation in the Company's Consolidated Financial Information has not yet been finalized, primarily relating to amounts allocated to net working capital, pension obligations, current and deferred income taxes as well as intangible assets. At December 31, 2018, the Company is still gathering, analyzing and evaluating relevant information, including certain inputs required for the valuation of intangibles. As a result, amounts recorded in the preliminary purchase price allocation may change in 2019. The final purchase price adjustments as well as the final fair value determinations could result in material adjustments to the values presented in the preliminary purchase price allocation table below.

On July 6, 2017, the Company acquired the shares of B&R, a worldwide provider of product- and software-based, open-architecture solutions for machine and factory automation. This acquisition closes a gap in the Company's industrial automation portfolio and consequently the goodwill acquired represents the future benefits associated with product portfolio expansion.

The aggregate allocation of the purchase consideration for business acquisitions in 2018 and 2017, was as follows:

	2018				2017	
	Preliminary					
($ in millions)	allocated amounts[1]			Weighted-average	Allocated	Weighted-average
	GEIS	Other	Total	useful life	amounts[1]	useful life
Technology	87	—	**87**	7 years	412	7 years
Customer Relationships	214	—	**214**	14 years	264	20 years
Trade names	122	—	**122**	13 years	61	10 years
Supply agreement	34	—	**34**	13 years	—	
Intangible assets	**457**	**—**	**457**		**737**	
Property, plant and equipment	379	9	**388**		131	
Debt acquired	—	—	**—**		(50)	
Deferred tax liabilities	(110)	(1)	**(111)**		(249)	
Inventories	435	3	**438**		176	
Other assets and liabilities, net [2]	126	(25)	**101**		(20)	
Goodwill [3]	1,442	30	**1,472**		1,267	
Noncontrolling interest	(107)	—	**(107)**		—	
Total consideration (net of cash acquired) [4]	**2,622**	**16**	**2,638**		**1,992**	

(1) Excludes measurement period adjustments related to prior year acquisitions.

(2) Gross receivables from the GEIS acquisition totaled $658 million; the fair value of which was $624 million after adjusting for contractual cash flows not expected to be collected.

(3) The Company expects that goodwill recorded in certain jurisdictions will be tax deductible. The amount is subject to the finalization of the purchase price allocation in 2019.

(4) Primarily relates to the acquisition of GEIS in 2018 and B&R in 2017. Cash acquired in the GEIS acquisition totaled $192 million.

The Company's Consolidated Income Statement for 2018, includes total revenues of $1,317 million and net income of $1 million in respect of GEIS since the date of acquisition.

The unaudited pro forma financial information in the table below summarizes the combined pro forma results of the Company and GEIS for 2018 and 2017, as if GEIS had been acquired on January 1, 2017.

($ in millions)	2018	2017
Total revenues	28,936	27,881
Income from continuing operations, net of tax	1,622	1,631

The pro forma results are for information purposes only and do not include any anticipated cost synergies or other effects of the planned integration of GEIS. Accordingly, such pro forma amounts are not necessarily indicative of the results that would have occurred had the acquisition been completed on the date indicated, nor are they indicative of the future operating results of the combined company.

The unaudited pro forma results above include certain adjustments related to the GEIS acquisition. The table below summarizes the adjustments necessary to present the pro forma financial information of the combined entity as if GEIS had been acquired on January 1, 2017.

($ in millions)	2018	2017
Impact on cost of sales from additional amortization of intangible assets	(10)	(20)
Impact on cost of sales from fair valuing acquired inventory	26	(26)
Impact on cost of sales from additional depreciation of property, plant and equipment	(4)	(8)
Impact on selling, general and administrative expenses from additional amortization of intangible assets	(5)	(12)
Impact on selling, general and administrative expenses from acquisition-related costs	44	20
Impact on interest expense from financing costs	(15)	(62)
Taxation adjustments	(5)	33
Total pro forma adjustments	**31**	**(75)**

Business divestments

In 2017, the Company received proceeds (net of transaction costs and cash disposed) of $605 million, relating to divestments of consolidated businesses and recorded net gains of $252 million in “Other income (expense), net” on the sale of such businesses. These are primarily due to the divestment of the Company’s high-voltage cables and cable accessories businesses (the Cables business) in March 2017 and the divestment of the Oil & Gas EPC business in December 2017. The assets and liabilities of the Cables business were classified as held for sale in the Company’s Consolidated Balance Sheets at December 31, 2016.

The Company has retained certain obligations of the Cables business and thus the Company remains directly or indirectly liable for these liabilities which existed at the date of the divestment. Subsequent to the divestment, the Company recorded a loss of $94 million in 2017 for changes in the amounts recorded for these obligations. In addition, the Company has provided certain performance guarantees to third parties which guarantee the performance of the buyer under existing contracts with customers as well as for certain capital expenditures of the divested business (see Note 15).

In 2018 and 2016, there were no significant amounts recognized from divestments of consolidated businesses.

Note 5—Cash and equivalents, marketable securities and short term investments

Current assets

Cash and equivalents and marketable securities and short term investments consisted of the following:

	December 31, 2018					
($ in millions)	**Cost basis**	**Gross unrealized gains**	**Gross unrealized losses**	**Fair value**	**Cash and equivalents**	**Marketable securities and short-term investments**
Changes in fair value recorded in net income						
Cash	1,983			**1,983**	1,983	
Time deposits	1,463			**1,463**	1,462	1
Other short-term investments	206			**206**		206
Equity securities[1]	206		(3)	**203**		203
	3,858	**—**	**(3)**	**3,855**	**3,445**	**410**
Changes in fair value recorded in other comprehensive income						
Debt securities available-for-sale:						
—U.S. government obligations	217		(3)	**214**		214
—Corporate	90		(2)	**88**		88
	307	**—**	**(5)**	**302**	**—**	**302**
Total	**4,165**	**—**	**(8)**	**4,157**	**3,445**	**712**

	December 31, 2017					
($ in millions)	**Cost basis**	**Gross unrealized gains**	**Gross unrealized losses**	**Fair value**	**Cash and equivalents**	**Marketable securities and short-term investments**
Changes in fair value recorded in net income						
Cash	1,963			**1,963**	1,963	
Time deposits	2,834			**2,834**	2,563	271
Other short-term investments	305	—		**305**		305
	5,102	**—**	**—**	**5,102**	**4,526**	**576**
Changes in fair value recorded in other comprehensive income						
Equity securities	152	13		**165**		165
Debt securities available-for-sale:						
—U.S. government obligations	127		(2)	**125**		125
—Other government obligations	2		—	**2**		2
—Corporate	215	1	(1)	**215**		215
	496	**14**	**(3)**	**507**	**—**	**507**
Total	**5,598**	**14**	**(3)**	**5,609**	**4,526**	**1,083**

(1) See “New accounting pronouncements - Applicable for current period” in Note 2 for changes applicable in 2018.

Included in Other short term investments at December 31, 2018 and 2017, are receivables of $206 million and $305 million, respectively, representing reverse repurchase agreements. These collateralized lendings, made to a financial institution, have maturity dates of less than one year.

Contractual maturities

Contractual maturities of debt securities consisted of the following:

	December 31, 2018	
	Available-for-sale	
($ in millions)	**Cost basis**	**Fair value**
Less than one year	80	80
One to five years	166	163
Six to ten years	60	58
Due after ten years	1	1
Total	**307**	**302**

At December 31, 2018 and 2017, the Company pledged $68 million and $66 million, respectively, of available for sale marketable securities as collateral for issued letters of credit and other security arrangements.

Note 6 —Derivative financial instruments

The Company is exposed to certain currency, commodity, interest rate and equity risks arising from its global operating, financing and investing activities. The Company uses derivative instruments to reduce and manage the economic impact of these exposures.

Currency risk

Due to the global nature of the Company's operations, many of its subsidiaries are exposed to currency risk in their operating activities from entering into transactions in currencies other than their functional currency. To manage such currency risks, the Company's policies require its subsidiaries to hedge their foreign currency exposures from binding sales and purchase contracts denominated in foreign currencies. For forecasted foreign currency denominated sales of standard products and the related foreign currency denominated purchases, the Company's policy is to hedge up to a maximum of 100 percent of the forecasted foreign currency denominated exposures, depending on the length of the forecasted exposures. Forecasted exposures greater than 12 months are not hedged. Forward foreign exchange contracts are the main instrument used to protect the Company against the volatility of future cash flows (caused by changes in exchange rates) of contracted and forecasted sales and purchases denominated in foreign currencies. In addition, within its treasury operations, the Company primarily uses foreign exchange swaps and forward foreign exchange contracts to manage the currency and timing mismatches arising in its liquidity management activities.

Commodity risk

Various commodity products are used in the Company's manufacturing activities. Consequently it is exposed to volatility in future cash flows arising from changes in commodity prices. To manage the price risk of commodities, the Company's policies require that its subsidiaries hedge the commodity price risk exposures from binding contracts, as well as at least 50 percent (up to a maximum of 100 percent) of the forecasted commodity exposure over the next 12 months or longer (up to a maximum of 18 months). Primarily swap contracts are used to manage the associated price risks of commodities.

Interest rate risk

The Company has issued bonds at fixed rates. Interest rate swaps are used to manage the interest rate risk associated with certain debt and generally such swaps are designated as fair value hedges. In addition, from time to time, the Company uses instruments such as interest rate swaps, interest rate futures, bond futures or forward rate agreements to manage interest rate risk arising from the Company's balance sheet structure but does not designate such instruments as hedges.

Equity risk

The Company is exposed to fluctuations in the fair value of its warrant appreciation rights (WARs) issued under its MIP. A WAR gives its holder the right to receive cash equal to the market price of an equivalent listed warrant on the date of exercise. To eliminate such risk, the Company has purchased cash settled call options indexed to the shares of the Company, which entitle the Company to receive amounts equivalent to its obligations under the outstanding WARs.

Volume of derivative activity

In general, while the Company's primary objective in its use of derivatives is to minimize exposures arising from its business, certain derivatives are designated and qualify for hedge accounting treatment while others either are not designated or do not qualify for hedge accounting.

Foreign exchange and interest rate derivatives

The gross notional amounts of outstanding foreign exchange and interest rate derivatives (whether designated as hedges or not) were as follows:

Type of derivative	Total notional amounts at December 31,		
($ in millions)	2018	2017	2016
Foreign exchange contracts	13,612	16,261	14,144
Embedded foreign exchange derivatives	733	899	1,125
Interest rate contracts	3,300	5,706	3,021

Derivative commodity contracts

The Company uses derivatives to hedge its direct or indirect exposure to the movement in the prices of commodities which are primarily copper, silver and aluminum. The following table shows the notional amounts of outstanding commodity derivatives (whether designated as hedges or not), on a net basis, to reflect the Company's requirements in the various commodities:

		Total notional amounts at December 31,		
Type of derivative	Unit	2018	2017	2016
Copper swaps	metric tonnes	46,143	28,976	17,667
Silver swaps	ounces	2,861,294	1,966,729	1,586,395
Aluminum swaps	metric tonnes	9,491	1,869	27

Equity derivatives

At December 31, 2018, 2017 and 2016, the Company held 41 million, 37 million and 47 million cash settled call options indexed to ABB Ltd shares (conversion ratio 5:1) with a total fair value of $6 million, $42 million and $23 million, respectively.

Cash flow hedges

As noted above, the Company mainly uses forward foreign exchange contracts to manage the foreign exchange risk of its operations, commodity swaps to manage its commodity risks and cash settled call options to hedge its WAR liabilities. Where such instruments are designated and qualify as cash flow hedges, the effective portion of the changes in their fair value is recorded in "Accumulated other comprehensive loss" and subsequently reclassified into earnings in the same line item and in the same period as the underlying hedged transaction affects earnings. Any ineffectiveness in the hedge relationship, or hedge component excluded from the assessment of effectiveness, is recognized in earnings during the current period.

At December 31, 2018, 2017 and 2016, "Accumulated other comprehensive loss" included net unrealized losses of $16 million, net unrealized gains of $12 million and net unrealized losses of $1 million, respectively, net of tax, on derivatives designated as cash flow hedges. Of the amount at December 31, 2018, net losses of $6 million are expected to be reclassified to earnings in 2019. At December 31, 2018, the longest maturity of a derivative classified as a cash flow hedge was 61 months.

In 2018, 2017 and 2016, the amounts of gains or losses, net of tax, reclassified into earnings due to the discontinuance of cash flow hedge accounting and the amount of ineffectiveness in cash flow hedge relationships directly recognized in earnings were not significant.

The pre tax effects of derivative instruments, designated and qualifying as cash flow hedges, on "Accumulated other comprehensive loss" (OCI) and the Consolidated Income Statements were as follows:

	Gains (losses) recognized in OCI on derivatives (effective portion)				Gains (losses) reclassified from OCI into income (effective portion)		
($ in millions)	**2018**	**2017**	**2016**		**2018**	**2017**	**2016**
Type of derivative				**Location**			
Foreign exchange contracts	(6)	3	(7)	Total revenues	—	2	1
				Total cost of sales	—	2	9
Commodity contracts	(9)	9	3	Total cost of sales	—	6	(2)
Cash-settled call options	(36)	22	15	SG&A expenses[1]	(22)	15	9
Total	**(51)**	**34**	**11**		**(22)**	**25**	**17**

(1) SG&A expenses represent "Selling, general and administrative expenses".

The amounts in respect of gains (losses) recognized in income for hedge ineffectiveness and amounts excluded from effectiveness testing were not significant in 2018, 2017 and 2016.

Net derivative losses of $24 million and net derivative gains of $23 million and $14 million, net of tax, were reclassified from "Accumulated other comprehensive loss" to earnings during 2018, 2017 and 2016, respectively.

Fair value hedges

To reduce its interest rate exposure arising primarily from its debt issuance activities, the Company uses interest rate swaps. Where such instruments are designated as fair value hedges, the changes in the fair value of these instruments, as well as the changes in fair value of the risk component of the underlying debt being hedged, are recorded as offsetting gains and losses in "Interest and other finance expense". Hedge ineffectiveness of instruments designated as fair value hedges in 2018, 2017 and 2016, was not significant.

The effect of Interest rate contracts, designated and qualifying as fair value hedges, on the Consolidated Income Statements was as follows:

($ in millions)	2018	2017	2016
Gains (losses) recognized in Interest and other finance expense:			
- on derivatives designated as fair value hedges	(4)	(23)	(28)
- on hedged item	5	27	30

Derivatives not designated in hedge relationships

Derivative instruments that are not designated as hedges or do not qualify as either cash flow or fair value hedges are economic hedges used for risk management purposes. Gains and losses from changes in the fair values of such derivatives are recognized in the same line in the income statement as the economically hedged transaction.

Furthermore, under certain circumstances, the Company is required to split and account separately for foreign currency derivatives that are embedded within certain binding sales or purchase contracts denominated in a currency other than the functional currency of the subsidiary and the counterparty.

The gains (losses) recognized in the Consolidated Income Statements on derivatives not designated in hedging relationships were as follows:

($ in millions)		Gains (losses) recognized in income		
Type of derivative not designated as a hedge	Location	2018	2017	2016
Foreign exchange contracts	Total revenues	(121)	92	(90)
	Total cost of sales	46	(41)	(28)
	SG&A expenses[1]	10	(18)	8
	Non-order related research and development	(1)	—	(1)
	Interest and other finance expense	40	22	(35)
Embedded foreign exchange contracts	Total revenues	58	7	(5)
	Total cost of sales	(4)	(2)	(4)
	SG&A expenses[1]	2	5	(2)
Commodity contracts	Total cost of sales	(33)	31	31
Other	Interest and other finance expense	3	(2)	(7)
Total		**—**	**94**	**(133)**

(1) SG&A expenses represent “Selling, general and administrative expenses”.

The fair values of derivatives included in the Consolidated Balance Sheets were as follows:

	December 31, 2018			
	Derivative assets		Derivative liabilities	
($ in millions)	Current in "Other current assets"	Non-current in "Other non-current assets"	Current in "Other current liabilities"	Non-current in "Other non-current liabilities"
Derivatives designated as hedging instruments:				
Foreign exchange contracts	—	—	1	4
Commodity contracts	—	—	2	—
Interest rate contracts	—	35	—	1
Cash-settled call options	3	3	—	—
Total	**3**	**38**	**3**	**5**
Derivatives not designated as hedging instruments:				
Foreign exchange contracts	117	14	160	30
Commodity contracts	8	1	21	1
Embedded foreign exchange derivatives	15	10	8	1
Total	**140**	**25**	**189**	**32**
Total fair value	**143**	**63**	**192**	**37**

	December 31, 2017			
	Derivative assets		Derivative liabilities	
($ in millions)	Current in "Other current assets"	Non-current in "Other non-current assets"	Current in "Other current liabilities"	Non-current in "Other non-current liabilities"
Derivatives designated as hedging instruments:				
Foreign exchange contracts	1	—	—	1
Commodity contracts	5	—	—	—
Interest rate contracts	—	41	—	4
Cash-settled call options	25	16	—	—
Total	**31**	**57**	**—**	**5**
Derivatives not designated as hedging instruments:				
Foreign exchange contracts	134	24	183	62
Commodity contracts	31	1	7	—
Cross-currency interest rate swaps	—	—	2	—
Cash-settled call options	—	1	—	—
Embedded foreign exchange derivatives	15	10	15	3
Total	**180**	**36**	**207**	**65**
Total fair value	**211**	**93**	**207**	**70**

Close out netting agreements provide for the termination, valuation and net settlement of some or all outstanding transactions between two counterparties on the occurrence of one or more pre defined trigger events.

Although the Company is party to close out netting agreements with most derivative counterparties, the fair values in the tables above and in the Consolidated Balance Sheets at December 31, 2018 and 2017, have been presented on a gross basis.

The Company's netting agreements and other similar arrangements allow net settlements under certain conditions. At December 31, 2018 and 2017, information related to these offsetting arrangements was as follows:

($ in millions)	December 31, 2018				
Type of agreement or similar arrangement	Gross amount of recognized assets	Derivative liabilities eligible for set-off in case of default	Cash collateral received	Non-cash collateral received	Net asset exposure
Derivatives	181	(121)	—	—	**60**
Reverse repurchase agreements	206	—	—	(206)	—
Total	**387**	**(121)**	**—**	**(206)**	**60**

($ in millions)	December 31, 2018				
Type of agreement or similar arrangement	Gross amount of recognized liabilities	Derivative liabilities eligible for set-off in case of default	Cash collateral pledged	Non-cash collateral pledged	Net liability exposure
Derivatives	220	(121)	—	—	**99**
Total	**220**	**(121)**	**—**	**—**	**99**

($ in millions)	December 31, 2017				
Type of agreement or similar arrangement	Gross amount of recognized assets	Derivative liabilities eligible for set-off in case of default	Cash collateral received	Non-cash collateral received	Net asset exposure
Derivatives	279	(167)	—	—	**112**
Reverse repurchase agreements	305	—	—	(305)	—
Total	**584**	**(167)**	**—**	**(305)**	**112**

($ in millions)	December 31, 2017				
Type of agreement or similar arrangement	Gross amount of recognized liabilities	Derivative liabilities eligible for set-off in case of default	Cash collateral pledged	Non-cash collateral pledged	Net liability exposure
Derivatives	259	(167)	—	—	**92**
Total	**259**	**(167)**	**—**	**—**	**92**

Note 7—Fair values

Recurring fair value measures

The fair values of financial assets and liabilities measured at fair value on a recurring basis were as follows:

	December 31, 2018			
($ in millions)	**Level 1**	**Level 2**	**Level 3**	**Total fair value**
Assets				
Securities in "Marketable securities and short-term investments":				
Equity securities	—	203	—	**203**
Debt securities—U.S. government obligations	214	—	—	**214**
Debt securities—Corporate	—	88	—	**88**
Derivative assets—current in "Other current assets"	—	143	—	**143**
Derivative assets—non-current in "Other non-current assets"	—	63	—	**63**
Total	**214**	**497**	**—**	**711**
Liabilities				
Derivative liabilities—current in "Other current liabilities"	—	192	—	**192**
Derivative liabilities—non-current in "Other non-current liabilities"	—	37	—	**37**
Total	**—**	**229**	**—**	**229**

	December 31, 2017			
($ in millions)	**Level 1**	**Level 2**	**Level 3**	**Total fair value**
Assets				
Securities in "Marketable securities and short-term investments":				
Equity securities	—	165	—	**165**
Debt securities—U.S. government obligations	125	—	—	**125**
Debt securities—Other government obligations	—	2	—	**2**
Debt securities—Corporate	—	215	—	**215**
Receivable in "Other non-current assets":				
Receivable under securities lending arrangement	79	—	—	**79**
Derivative assets—current in "Other current assets"	—	211	—	**211**
Derivative assets—non-current in "Other non-current assets"	—	93	—	**93**
Total	**204**	**686**	**—**	**890**
Liabilities				
Derivative liabilities—current in "Other current liabilities"	—	207	—	**207**
Derivative liabilities—non-current in "Other non-current liabilities"	—	70	—	**70**
Total	**—**	**277**	**—**	**277**

During 2018, 2017 and 2016 there have been no reclassifications for any financial assets or liabilities between Level 1 and Level 2.

The Company uses the following methods and assumptions in estimating fair values of financial assets and liabilities measured at fair value on a recurring basis:

- *Securities in "Marketable securities and short term investments" and "Other non current assets":* If quoted market prices in active markets for identical assets are available, these are considered Level 1 inputs; however, when markets are not active, these inputs are considered Level 2. If such quoted market prices are not available, fair value is determined using market prices for similar assets or present value techniques, applying an appropriate risk free interest rate adjusted for non performance risk. The inputs used in present value techniques are observable and fall into the Level 2 category. The fair value of the receivable under the securities lending arrangement has been determined based on the fair value of the security lent.

- *Derivatives:* The fair values of derivative instruments are determined using quoted prices of identical instruments from an active market, if available (Level 1 inputs). If quoted prices are not available, price quotes for similar instruments, appropriately adjusted, or present value techniques, based on available market data, or option pricing models are used. Cash settled call options hedging the Company's WAR liability are valued based on bid prices of the equivalent listed warrant. The fair values obtained using price quotes for similar instruments or valuation techniques represent a Level 2 input unless significant unobservable inputs are used.

Non recurring fair value measures

There were no significant non recurring fair value measurements during 2018 and 2017.

Disclosure about financial instruments carried on a cost basis

The fair values of financial instruments carried on a cost basis were as follows:

	December 31, 2018				
($ in millions)	**Carrying value**	**Level 1**	**Level 2**	**Level 3**	**Total fair value**
Assets					
Cash and equivalents (excluding securities with original maturities up to 3 months):					
Cash	1,983	1,983	—	—	**1,983**
Time deposits	1,462	—	1,462	—	**1,462**
Marketable securities and short-term investments (excluding securities):					
Time deposits	1	—	1	—	**1**
Receivables under reverse repurchase agreements	206	—	206	—	**206**
Other non-current assets:					
Loans granted	30	—	31	—	**31**
Restricted cash and cash deposits	39	39	—	—	**39**
Liabilities					
Short-term debt and current maturities of long-term debt (excluding capital lease obligations)	2,008	1,480	528	—	**2,008**
Long-term debt (excluding capital lease obligations)	6,457	5,839	707	—	**6,546**

	December 31, 2017				
($ in millions)	Carrying value	Level 1	Level 2	Level 3	Total fair value
Assets					
Cash and equivalents (excluding securities with original maturities up to 3 months):					
Cash	1,963	1,963	—	—	**1,963**
Time deposits	2,563	—	2,563	—	**2,563**
Marketable securities and short-term investments (excluding securities):					
Time deposits	271	—	271	—	**271**
Receivables under reverse repurchase agreements	305	—	305	—	**305**
Other non-current assets:					
Loans granted	29	—	30	—	**30**
Restricted cash and cash deposits	35	35	—	—	**35**
Liabilities					
Short-term debt and current maturities of long-term debt (excluding capital lease obligations)	694	400	294	—	**694**
Long-term debt (excluding capital lease obligations)	6,567	6,046	773	—	**6,819**

The Company uses the following methods and assumptions in estimating fair values of financial instruments carried on a cost basis:

- *Cash and equivalents (excluding securities with original maturities up to 3 months), and Marketable securities and short term investments (excluding securities):* The carrying amounts approximate the fair values as the items are short term in nature.

- *Other non current assets:* Includes (i) loans granted whose fair values are based on the carrying amount adjusted using a present value technique to reflect a premium or discount based on current market interest rates (Level 2 inputs), (ii) restricted cash whose fair values approximate the carrying amounts (Level 1 inputs).

- *Short term debt and current maturities of long term debt (excluding capital lease obligations):* Short term debt includes commercial paper, bank borrowings and overdrafts. The carrying amounts of short term debt and current maturities of long term debt, excluding capital lease obligations, approximate their fair values.

- *Long term debt (excluding capital lease obligations):* Fair values of bonds are determined using quoted market prices (Level 1 inputs), if available. For bonds without available quoted market prices and other long term debt, the fair values are determined using a discounted cash flow methodology based upon borrowing rates of similar debt instruments and reflecting appropriate adjustments for non performance risk (Level 2 inputs).

Note 8—Receivables, net and Contract assets and liabilities

"Receivables, net" consisted of the following:

	December 31,	
($ in millions)	**2018**	**2017**
Trade receivables	5,970	5,553
Other receivables	635	510
Allowance	(219)	(202)
Total	**6,386**	**5,861**

"Trade receivables" in the table above includes contractual retention amounts billed to customers of $176 million and $168 million at December 31, 2018 and 2017, respectively. Management expects that the substantial majority of related contracts will be completed and the substantial majority of the billed amounts retained by the customer will be collected. Of the retention amounts outstanding at December 31, 2018, 62 percent and 28 percent are expected to be collected in 2019 and 2020, respectively.

"Other receivables" in the table above consists of value added tax, claims, rental deposits and other non trade receivables.

The reconciliation of changes in the allowance for doubtful accounts is as follows:

($ in millions)	**2018**	**2017**	**2016**
Balance at January 1,	**202**	**202**	**160**
Additions	126	61	116
Deductions	(93)	(74)	(64)
Exchange rate differences	(16)	13	(10)
Balance at December 31,	**219**	**202**	**202**

The following table provides information about Contract assets and Contract liabilities:

($ in millions)	**2018**	**2017**	**2016**
Contract assets	1,082	1,141	1,222
Contract liabilities	1,707	1,792	1,690

Contract assets primarily relate to the Company's right to receive consideration for work completed but for which no invoice has been issued at the reporting date. Contract assets are transferred to receivables when rights to receive payment become unconditional. Management expects that the majority of the amounts will be collected within one year of the respective balance sheet date.

Contract liabilities primarily relate to up-front advances received on orders from customers as well as amounts invoiced to customers in excess of revenues recognized predominantly on long-term projects. Contract liabilities are reduced as work is performed and as revenues are recognized.

The significant changes in the Contract assets and Contract liabilities balances were as follows:

	2018		2017	
($ in millions)	Contract assets	Contract liabilities	Contract assets	Contract liabilities
Revenue recognized, which was included in the Contract liabilities balance at Jan 1, 2018/2017		(879)		(1,212)
Additions to Contract liabilities - excluding amounts recognized as revenue during the period		518		868
Receivables recognized that were included in the Contract assets balance at Jan 1, 2018/2017	(633)		(584)	

At December 31, 2018, the Company had unsatisfied performance obligations totaling $13,084 million and, of this amount, the Company expects to fulfill approximately 76 percent of the obligations in 2019, approximately 14 percent of the obligations in 2020 and the balance thereafter.

Note 9—Inventories, net

“Inventories, net” consisted of the following:

	December 31,	
($ in millions)	2018	2017
Raw materials	1,823	1,412
Work in process	837	840
Finished goods	1,525	1,379
Advances to suppliers	99	106
Total	**4,284**	**3,737**

Note 10—Property, plant and equipment, net

“Property, plant and equipment, net” consisted of the following:

	December 31,	
($ in millions)	2018	2017
Land and buildings	3,573	3,268
Machinery and equipment	5,624	5,572
Construction in progress	464	511
	9,661	**9,351**
Accumulated depreciation	(5,528)	(5,547)
Total	**4,133**	**3,804**

Assets under capital leases included in “Property, plant and equipment, net” were as follows:

	December 31,	
($ in millions)	2018	2017
Land and buildings	171	127
Machinery and equipment	69	81

	240	**208**
Accumulated depreciation	(122)	(105)
Total	**118**	**103**

In 2018, 2017 and 2016 depreciation, including depreciation of assets under capital leases, was $578 million, $549 million and $566 million, respectively. In 2018, 2017 and 2016 there were no significant impairments of property, plant or equipment.

Note 11—Goodwill and other intangible assets

The changes in "Goodwill" below have been recast to reflect the reorganization in 2018 of the Company's operating segments as outlined in Note 23:

($ in millions)	Electrification Products	Industrial Automation	Robotics and Motion	Corporate and Other	Total
Cost at January 1, 2017	2,805	1,592	3,536	38	**7,971**
Accumulated impairment charges	—	—	—	(18)	**(18)**
Balance at January 1, 2017	**2,805**	**1,592**	**3,536**	**20**	**7,953**
Goodwill acquired during the year	—	1,263	4	—	**1,267**
Goodwill allocated to disposals	—	(1)	—	(1)	**(2)**
Exchange rate differences and other	164	85	67	2	**318**
Balance at December 31, 2017	**2,969**	**2,939**	**3,607**	**21**	**9,536**
Goodwill acquired during the year	1,442	—	30	—	**1,472**
Goodwill allocated to disposals	(31)	—	—	—	**(31)**
Exchange rate differences and other	(104)	(75)	(34)	—	**(213)**
Balance at December 31, 2018	**4,276**	**2,864**	**3,603**	**21**	**10,764**

In 2018, goodwill acquired primarily relates to GEIS, acquired in June, 2018, which has been allocated to the Electrification Products operating segment.

In 2017, goodwill acquired primarily relates to B&R, acquired in July, 2017, which has been allocated to the Industrial Automation operating segment.

Intangible assets other than goodwill consisted of the following:

	December 31,					
	2018			2017		
($ in millions)	Gross carrying amount	Accumulated amortization	Net carrying amount	Gross carrying amount	Accumulated amortization	Net carrying amount
Capitalized software for internal use	779	(586)	**193**	704	(572)	**132**
Capitalized software for sale	30	(30)	**—**	31	(31)	**—**
Intangibles other than software:						
Customer-related	2,609	(909)	**1,700**	2,452	(782)	**1,670**
Technology-related	1,131	(701)	**430**	1,082	(636)	**446**
Marketing-related	483	(240)	**243**	366	(199)	**167**
Other	67	(26)	**41**	33	(23)	**10**
Total	**5,099**	**(2,492)**	**2,607**	**4,668**	**(2,243)**	**2,425**

Additions to intangible assets other than goodwill consisted of the following:

($ in millions)	2018	2017
Capitalized software for internal use	139	69
Intangibles other than software:		
Customer-related	214	264
Technology-related	87	412
Marketing-related	122	61
Other	34	—
Total	**596**	**806**

Included in the additions of $596 million and $806 million in 2018 and 2017, respectively, were the following intangible assets other than goodwill related to business combinations:

($ in millions)	2018		2017	
	Amount acquired	Weighted-average useful life	Amount acquired	Weighted-average useful life
Capitalized software for internal use	65	2 years		
Intangibles other than software:				
Customer-related	214	14 years	264	20 years
Technology-related	87	7 years	412	7 years
Marketing-related	122	13 years	61	10 years
Other	34	13 years	—	
Total	**522**		**737**	

Amortization expense of intangible assets other than goodwill consisted of the following:

($ in millions)	2018	2017	2016
Capitalized software for internal use	59	50	50
Intangibles other than software	279	237	254
Total	**338**	**287**	**304**

In 2018, 2017 and 2016, impairment charges on intangible assets other than goodwill were not significant.

At December 31, 2018, future amortization expense of intangible assets other than goodwill is estimated to be:

	($ in millions)
2019	342
2020	321
2021	285
2022	253
2023	234
Thereafter	1,172
Total	**2,607**

Note 12—Debt

The Company’s total debt at December 31, 2018 and 2017, amounted to $8,618 million and $7,408 million, respectively.

Short term debt and current maturities of long term debt

The Company's "Short term debt and current maturities of long term debt" consisted of the following:

	December 31,	
($ in millions)	**2018**	**2017**
Short-term debt (weighted-average interest rate of 2.3% and 2.7%, respectively)	561	317
Current maturities of long-term debt (weighted-average nominal interest rate of 2.7% and 2.0%, respectively)	1,470	409
Total	**2,031**	**726**

Short term debt primarily represents short term loans from various banks and issued commercial paper.

At December 31, 2018, the Company had in place two commercial paper programs: a $2 billion Euro commercial paper program for the issuance of commercial paper in a variety of currencies, and a $2 billion commercial paper program for the private placement of U.S. dollar denominated commercial paper in the United States. At December 31, 2018 and 2017, $292 million and $259 million, respectively, was outstanding under the $2 billion program in the United States. At December 31, 2018, $172 million was outstanding under the Euro commercial $2 billion program. No amount was outstanding under this program at December 31, 2017.

In addition, the Company has a $2 billion multicurrency revolving credit facility, maturing in 2021, for general corporate purposes. Interest costs on drawings under the facility are LIBOR or EURIBOR (depending on the currency of the drawings) plus a margin of 0.20 percent, while commitment fees (payable on the unused portion of the facility) amount to 35 percent of the margin, which represents commitment fees of 0.07 percent per annum. Utilization fees, payable on drawings, amount to 0.075 percent per annum on drawings up to one third of the facility, 0.15 percent per annum on drawings in excess of one third but less than or equal to two thirds of the facility, or 0.30 percent per annum on drawings over two thirds of the facility. No amount was drawn at December 31, 2018 and 2017. The facility contains cross default clauses whereby an event of default would occur if the Company were to default on indebtedness as defined in the facility, at or above a specified threshold.

Long term debt

The Company raises long term debt in various currencies, maturities and on various interest rate terms. For certain of its debt obligations, the Company utilizes derivative instruments to modify its interest rate exposure. In particular, the Company uses interest rate swaps to effectively convert certain fixed rate long term debt into floating rate obligations. The carrying value of debt, designated as being hedged by fair value hedges, is adjusted for changes in the fair value of the risk component of the debt being hedged.

The following table summarizes the Company's long term debt considering the effect of interest rate swaps. Consequently, a fixed rate debt subject to a fixed to floating interest rate swap is included as a floating rate debt in the table below:

	December 31,					
	2018			**2017**		
($ in millions, except % data)	**Balance**	**Nominal rate**	**Effective rate**	**Balance**	**Nominal rate**	**Effective rate**
Floating rate	3,106	1.7%	1.1%	3,213	1.7%	0.6%
Fixed rate	4,951	3.6%	3.6%	3,878	3.5%	3.5%
	8,057			**7,091**		
Current portion of long-term debt	(1,470)	2.7%	2.7%	(409)	2.0%	2.0%
Total	**6,587**			**6,682**		

At December 31, 2018, the principal amounts of long term debt repayable (excluding capital lease obligations) at maturity were as follows:

	($ in millions)
2019	1,448
2020	326
2021	1,269
2022	1,250
2023	1,252
Thereafter	2,366
Total	**7,911**

Details of the Company's outstanding bonds were as follows:

	December 31,							
	2018				2017			
	Nominal outstanding		Carrying value[1]		Nominal outstanding		Carrying value[1]	
	(in millions)				(in millions)			
Bonds:								
1.50% CHF Bonds, due 2018					CHF	350	$	358
2.625% EUR Instruments, due 2019	EUR	1,250	$	1,431	EUR	1,250	$	1,493
2.8% USD Notes, due 2020	USD	300	$	299				
4.0% USD Notes, due 2021	USD	650	$	646	USD	650	$	644
2.25% CHF Bonds, due 2021	CHF	350	$	373	CHF	350	$	378
5.625% USD Notes, due 2021	USD	250	$	265	USD	250	$	270
2.875% USD Notes, due 2022	USD	1,250	$	1,242	USD	1,250	$	1,256
3.375% USD Notes, due 2023	USD	450	$	448				
0.625% EUR Instruments, due 2023	EUR	700	$	807	EUR	700	$	834
0.75% EUR Instruments, due 2024	EUR	750	$	862	EUR	750	$	889
3.8% USD Notes, due 2028	USD	750	$	746				
4.375% USD Notes, due 2042	USD	750	$	723	USD	750	$	723
Total			**$**	**7,842**			**$**	**6,845**

(1) USD carrying values include unamortized debt issuance costs, bond discounts or premiums, as well as adjustments for fair value hedge accounting, where appropriate.

During 2018, the Company repaid at maturity the 1.50% CHF Bonds, due 2018. The 1.50% CHF Bonds, due 2018, paid interest annually in arrears at a fixed annual rate of 1.5 percent.

The 2.625% EUR Instruments, due 2019, pay interest annually in arrears at a fixed rate of 2.625 percent per annum.

The 4.0% USD Notes, due 2021, pay interest semi annually in arrears, at a fixed annual rate of 4.0 percent. The Company may redeem these notes prior to maturity, in whole or in part, at the greater of (i) 100 percent of the principal amount of the notes to be redeemed and (ii) the sum of the present values of remaining scheduled payments of principal and interest (excluding interest accrued to the redemption date) discounted to

the redemption date at a rate defined in the note terms, plus interest accrued at the redemption date.

The 2.25% CHF Bonds, due 2021, pay interest annually in arrears, at a fixed annual rate of 2.25 percent. The Company has the option to redeem the bonds prior to maturity, in whole, at par plus accrued interest, if 85 percent of the aggregate principal amount of the bonds has been redeemed or purchased and cancelled. The Company entered into interest rate swaps to hedge its interest obligations on these bonds. After considering the impact of such swaps, these bonds effectively became floating rate Swiss franc obligations and consequently have been shown as floating rate debt in the table of long term debt above.

The 5.625% USD Notes, due 2021, pay interest semi annually in arrears at a fixed annual rate of 5.625 percent. The Company has the option to redeem the notes prior to maturity at the greater of (i) 100 percent of the principal amount of the notes to be redeemed, and (ii) the sum of the present values of remaining scheduled payments of principal and interest (excluding interest accrued to the redemption date) discounted to the redemption date at a rate defined in the note terms, plus interest accrued at the redemption date.

The 2.875% USD Notes, due 2022, pay interest semi annually in arrears at a fixed annual rate of 2.875 percent. The 4.375% USD Notes, due 2042, pay interest semi annually in arrears at a fixed annual rate of 4.375 percent. The Company may redeem both of these notes (which were issued together in May 2012) prior to maturity, in whole or in part, at the greater of (i) 100 percent of the principal amount of the notes to be redeemed and (ii) the sum of the present values of remaining scheduled payments of principal and interest (excluding interest accrued to the redemption date) discounted to the redemption date at a rate defined in the note terms, plus interest accrued at the redemption date. These notes, registered with the U.S. Securities and Exchange Commission, were issued by ABB Finance (USA) Inc., a 100 percent owned finance subsidiary, and were fully and unconditionally guaranteed by ABB Ltd. There are no significant restrictions on the ability of the parent company to obtain funds from its subsidiaries by dividend or loan. In reliance on Rule 3 10 of Regulation S X, the separate financial statements of ABB Finance (USA) Inc. are not provided. The Company has entered into interest rate swaps for an aggregate nominal amount of $1,050 million to partially hedge its interest obligations on the 2.875% USD Notes, due 2022. After considering the impact of such swaps, $1,050 million of the outstanding principal is shown as floating rate debt in the table of long term debt above.

The 0.625% EUR Instruments, due 2023, were issued in May 2016, with total net issuance proceeds of EUR 697 million (equivalent to approximately $807 million on date of issuance). These Instruments pay interest annually in arrears at a fixed rate of 0.625 percent per annum. The Company may redeem these notes three months prior to maturity (Par call date), in whole or in part, at the greater of (i) 100 percent of the principal amount of the notes to be redeemed and (ii) the sum of the present values of remaining scheduled payments of principal and interest (excluding interest accrued to the redemption date) discounted to the redemption date at a rate defined in the note terms, plus interest accrued at the redemption date. The Company may redeem these instruments in whole or in part, after the Par call date at 100 percent of the principal amount of the notes to be redeemed. In 2017, the Company entered into interest rate swaps to hedge its interest on these bonds. After considering the impact of such swaps, these notes effectively became floating rate euro obligations and consequently have been shown as floating rate debt, in the table of long term debt above.

The 0.75% EUR Instruments, due 2024, were issued in May 2017, with total net issuance proceeds of EUR 745 million (equivalent to approximately $824 million on date of issuance). These Instruments pay interest annually in arrears at a fixed rate of 0.75 percent per annum and have the same early redemption terms as the 0.625% EUR Instruments above. The Company entered into interest rate swaps to hedge its interest on these bonds. After considering the impact of such swaps, these bonds effectively became floating rate euro obligations and consequently have been shown as floating rate debt in the table of long term debt above.

In April 2018, the Company issued the following notes (i) $300 million of 2.8% USD Notes, due 2020, (ii) $450 million of 3.375% USD Notes, due 2023, and (iii) $750 million of 3.8% USD Notes, due 2028. Each of the respective notes pays interest semi annually in arrears. The aggregate net proceeds of these bond issues, after underwriting discount and other fees, amounted to $1,494 million. The Company may redeem the notes at any time prior to their maturity date in the case of the 2020 Notes, up to one month prior to their maturity date in the case of the 2023 Notes, and up to three months prior to their maturity date in the case of the 2028 Notes, in whole or in part, at the greater of (i) 100 percent of the principal amount of the notes to be redeemed and (ii) the sum of the present values of remaining scheduled payments of principal and interest (excluding interest accrued to the redemption date) discounted to the redemption date at a rate defined in the Notes terms, plus interest accrued at the redemption date. On or after March 3, 2023 (one month prior to their maturity date) in the case of the 2023 Notes and on or after January 3, 2028 (three months prior to their maturity date) in the case of the 2028 Notes, the Company may also redeem the notes of the applicable series, in whole or in part, at any time at a redemption price equal to 100 percent of the principal amount of the notes to be redeemed plus unpaid accrued interest to, but excluding, the redemption date. These notes, registered with the U.S. Securities and Exchange Commission, were issued by ABB Finance (USA) Inc., a 100 percent owned finance subsidiary, and were fully and unconditionally guaranteed by ABB Ltd. There are no significant restrictions on the ability of the parent company to obtain funds from its subsidiaries by dividend or loan. In reliance on Rule 3 10 of Regulation S X, the separate financial statements of ABB Finance (USA) Inc. are not provided.

The Company's various debt instruments contain cross default clauses which would allow the bondholders to demand repayment if the Company were to default on any borrowing at or above a specified threshold. Furthermore, all such bonds constitute unsecured obligations of the Company and rank pari passu with other debt obligations.

In addition to the bonds described above, included in long term debt at December 31, 2018 and 2017, are capital lease obligations, bank borrowings of subsidiaries and other long term debt, none of which is individually significant.

In February 2019, the Company issued the following notes: (i) CHF 280 million of 0.3% CHF Notes, due 2024 and (ii) CHF 170 million of 1.0% CHF Notes, due 2029. Each of the respective notes pays interest annually in arrears. The Company recorded aggregate net proceeds, after underwriting discount and other fees, of CHF 449 million (equivalent to approximately $449 million on date of issuance).

On March 26, 2019, the Company repaid at maturity its EUR 1,250 million 2.625% Instruments, equivalent to $1,414 million at date of payment. In addition, at March 27, 2019, the amount outstanding under the $2 billion program in the United States had increased to $825 million from $292 million at December 31, 2018, and the amount outstanding under the $2 billion Euro commercial paper program had increased to $509 million from $172 million at December 31, 2018.

Note 13—Other provisions, other current liabilities and other non current liabilities

"Other provisions" consisted of the following:

	December 31,	
($ in millions)	**2018**	**2017**
Contract-related provisions	590	443
Restructuring and restructuring-related provisions	277	334
Provisions for contractual penalties and compliance and litigation matters	209	209
Provision for insurance-related reserves	166	153
Other	130	138
Total	**1,372**	**1,277**

"Other current liabilities" consisted of the following:

($ in millions)	December 31, 2018	2017
Employee-related liabilities	1,506	1,439
Accrued expenses	546	389
Non-trade payables	477	454
Accrued customer rebates	299	230
Other tax liabilities	277	274
Income taxes payable	260	313
Derivative liabilities (see Note 6)	192	207
Accrued interest	73	61
Deferred income	36	33
Pension and other employee benefits	34	40
Other	80	69
Total	**3,780**	**3,509**

"Other non current liabilities" consisted of the following:

($ in millions)	December 31, 2018	2017
Income tax related liabilities	1,111	1,197
Provisions for contractual penalties and compliance and litigation matters	132	137
Non-current deposit liabilities	91	95
Employee-related liabilities	74	70
Environmental provisions	56	53
Derivative liabilities (see Note 6)	37	70
Deferred income	12	11
Other	176	216
Total	**1,689**	**1,849**

Note 14—Leases

The Company's lease obligations primarily relate to real estate, vehicles and machinery. Rent expense was $364 million, $385 million and $390 million in 2018, 2017 and 2016, respectively. Sublease income received by the Company on leased assets was $7 million, $11 million and $13 million in 2018, 2017 and 2016, respectively.

At December 31, 2018, future net minimum lease payments for operating leases, having initial or remaining non cancelable lease terms in excess of one year, consisted of the following:

	($ in millions)
2019	329
2020	254
2021	191
2022	132
2023	105
Thereafter	267
	1,278
Sublease income	(13)
Total	**1,265**

At December 31, 2018, the future net minimum lease payments for capital leases and the present value of the net minimum lease payments consisted of the following:

	($ in millions)
2019	34
2020	27
2021	24
2022	24
2023	19
Thereafter	111
Total minimum lease payments	**239**
Less amount representing estimated executory costs	
included in total minimum lease payments	(1)
Net minimum lease payments	**238**
Less amount representing interest	(87)
Present value of minimum lease payments	**151**

Minimum lease payments have not been reduced by minimum sublease rentals due in the future under non cancelable subleases. Such minimum sublease rentals were not significant. The present value of minimum lease payments is included in “Short term debt and current maturities of long term debt” or “Long term debt” in the Consolidated Balance Sheets.

Note 15—Commitments and contingencies

Contingencies—Regulatory, Compliance and Legal

Regulatory

In April 2014, the European Commission announced its decision regarding its investigation of anticompetitive practices in the cables industry and granted the Company full immunity from fines under its leniency program.

In February 2019, the Brazilian Antitrust Authority (CADE) announced its decision regarding its investigation of anticompetitive practices in certain power businesses of the Company, including flexible alternating current transmission systems (FACTS) and power transformers, and granted the Company full immunity from fines under its leniency program.

As a result of an internal investigation, the Company self-reported to the Securities and Exchange Commission (SEC) and the Department of Justice (DoJ) in the United States as well as to the Serious Fraud Office (SFO) in the United Kingdom concerning certain of its past dealings with Unaoil and its subsidiaries, including alleged improper payments made by these entities to third parties. The SFO has commenced an investigation into this matter. The Company is cooperating fully with the authorities. At this time, it is not possible for the Company to make an informed judgment about the outcome of these matters.

Based on findings during an internal investigation, the Company self-reported to the SEC and the DoJ, to various authorities in South Africa and other countries as well as to certain multilateral financial institutions potential suspect payments and other compliance concerns in connection with some of the Company’s dealings with Eskom and related persons. Many of those parties have expressed an interest in, or commenced an investigation into, these matters and the Company is cooperating fully with them. At this time, it is not possible for the Company to make an informed judgment about the outcome of these matters.

General

The Company is aware of proceedings, or the threat of proceedings, against it and others in respect of private claims by customers and other third parties with regard to certain actual or alleged anticompetitive practices. Also, the Company is subject to other claims and legal proceedings, as well as investigations carried out by various law enforcement authorities. With respect to the above-mentioned claims, regulatory matters, and any related proceedings, the Company will bear the related costs, including costs necessary to resolve them.

Liabilities recognized

At December 31, 2018 and 2017, the Company had aggregate liabilities of $221 million and $229 million, respectively, included in "Other provisions" and "Other non current liabilities", for the above regulatory, compliance and legal contingencies, and none of the individual liabilities recognized was significant. As it is not possible to make an informed judgment on, or reasonably predict, the outcome of certain matters and as it is not possible, based on information currently available to management, to estimate the maximum potential liability on other matters, there could be material adverse outcomes beyond the amounts accrued.

Guarantees

General

The following table provides quantitative data regarding the Company's third party guarantees. The maximum potential payments represent a "worst case scenario", and do not reflect management's expected outcomes.

	December 31,	
	2018	**2017**
($ in millions)	**Maximum potential payments[1]**	
Performance guarantees	1,584	1,775
Financial guarantees	10	17
Indemnification guarantees	64	72
Total	**1,658**	**1,864**

(1) Maximum potential payments include amounts in both continuing and discontinued operations

The carrying amount of liabilities recorded in the Consolidated Balance Sheets reflects the Company's best estimate of future payments, which it may incur as part of fulfilling its guarantee obligations. In respect of the above guarantees, the carrying amounts of liabilities at December 31, 2018 and 2017, were not significant.

The Company is party to various guarantees providing financial or performance assurances to certain third parties. These guarantees, which have various maturities up to 2027, mainly consist of performance guarantees whereby (i) the Company guarantees the performance of a third party's product or service according to the terms of a contract and (ii) as member of a consortium/joint venture that includes third parties, the Company guarantees not only its own performance but also the work of third parties. Such guarantees may include guarantees that a project will be completed within a specified time. If the third party does not fulfill the obligation, the Company will compensate the guaranteed party in cash or in kind. The original maturity dates for the majority of these performance guarantees range from one to eight years.

In conjunction with the divestment of the high voltage cable and cables accessories businesses, the Company has entered into various performance guarantees with other parties with respect to certain liabilities of the divested business. At December 31, 2018 and 2017, the maximum potential payable under these guarantees amounts to $771 million and $929 million, respectively, and these guarantees have various maturities ranging from one to ten years.

Commercial commitments

In addition, in the normal course of bidding for and executing certain projects, the Company has entered into standby letters of credit, bid/performance bonds and surety bonds (collectively "performance bonds") with various financial institutions. Customers can draw on such performance bonds in the event that the Company does not fulfill its contractual obligations. The Company would then have an obligation to reimburse the financial institution for amounts paid under the performance bonds. At December 31, 2018 and 2017, the total outstanding performance bonds aggregated to $7.4 billion and $7.7 billion, respectively, of which $4.3 billion and $4.7 billion, respectively, relate to discontinued operations. There have been no significant amounts reimbursed to financial institutions under these types of arrangements in 2018, 2017 and 2016.

Product and order related contingencies

The Company calculates its provision for product warranties based on historical claims experience and specific review of certain contracts.

The reconciliation of the "Provisions for warranties", including guarantees of product performance, was as follows:

($ in millions)	2018	2017	2016
Balance at January 1,	**909**	**815**	**763**
Net change in warranties due to acquisitions and divestments	41	30	—
Claims paid in cash or in kind	(307)	(243)	(248)
Net increase in provision for changes in estimates, warranties issued	341	234	327
Exchange rate differences	(36)	73	(27)
Balance at December 31,	**948**	**909**	**815**

During 2018, the Company recorded changes in the estimated amount for a product warranty relating to a divested business which is included within Corporate and Other. The relevant product had an unexpected level of product failure which requires higher than expected costs to remediate. As a result, warranty expenses of $92 million were recorded in "Cost of sales of products" in 2018. As these costs relate to a divested business, in accordance with the definition of the Company's primary measure of segment performance, Operational EBITA (see Note 23), the costs have been excluded from this measure.

During 2016, the Company determined that the provision for product warranties in its solar business, acquired in 2013 as part of the purchase of Power-One, was no longer sufficient to cover expected warranty costs in the remaining warranty period. Due to higher than originally expected product failure rates for certain solar inverters designed and manufactured by Power-One, a substantial portion of which relates to products which were delivered to customers prior to the acquisition date, the previously estimated product warranty provision was increased by a total of $36 million, $23 million and $151 million, during 2018, 2017 and 2016, respectively. The corresponding increases were included in "Cost of sales of products". As $16 million, $8 million and $131 million, in 2018, 2017 and 2016, respectively, relates to products which were sold prior to the acquisition date these costs have been excluded from the Company's measure of segment profit, Operational EBITA (see Note 23).

The warranty liability has been recorded based on the information currently available and is subject to change in the future.

Related party transactions

The Company conducts business with certain companies where members of the Company's Board of Directors or Executive Committee act, or in recent years have acted, as directors or senior executives. The Company's Board of Directors has determined that the Company's business relationships with those companies do not constitute material business relationships. This determination was made in accordance with the Company's related party transaction policy which was prepared based on the Swiss Code of Best Practice and the independence criteria set forth in the corporate governance rules of the New York Stock Exchange.

Note 16—Income taxes

"Provision for taxes" consisted of the following:

($ in millions)	2018	2017	2016
Current taxes	686	782	671
Deferred taxes	(142)	(199)	(145)
Tax expense from continuing operations	**544**	**583**	**526**
Tax expense from discontinued operations	**228**	**273**	**251**

Income tax expense from continuing operations is reconciled below from the Company's weighted average global tax rate (rather than from the Swiss domestic statutory tax rate) as the parent company of the ABB Group, ABB Ltd, is domiciled in Switzerland and income generated in jurisdictions outside of Switzerland (hereafter "foreign jurisdictions") which has already been subject to corporate income tax in those foreign jurisdictions is, to a large extent, tax exempt in Switzerland. There is no requirement in Switzerland for any parent company of a group to file a tax return of the consolidated group determining domestic and foreign pre tax income. As the Company's consolidated income from continuing operations is predominantly earned outside of Switzerland, corporate income tax in foreign jurisdictions largely determines the weighted average global tax rate of the Company.

On December 22, 2017, the U.S. government enacted comprehensive tax legislation commonly referred to as the Tax Cuts and Jobs Act (the Tax Act). The Tax Act makes broad and complex changes to the U.S. tax code. The SEC staff issued Staff Accounting Bulletin No. 118, which has allowed the Company to record provisional amounts in income tax expense from continuing operations in the 2017 financial statements. The estimated impact included a benefit of $30 million due to changes in tax rates, valuation allowance on foreign tax credits and undistributed earnings of subsidiaries, offset by $26 million charge for one time transition tax. The amounts were finalized in 2018 and no material change to the estimated figures was recorded.

The reconciliation of "Tax expense from continuing operations" at the weighted average tax rate to the effective tax rate is as follows:

($ in millions, except % data)	2018	2017	2016
Income from continuing operations before taxes	**2,119**	**2,102**	**1,761**
Weighted-average global tax rate	**22.2%**	**23.6%**	**19.9%**
Income taxes at weighted-average tax rate	470	497	350
Items taxed at rates other than the weighted-average tax rate	(43)	(114)	9
Changes in valuation allowance, net	41	763	(8)
Effects of changes in tax laws and (enacted) tax rates	1	(747)	42
Non-deductible expenses, excluding goodwill	86	58	79
Other, net	(11)	126	54
Tax expense from continuing operations	**544**	**583**	**526**
Effective tax rate for the year	**25.7%**	**27.7%**	**29.9%**

In 2018 and 2017, the benefit reported in "Items taxed at rates other than the weighted average tax rate" included positive impacts of $17 million and $72 million, respectively, relating to non taxable amounts for net gains from sale of businesses.

In 2018, the "Changes in valuation allowance, net" included adjustments in valuation allowance recorded in certain jurisdictions where the company updated its assessment that it was more likely than not that such deferred tax assets would be realized. The amount included an increase of $40 million relating to certain operations in Central Europe.

In 2017, the relevant tax rate applicable to one of the Company's subsidiaries increased and in connection with this change, the company benefited from an increase of $721 million in deferred tax assets relating to certain long term assets. The respective effect is reported in "Effects of changes in tax laws and (enacted) tax rates". After evaluating the recoverability of this deferred tax asset, the Company recorded a valuation allowance of $668 million as the Company determined that it was more likely than not that such deferred tax assets would not be realized. This is reported in the table above in "Changes in valuation allowance, net".

In 2016, "Changes in valuation allowance, net" included reductions in valuation allowances recorded in certain jurisdictions where the Company determined that it was more likely than not that such deferred tax assets (recognized for net operating losses and temporary differences in those jurisdictions) would be realized, as well as increases in the valuation allowance in certain other jurisdictions.

In 2018, 2017 and 2016, "Non deductible expenses" of $86 million, $58 million and $79 million, respectively, included expenses in relation to items that were deducted for financial accounting purposes, but were not tax deductible, such as interest expense, local taxes on productive activities, disallowed meals and entertainment expenses and other similar items.

In 2018, "Other, net" in the table above included a net benefit of $22 million while in 2017 and 2016, "Other, net" included net charges of $148 million and $53 million, respectively, related to the interpretation of tax law and double tax treaty agreements by competent tax authorities.

Deferred income tax assets and liabilities from continued operations consisted of the following:

	December 31,	
($ in millions)	**2018**	**2017**
Deferred tax assets:		
Unused tax losses and credits	600	521
Provisions and other accrued liabilities	769	761
Pension	476	458
Inventories	253	263
Property, plant and equipment and other non-current assets	1,039	1,146
Other	114	93
Total gross deferred tax asset	**3,251**	**3,242**
Valuation allowance	(1,535)	(1,303)
Total gross deferred tax asset, net of valuation allowance	**1,716**	**1,939**
Deferred tax liabilities:		
Property, plant and equipment	(202)	(210)
Intangibles and other assets	(770)	(724)
Pension and other liabilities	(153)	(217)
Inventories	(67)	(69)
Unremitted earnings	(445)	(557)
Total gross deferred tax liability	**(1,637)**	**(1,777)**
Net deferred tax asset (liability)	**79**	**162**
Included in:		
"Deferred taxes"—non-current assets	1,006	1,212
"Deferred taxes"—non-current liabilities	(927)	(1,050)
Net deferred tax asset (liability)	**79**	**162**

Certain entities have deferred tax assets related to net operating loss carry forwards and other items. As recognition of these assets in certain entities did not meet the more likely than not criterion, valuation allowances have been recorded and amount to $1,535 million and $1,303 million, at December 31, 2018 and 2017, respectively. "Unused tax losses and credits" at December 31, 2018 and 2017, in the table above, included $145 million and $148 million, respectively, for which the Company has established a full valuation allowance as, due to limitations

imposed by the relevant tax law, the Company determined that, more likely than not, such deferred tax assets would not be realized.

The valuation allowance at December 31, 2018, 2017 and 2016 was $1,535 million, $1,303 million and $539 million, respectively.

At December 31, 2018 and 2017, deferred tax liabilities totaling $445 million and $557 million, respectively, have been provided for primarily in respect of withholding taxes, dividend distribution taxes or additional corporate income taxes (hereafter "withholding taxes") on unremitted earnings which will be payable in foreign jurisdictions on the repatriation of earnings to Switzerland. Income which has been generated outside of Switzerland and has already been subject to corporate income tax in such foreign jurisdictions is, to a large extent, tax exempt in Switzerland. Therefore, generally no or only limited Swiss income tax has to be provided for on the repatriated earnings of foreign subsidiaries.

Certain countries levy withholding taxes on dividend distributions. Such taxes cannot always be fully reclaimed by the shareholder, although they have to be declared and withheld by the subsidiary. In 2018 and 2017, certain taxes arose in certain foreign jurisdictions for which the technical merits do not allow utilization of benefits. At both December 31, 2018 and 2017, foreign subsidiary retained earnings subject to withholding taxes upon distribution of approximately $100 million were considered as permanently reinvested, as these funds are used for financing current operations as well as business growth through working capital and capital expenditure in those countries and, consequently, no deferred tax liability was recorded.

At December 31, 2018, net operating loss carry forwards of $2,153 million and tax credits of $120 million were available to reduce future taxes of certain subsidiaries. Of these amounts, $1,413 million of loss carry forwards and $95 million of tax credits will expire in varying amounts through 2038, while the remainder will not expire. The largest amount of these carry forwards related to the Company's Europe operations.

Unrecognized tax benefits consisted of the following:

($ in millions)	Unrecognized tax benefits	Penalties and interest related to unrecognized tax benefits	Total
Classification as unrecognized tax items on January 1, 2016	**744**	**145**	**889**
Increase relating to prior year tax positions	88	74	**162**
Decrease relating to prior year tax positions	(21)	(20)	**(41)**
Increase relating to current year tax positions	167	13	**180**
Decrease due to settlements with tax authorities	(96)	(21)	**(117)**
Decrease as a result of the applicable statute of limitations	(95)	(13)	**(108)**
Exchange rate differences	(27)	(6)	**(33)**
Balance at December 31, 2016, which would, if recognized, affect the effective tax rate	**760**	**172**	**932**
Increase relating to prior year tax positions	115	103	**218**
Decrease relating to prior year tax positions	(76)	(37)	**(113)**
Increase relating to current year tax positions	223	—	**223**
Decrease due to settlements with tax authorities	(23)	(2)	**(25)**
Decrease as a result of the applicable statute of limitations	(75)	(12)	**(87)**
Exchange rate differences	101	18	**119**
Balance at December 31, 2017, which would, if recognized, affect the effective tax rate	**1,025**	**242**	**1,267**
Net change due to acquisitions and divestments	8	—	**8**
Increase relating to prior year tax positions	35	37	**72**
Decrease relating to prior year tax positions	(99)	14	**(85)**
Increase relating to current year tax positions	126	5	**131**
Decrease due to settlements with tax authorities	(44)	(17)	**(61)**
Decrease as a result of the applicable statute of limitations	(66)	(31)	**(97)**
Exchange rate differences	(24)	(11)	**(35)**
Balance at December 31, 2018, which would, if recognized, affect the effective tax rate	**961**	**239**	**1,200**

In 2018, 2017 and 2016, the “Increase relating to current year tax positions” included a total of $111 million, $193 million and $132 million, respectively, in taxes related to the interpretation of tax law and double tax treaty agreements by competent tax authorities.

At December 31, 2018, the Company expected the resolution, within the next twelve months, of unrecognized tax benefits related to pending court cases amounting to $52 million for taxes, penalties and interest. Otherwise, the Company had not identified any other significant changes which were considered reasonably possible to occur within the next twelve months.

At December 31, 2018, the earliest significant open tax years that remained subject to examination were the following:

Region	Year
Europe	2011
The Americas	2015
Asia, Middle East and Africa	2009

Note 17—Employee benefits

The Company operates defined benefit pension plans, defined contribution pension plans, and termination indemnity plans, in accordance with local regulations and practices. The Company's most significant defined benefit pension plans are in Switzerland as well as in Germany, the United Kingdom, the U.S., Sweden and Finland. These plans cover a large portion of the Company's employees and provide benefits to employees in the event of death, disability, retirement, or termination of employment. Certain of these plans are multi employer plans. The Company also operates other postretirement benefit plans including postretirement health care benefits and other employee related benefits for active employees including long service award plans. The measurement date used for the Company's employee benefit plans is December 31. The funding policies of the Company's plans are consistent with the local government and tax requirements.

The Company recognizes in its Consolidated Balance Sheets the funded status of its defined benefit pension plans, postretirement plans, and other employee related benefits measured as the difference between the fair value of the plan assets and the benefit obligation.

Unless otherwise indicated, the following tables include amounts relating to both continuing and discontinued operations.

Obligations and funded status of the plans

The change in benefit obligation, change in fair value of plan assets, and funded status recognized in the Consolidated Balance Sheets were as follows:

	Defined pension benefits				Other postretirement benefits	
	Switzerland		International		International	
($ in millions)	**2018**	**2017**	**2018**	**2017**	**2018**	**2017**
Benefit obligations at January 1,	**4,055**	**3,708**	**7,892**	**7,188**	**132**	**147**
Service cost	92	106	122	122	1	1
Interest cost	30	41	198	208	4	5
Contributions by plan participants	69	70	16	12	—	—
Benefit payments	(239)	(245)	(318)	(345)	(11)	(11)
Benefit obligations of businesses acquired (divested)	10	56	60	8	8	—
Actuarial (gain) loss	6	127	(92)	101	(12)	(11)
Plan amendments and other	(4)	23	(119)	(45)	—	(1)
Exchange rate differences	(26)	169	(330)	643	(2)	2
Benefit obligation at December 31,	**3,993**	**4,055**	**7,429**	**7,892**	**120**	**132**
Fair value of plan assets at January 1,	**4,020**	**3,682**	**6,514**	**5,811**	**—**	**—**
Actual return on plan assets	(41)	207	(184)	437	—	—
Contributions by employer	89	90	152	139	11	11
Contributions by plan participants	69	70	16	12	—	—
Benefit payments	(239)	(245)	(318)	(345)	(11)	(11)
Plan assets of businesses acquired (divested)	7	52	39	—	—	—
Plan amendments and other	—	(3)	(94)	(47)	—	—
Exchange rate differences	(26)	167	(259)	507	—	—
Fair value of plan assets at December 31,	**3,879**	**4,020**	**5,866**	**6,514**	**—**	**—**
Funded status — underfunded	**(114)**	**(35)**	**(1,563)**	**(1,378)**	**(120)**	**(132)**

The amounts recognized in "Accumulated other comprehensive loss" and "Noncontrolling interests" were:

	December 31,					
	2018	2017	2016	2018	2017	2016
($ in millions)	Defined pension benefits			Other postretirement benefits		
Net actuarial (loss) gain	(2,628)	(2,321)	(2,237)	30	20	10
Prior service credit	74	99	108	23	27	31
Amount recognized in OCI[1] and NCI[2]	**(2,554)**	**(2,222)**	**(2,129)**	**53**	**47**	**41**
Taxes associated with amount recognized in OCI and NCI	535	503	487	—	—	—
Amount recognized in OCI and NCI, net of tax[3]	**(2,019)**	**(1,719)**	**(1,642)**	**53**	**47**	**41**

(1) OCI represents “Accumulated other comprehensive loss”.

(2) NCI represents “Noncontrolling interests”.

(3) NCI, net of tax, amounted to $(1) million, $0 million, and $0 million at December 31, 2018, 2017 and 2016.

In addition, the following amounts were recognized in the Company's Consolidated Balance Sheets:

	December 31,					
	2018	2017	2018	2017	2018	2017
	Defined pension benefits				Other postretirement benefits	
($ in millions)	Switzerland		International		International	
Overfunded plans	24	60	59	62	—	—
Underfunded plans — current	—	—	(19)	(18)	(11)	(12)
Underfunded plans — non-current	(138)	(95)	(1,603)	(1,422)	(109)	(120)
Funded status - underfunded	**(114)**	**(35)**	**(1,563)**	**(1,378)**	**(120)**	**(132)**
Amounts reported as assets and liabilities held for sale	*(93)*	*(133)*	*(120)*	*(106)*	—	—

	December 31,	
($ in millions)	2018	2017
Non-current assets		
Overfunded pension plans	83	122
Other employee-related benefits	1	22
Pension and other employee benefits	**84**	**144**
Amounts reported as Non-current assets held for sale	*1*	*1*

($ in millions)	December 31, 2018	2017
Current liabilities		
Underfunded pension plans	(19)	(18)
Underfunded other postretirement benefit plans	(11)	(12)
Other employee-related benefits	(10)	(17)
Pension and other employee benefits	**(40)**	**(47)**
Amounts reported as Current liabilities held for sale	*(4)*	*(7)*

($ in millions)	December 31, 2018	2017
Non-current liabilities		
Underfunded pension plans	(1,741)	(1,517)
Underfunded other postretirement benefit plans	(109)	(120)
Other employee-related benefits	(246)	(245)
Pension and other employee benefits	**(2,096)**	**(1,882)**
Amounts reported as Non-current liabilities held for sale	*(266)*	*(291)*

The accumulated benefit obligation (ABO) for all defined benefit pension plans was $11,249 million and $11,683 million at December 31, 2018 and 2017, respectively. The projected benefit obligation (PBO), ABO and fair value of plan assets, for pension plans with a PBO in excess of fair value of plan assets or ABO in excess of fair value of plan assets, was:

	PBO exceeds fair value of plan assets				ABO exceeds fair value of plan assets			
($ in millions)	Switzerland		International		Switzerland		International	
December 31,	**2018**	**2017**	**2018**	**2017**	**2018**	**2017**	**2018**	**2017**
PBO	3,482	3,557	6,897	7,477	3,482	3,557	6,872	5,864
ABO	3,482	3,557	6,743	7,235	3,482	3,557	6,724	5,725
Fair value of plan assets	3,344	3,461	5,275	6,038	3,344	3,461	5,254	4,453

All of the Company's other postretirement benefit plans are unfunded.

Components of net periodic benefit cost

Net periodic benefit cost consisted of the following:

	Defined pension benefits						Other postretirement benefits		
	Switzerland			International			International		
($ in millions)	2018	2017	2016	2018	2017	2016	2018	2017	2016
Operational pension cost:									
Service cost	92	106	133	122	122	116	1	1	1
Operational pension cost	**92**	**106**	**133**	**122**	**122**	**116**	**1**	**1**	**1**
Non-operational pension cost (credit):									
Interest cost	30	41	46	198	208	234	4	5	6
Expected return on plan assets	(117)	(112)	(130)	(305)	(295)	(272)	—	—	—
Amortization of prior service cost (credit)	(15)	10	36	1	1	4	(5)	(5)	(12)
Amortization of net actuarial loss	—	—	—	92	91	85	(1)	(1)	—
Curtailments, settlements and special termination benefits	—	—	—	23	16	41	—	(1)	—
Non-operational pension cost (credit)	**(102)**	**(61)**	**(48)**	**9**	**21**	**92**	**(2)**	**(2)**	**(6)**
Net periodic benefit cost	**(10)**	**45**	**85**	**131**	**143**	**208**	**(1)**	**(1)**	**(5)**

The components of net periodic benefit cost other than the service cost component are included in the line “Non-operational pension (cost) credit” in the income statement. Net periodic benefit cost includes $45 million, $55 million and $67 million in 2018, 2017 and 2016, respectively, related to discontinued operations.

Assumptions

The following weighted-average assumptions were used to determine benefit obligations:

	December 31,					
	2018	2017	2018	2017	2018	2017
	Defined pension benefits				Other postretirement benefits	
(in %)	Switzerland		International		International	
Discount rate	0.8	0.8	2.8	2.6	3.9	3.2
Rate of compensation increase	—	—	2.4	2.5	0.2	—
Rate of pension increase	—	—	1.4	1.5	—	—
Cash balance interest credit rate	1.0	1.0	1.6	1.7	—	—

For the Company's significant benefit plans, the discount rate used at each measurement date is set based on a high-quality corporate bond yield curve – derived based on bond universe information sourced from reputable third-party index and data providers and rating agencies – reflecting the timing, amount and currency of the future expected benefit payments for the respective plan. Consistent discount rates are used across all plans in each currency zone, based on the duration of the applicable plan(s) in that zone. For plans in the other countries, the discount rate is based on high quality corporate or government bond yields applicable in the respective currency, as appropriate at each measurement date with a duration broadly consistent with the respective plan's obligations.

At the end of 2018, the Company changed the approach used to calculate the service and interest components of net periodic benefit cost for its significant benefit plans to provide a more precise measurement of service and interest costs. This change compared to the previous approach is expected to result in a net decrease in the service and interest components for benefit cost in 2019. The Company calculates the service and interest cost components utilizing a single weighted-average discount rate derived from the yield curve used to measure the benefit obligation at the beginning of the period. Going forward, the Company has elected to utilize an approach that discounts the individual expected cash flows using the applicable spot rates derived from the yield curve over the projected cash flow period. This change does not affect the measurement of our total benefit obligations. The Company has accounted for this change as a change in accounting estimate and, accordingly, has accounted for it prospectively.

The following weighted average assumptions were used to determine the "Net periodic benefit cost":

	Defined pension benefits						Other postretirement benefits		
	Switzerland			International			International		
(in %)	2018	2017	2016	2018	2017	2016	2018	2017	2016
Discount rate	0.8	1.1	1.2	2.6	2.9	3.4	3.2	3.3	3.6
Expected long-term rate of return on plan assets	3.0	3.0	3.5	4.9	5.0	4.8	—	—	—
Rate of compensation increase	—	—	—	2.5	2.5	2.4	—	—	—
Cash balance interest credit rate	1.0	1.0	1.3	1.7	1.7	1.6	—	—	—

The "Expected long term rate of return on plan assets" is derived for each benefit plan by considering the expected future long term return assumption for each individual asset class. A single long term return assumption is then derived for each plan based upon the plan's target asset allocation.

The Company maintains other postretirement benefit plans, which are generally contributory with participants' contributions adjusted annually. The assumptions used were:

	December 31,	
	2018	**2017**
Health care cost trend rate assumed for next year	6.7%	7.1%
Rate to which the trend rate is assumed to decline (the ultimate trend rate)	5.0%	5.0%
Year that the rate reaches the ultimate trend rate	2028	2028

Plan assets

The Company has pension plans in various countries with the majority of the Company's pension liabilities deriving from a limited number of these countries.

The pension plans are typically funded by regular contributions from employees and the Company. These plans are typically administered by boards of trustees (which include Company representatives) whose primary responsibilities include ensuring that the plans meet their liabilities through contributions and investment returns. The boards of trustees have the responsibility for making key investment strategy decisions within a risk controlled framework.

The pension plan assets are invested in diversified portfolios that are managed by third party asset managers, in accordance with local statutory regulations, pension plan rules and the respective plans' investment guidelines, as approved by the boards of trustees.

Plan assets are generally segregated from those of the Company and invested with the aim of meeting the respective plans' projected future pension liabilities. Plan assets are measured at fair value at the balance sheet date.

The boards of trustees manage the assets of the pension plans in a risk controlled manner and assess the risks embedded in the pension plans through asset/liability management studies. Asset/liability management studies typically take place every three years. However, the risks of the plans are monitored on an ongoing basis.

The board of trustees' investment goal is to maximize the long term returns of plan assets within specified risk parameters, while considering the future liabilities and liquidity needs of the individual plans. Risk measures taken into account include the funding ratio of the plan, the likelihood of extraordinary cash contributions being required, the risk embedded in each individual asset class, and the plan asset portfolio as a whole.

The Company's global pension asset allocation is the result of the asset allocations of the individual plans, which are set by the respective boards of trustees. The target asset allocation of the Company's plans on a weighted average basis is as follows:

	Target	
(in %)	**Switzerland**	**International**
Asset class		
Equity	19	22
Fixed income	54	61
Real estate	22	7
Other	5	10
	100	**100**

The actual asset allocations of the plans are in line with the target asset allocations.

Equity securities primarily includes investments in large cap and mid cap publicly traded companies. Fixed income assets primarily include corporate bonds of companies from diverse industries and government bonds. Both fixed income and equity assets are invested either via funds or directly in segregated investment mandates, and include an allocation to emerging markets. Real estate consists primarily of investments in real estate in Switzerland held in the Swiss plans. The "Other" asset class includes investments in private equity, hedge funds, commodities, and cash and reflects a variety of investment strategies.

Based on the above global asset allocation and the fair values of the plan assets, the expected long term return on assets at December 31, 2018, is 4.1 percent. The Company and the local boards of trustees regularly review the investment performance of the asset classes and individual asset managers. Due to the diversified nature of the investments, the Company is of the opinion that no significant concentration of risks exists in its pension fund assets.

At December 31, 2018 and 2017, plan assets include ABB Ltd's shares (as well as an insignificant amount of the Company's debt instruments) with a total value of $8 million and $11 million, respectively.

The fair values of the Company's pension plan assets by asset class are presented below. For further information on the fair value hierarchy and an overview of the Company's valuation techniques applied, see the "Fair value measures" section of Note 2.

	December 31, 2018			
($ in millions)	**Level 1**	**Level 2**	**Not subject to leveling[1]**	**Total fair value**
Asset class				
Equity				
Equity securities	209	—	—	**209**
Mutual funds/commingled funds	—	1,433	39	**1,472**
Emerging market mutual funds/commingled funds	—	363	—	**363**
Fixed income				
Government and corporate securities	524	997	—	**1,521**
Government and corporate—mutual funds/commingled funds	—	3,496	—	**3,496**
Emerging market bonds—mutual funds/commingled funds	—	729	—	**729**
Real estate	—	—	1,381	**1,381**
Insurance contracts	—	121	—	**121**
Cash and short-term investments	202	86	—	**288**
Private equity	—	—	139	**139**
Hedge funds	—	—	2	**2**
Commodities	—	24	—	**24**
Total	**935**	**7,249**	**1,561**	**9,745**

	December 31, 2017			
($ in millions)	Level 1	Level 2	Not subject to leveling[1]	Total fair value
Asset class				
Equity				
Equity securities	274	—	—	**274**
Mutual funds/commingled funds	—	1,726	46	**1,772**
Emerging market mutual funds/commingled funds	—	507	—	**507**
Fixed income				
Government and corporate securities	564	1,092	—	**1,656**
Government and corporate—mutual funds/commingled funds	—	3,622	—	**3,622**
Emerging market bonds—mutual funds/commingled funds	—	708	—	**708**
Real estate	—	9	1,355	**1,364**
Insurance contracts	—	113	—	**113**
Cash and short-term investments	162	140	—	**302**
Private equity	—	—	128	**128**
Hedge funds	—	—	15	**15**
Commodities	—	73	—	**73**
Total	**1,000**	**7,990**	**1,544**	**10,534**

(1) Amounts relate to assets measured using the NAV practical expedient which are not subject to leveling.

The Company applies accounting guidance related to the presentation of certain investments using the net asset value (NAV) practical expedient. This accounting guidance exempts investments using this practical expedient from categorization within the fair value hierarchy.

Contributions

Employer contributions were as follows:

	Defined pension benefits				Other postretirement benefits	
	Switzerland		International		International	
($ in millions)	2018	2017	2018	2017	2018	2017
Total contributions to defined benefit pension						
and other postretirement benefit plans	89	90	152	139	11	11
Of which, discretionary contributions to						
defined benefit pension plans	—	—	25	15	—	—

In 2018, 2017 and 2016, total contributions included non cash contributions totaling $31 million, $31 million and $52 million, respectively, of available for sale debt securities to certain of the Company's pension plans.

The Company expects to contribute approximately $202 million, including $8 million in discretionary contributions, to its defined benefit pension plans in 2019. Of these discretionary contributions $6 million are expected to be non cash contributions. The Company expects to contribute approximately $11 million to its other postretirement benefit plans in 2019.

The Company also contributes to a number of defined contribution plans. The aggregate expense for these plans was $245 million, $233 million and $210 million in 2018, 2017 and 2016, respectively. Contributions to multi employer plans were not significant in 2018, 2017 and 2016. Defined contribution expense includes $59 million, $61 million and $58 million in 2018, 2017 and 2016, respectively, related to discontinued operations.

Estimated future benefit payments

The expected future cash flows to be paid by the Company's plans in respect of pension and other postretirement benefit plans at December 31, 2018, are as follows:

	Defined pension benefits		Other postretirement benefits
($ in millions)	**Switzerland**	**International**	**International**
2019	357	338	11
2020	271	348	11
2021	233	345	11
2022	228	350	10
2023	213	350	10
Years 2024 - 2028	941	1,840	42

Note 18—Share based payment arrangements

The Company has three principal share based payment plans, as more fully described in the respective sections below. Compensation cost for equity settled awards is recorded in "Total cost of sales" and in "Selling, general and administrative expenses" and totaled $50 million, $49 million and $45 million in 2018, 2017 and 2016, respectively. Compensation cost for cash settled awards is recorded in "Selling, general and administrative expenses" and is disclosed in the "WARs", "LTIP" and "Other share based payments" sections of this note. The total tax benefit recognized in 2018, 2017 and 2016 was not significant.

At December 31, 2018, the Company had the ability to issue up to 94 million new shares out of contingent capital in connection with share based payment arrangements. In addition, 36 million shares held by the Company as treasury stock at December 31, 2018, could be used to settle share based payment arrangements.

As the primary trading market for the shares of ABB Ltd is the SIX Swiss Exchange (on which the shares are traded in Swiss francs) and substantially all the share based payment arrangements with employees are based on the Swiss franc share or have strike prices set in Swiss francs, certain data disclosed below related to the instruments granted under share based payment arrangements are presented in Swiss francs.

MIP

Under the MIP, the Company offers options and cash settled WARs to key employees for no consideration.

The options granted under the MIP allow participants to purchase shares of ABB Ltd at predetermined prices. Participants may sell the options rather than exercise the right to purchase shares. Equivalent warrants are listed by a third party bank on the SIX Swiss Exchange, which facilitates pricing and transferability of options granted under this plan. The options entitle the holder to request that the third party bank purchase such options at the market price of equivalent listed warrants related to that MIP launch. If the participant elects to sell the options, the options will thereafter be held by a third party and, consequently, the Company's obligation to deliver shares will be toward this third party.

Each WAR gives the participant the right to receive, in cash, the market price of an equivalent listed warrant on the date of exercise of the WAR. Participants may exercise or sell options and exercise WARs after the vesting period, which is three years from the date of grant. All options and WARs expire six years from the date of grant.

Options

The fair value of each option is estimated on the date of grant using a lattice model that uses the assumptions noted in the table below. Expected volatilities are based on implied volatilities from equivalent listed warrants on ABB Ltd shares. The expected term of the options granted is the contractual six year life of each option, based on the fact that after the vesting period, a participant can elect to sell the option rather than exercise the right to purchase shares, thereby also realizing the time value of the options. The risk free rate is based on a six year Swiss franc interest rate, reflecting the six year contractual life of the options. In estimating forfeitures, the Company has used the data from previous comparable MIP launches.

	2018	2017	2016
Expected volatility	17%	19%	19%
Dividend yield	3.1%	4.7%	4.9%
Expected term	6 years	6 years	6 years
Risk-free interest rate	-0.1%	-0.1%	-0.5%

Presented below is a summary of the activity related to options under the MIP:

	Number of options (in millions)	Number of shares (in millions)[1]	Weighted-average exercise price (in Swiss francs)[2]	Weighted-average remaining contractual term (in years)	Aggregate intrinsic value (in millions of Swiss francs)(3)
Outstanding at January 1, 2018	**390.6**	**78.1**	**21.06**		
Granted	71.3	14.3	23.50		
Exercised[4]	(10.3)	(2.1)	16.66		
Forfeited	(6.7)	(1.3)	21.86		
Outstanding at December 31, 2018	**444.9**	**89.0**	**21.54**	**3.0**	**—**
Vested and expected to vest at December 31, 2018	**439.4**	**87.9**	**21.52**	**3.0**	**—**
Exercisable at December 31, 2018	**250.5**	**50.1**	**20.76**	**1.7**	**—**

(1) Information presented reflects the number of ABB Ltd shares that can be received upon exercise, as options have a conversion ratio of 5:1.

(2) Information presented reflects the exercise price per ABB Ltd share.

(3) Options outstanding at December 31, 2018, did not have any intrinsic value as the closing price, in Swiss francs, of ABB Ltd shares on the SIX Swiss Exchange was below the various exercise prices per share.

(4) The cash received upon exercise amounted to approximately $35 million. The shares were delivered out of treasury stock.

At December 31, 2018, there was $50 million of total unrecognized compensation cost related to non vested options granted under the MIP. That cost is expected to be recognized over a weighted average period of 2.1 years. The weighted average grant date fair value (per option) of options granted during 2018, 2017 and 2016 was 0.46 Swiss francs, 0.47 Swiss francs and 0.47 Swiss francs, respectively. In 2018, 2017 and 2016 the aggregate intrinsic value (on the date of exercise) of options exercised was $13 million, $38 million and $27 million, respectively.

Presented below is a summary, by launch, related to options outstanding at December 31, 2018:

Exercise price (in Swiss francs)[1]	Number of options (in millions)	Number of shares (in millions)[2]	Weighted-average remaining contractual term (in years)
21.50	81.0	16.2	0.4
21.00	72.3	14.5	1.7
19.50	78.1	15.6	2.6
21.50	74.2	14.8	3.7
22.50	68.7	13.7	4.6
23.50	70.7	14.1	5.7
Total number of options and shares	**444.9**	**89.0**	**3.0**

(1) Information presented reflects the exercise price per share of ABB Ltd.

(2) Information presented reflects the number of shares of ABB Ltd that can be received upon exercise.

WARs

As each WAR gives the holder the right to receive cash equal to the market price of the equivalent listed warrant on date of exercise, the Company records a liability based upon the fair value of outstanding WARs at each period end, accreted on a straight line basis over the three year vesting period. In “Selling, general and administrative expenses”, the Company recorded an income of $14 million and an expense of $19 million in 2018 and 2017, respectively, as a result of changes in both the fair value and vested portion of the outstanding WARs. The amount recorded in 2016 was not significant. To hedge its exposure to fluctuations in the fair value of outstanding WARs, the Company purchased cash settled call options, which entitle the Company to receive amounts equivalent to its obligations under the outstanding WARs. The cash settled call options are recorded as derivatives measured at fair value (see Note 6), with subsequent changes in fair value recorded in earnings to the extent that they offset the change in fair value of the liability for the WARs. In 2018 and 2017, the Company recorded an expense of $18 million and an income of $15 million in “Selling, general and administrative expenses” related to the cash settled call options. The amount recorded in 2016 was not significant.

The aggregate fair value of outstanding WARs was $6 million and $42 million at December 31, 2018 and 2017, respectively. The fair value of WARs was determined based upon the trading price of equivalent warrants listed on the SIX Swiss Exchange.

Presented below is a summary of the activity related to WARs:

	Number of WARs (in millions)
Outstanding at January 1, 2018	**37.1**
Granted	10.9
Exercised	(6.3)
Forfeited	(0.5)
Outstanding at December 31, 2018	**41.2**
Exercisable at December 31, 2018	**14.4**

The aggregate fair value at date of grant of WARs granted in 2018, 2017 and 2016 was not significant. In 2018, 2017 and 2016, share based liabilities of $6 million, $10 million and $7 million, respectively, were paid upon exercise of WARs by participants.

ESAP

The employee share acquisition plan (ESAP) is an employee stock option plan with a savings feature. Employees save over a twelve month period, by way of regular payroll deductions. At the end of the savings period, employees choose whether to exercise their stock options using their savings plus interest, if any, to buy ABB Ltd shares (American Depositary Shares (ADS) in the case of employees in the United States and Canada—each ADS representing one registered share of the Company) at the exercise price set at the grant date, or have their savings returned with any interest. The savings are accumulated in bank accounts held by a third party trustee on behalf of the participants and earn interest, where applicable. Employees can withdraw from the ESAP at any time during the savings period and will be entitled to a refund of their accumulated savings.

The fair value of each option is estimated on the date of grant using the same option valuation model as described under the MIP, using the assumptions noted in the table below. The expected term of the option granted has been determined to be the contractual one year life of each option, at the end of which the options vest and the participants are required to decide whether to exercise their options or have their savings returned with interest. The risk free rate is based on one year Swiss franc interest rates, reflecting the one year contractual life of the options. In estimating forfeitures, the Company has used the data from previous ESAP launches.

	2018	2017	2016
Expected volatility	19%	17%	20%
Dividend yield	4.1%	3.1%	3.7%
Expected term	1 year	1 year	1 year
Risk-free interest rate	-0.6%	-0.6%	-0.7%

Presented below is a summary of activity under the ESAP:

	Number of shares (in millions)[1]	Weighted-average exercise price (in Swiss francs)[2]	Weighted-average remaining contractual term (in years)	Aggregate intrinsic value (in millions of Swiss francs)[2][3]
Outstanding at January 1, 2018	**2.9**	**26.26**		
Granted	3.6	20.38		
Forfeited	(0.2)	26.01		
Not exercised (savings returned plus interest)	(2.7)	26.26		
Outstanding at December 31, 2018	**3.6**	**20.38**	**0.8**	—
Vested and expected to vest at December 31, 2018	**3.4**	**20.38**	**0.8**	—
Exercisable at December 31, 2018	—	—	—	—

(1) Includes shares represented by ADS.

(2) Information presented for ADS is based on equivalent Swiss franc denominated awards.

(3) Options outstanding at December 31, 2018, did not have any intrinsic value as the closing price, in Swiss francs, of ABB Ltd shares on the SIX Swiss Exchange was below the exercise price per share.

The exercise prices per ABB Ltd share and per ADS of 20.38 Swiss francs and $20.37, respectively, for the 2018 grant, 26.26 Swiss francs and $26.24, respectively, for the 2017 grant, and 20.12 Swiss francs and $20.52, respectively, for the 2016 grant were determined using the closing price of the ABB Ltd share on the SIX Swiss Exchange and ADS on the New York Stock Exchange on the respective grant dates.

At December 31, 2018, the total unrecognized compensation cost related to non vested options granted under the ESAP was not significant. The weighted average grant date fair value (per option) of options granted during 2018, 2017 and 2016 was 1.10 Swiss francs, 1.37 Swiss francs and 1.24 Swiss francs, respectively. The total intrinsic value (on the date of exercise) of options exercised in 2017 was $17 million, while in 2018 and 2016 it was not significant.

LTIP

The Company has a long term incentive plan (LTIP) for members of its Executive Committee and selected other senior executives (Eligible Participants), as defined in the terms of the LTIP. The LTIP involves annual conditional grants of the Company's stock to such Eligible Participants that are subject to certain conditions. The ultimate amount delivered under the LTIP is based on achieving certain results against targets, as set out below, over a three-year period from grant and the final amount is delivered to Eligible Participants at the end of this period.

The 2018 LTIP launch is composed of a performance component, based on the Company's earnings per share performance, and a market component, based on the Company's relative total shareholder return. The 2017 LTIP launch is composed of two performance components: (i) a component which is based on the average percentage achievement of income from continuing operations, net of tax, versus budget and (ii) a component which is based on the Company's earnings per share performance. The 2016 LTIP launch is composed of two performance components: (i) a component which is based on the achievement of a net income threshold and (ii) a component which is based on the Company's earnings per share performance.

For the relative total shareholder return component of the 2018 LTIP launch, the actual number of shares that will be delivered at a future date is based on the Company's total shareholder return performance relative to a peer group of companies over a three-year period starting with the year of grant. The actual number of shares that will ultimately be delivered will vary depending on the relative total shareholder return outcome achieved between a lower threshold (no shares delivered) and an upper threshold (the number of shares delivered is capped at 200 percent of the conditional grant). For the average percentage achievement of income versus budget component of the 2017 LTIP launch, the actual number of shares that will be delivered at a future date is dependent on the average percentage (of each year in a three-year period starting with the year of grant) of the Company's income from continuing operations, net of tax, divided by the Company's budgeted income from operations, net of tax. The actual number of shares that will ultimately be delivered will vary depending on the average percentage that is achieved between a lower threshold (no shares delivered) and an upper threshold (the number of shares delivered is capped at 150 percent of the conditional grant). For shares to be delivered under the threshold net income component of the 2016 LTIP launch, the Company's net income has to reach a certain level in 2018 as set by the Board of Directors at the launch of the LTIP. No shares will be delivered if this threshold is not achieved and 100 percent of the conditional grant will be delivered if this threshold is equaled or exceeded.

For the earnings per share performance component of the 2018 LTIP launch, the actual number of shares that will be delivered at a future date is based on the Company's average earnings per share over three financial years, beginning with the year of launch. For the earnings per share performance component of the 2017 and 2016 LTIP launches, the actual number of shares that will be delivered at a future date is dependent on the Company's weighted cumulative earnings per share performance over three financial years, beginning with the year of launch. The cumulative earnings per share performance is weighted as follows: 33 percent of the first year's result, 67 percent of the second year's result and 100 percent of the third year's result. Under all LTIP launches, the actual number of shares that will ultimately be delivered will vary depending on the earnings per share outcome as computed under each LTIP launch, interpolated between a lower threshold (no shares delivered) and an upper threshold (the number of shares delivered is capped at 200 percent of the conditional grant).

Under each component of the 2018 LTIP, an Eligible Participant receives 65 percent of the shares that have vested in the form of shares and 35 percent of the value of the shares that have vested in cash, with the possibility to elect to also receive the 35 percent portion in shares rather than in cash. Under each component of the 2017 and 2016 LTIP launches, an Eligible Participant receives 70 percent of the shares that have vested in the form of shares and 30 percent of the value of the shares that have vested in cash, with the possibility to elect to also receive the 30 percent portion in shares rather than in cash.

In addition, for certain awards to vest, the Eligible Participant has to fulfill a three-year service condition as defined in the terms and conditions of the LTIP.

Presented below is a summary of activity under the LTIP:

	Number of Shares Conditionally Granted (in millions)	Weighted-average grant-date fair value per share (Swiss francs)
Nonvested at January 1, 2018	**1.4**	**21.47**
Granted	0.8	21.97
Vested	(0.7)	21.78
Forfeited	(0.2)	21.50
Nonvested at December 31, 2018	**1.3**	**21.61**

Equity settled awards are recorded in the "Additional paid in capital" component of stockholders' equity, with compensation cost recorded in "Selling, general and administrative expenses" over the vesting period (which is from grant date to the end of the vesting period) based on the grant date fair value of the shares. Cash settled awards are recorded as a liability, remeasured at fair value at each reporting date for the percentage vested, with changes in the liability recorded in "Selling, general and administrative expenses".

At December 31, 2018, total unrecognized compensation cost related to equity settled awards under the LTIP was not significant. The compensation cost recorded in 2018, 2017 and 2016 for cash settled awards was not significant.

The aggregate fair value, at the dates of grant, of shares granted in 2018, 2017 and 2016 was $19 million, $22 million and $22 million, respectively. The total grant date fair value of shares that vested during 2018, 2017 and 2016 was $17 million, $22 million and $15 million, respectively. The weighted average grant date fair value (per share) of shares granted during 2018, 2017 and 2016 was 21.97 Swiss francs, 22.13 Swiss francs and 20.77 Swiss francs, respectively.

For the relative total shareholder return component of the 2018 LTIP launch, the fair value of granted shares at grant date, for equity settled awards, and at each reporting date, for cash settled awards, is determined using a Monte Carlo simulation model. The main inputs to this model are the Company's share price and dividend yield, the volatility of the Company's and the peer group's share price as well as the correlation between the peer companies. For the average percentage achievement of income versus budget component of the 2017 LTIP launch the fair value of granted shares is based on the market price of the ABB Ltd share at grant date for equity settled awards and at each reporting date for cash settled awards, as well as the probable outcome of the average percentage achievement of income versus budget that would result in the vesting of the highest number of shares, as computed using a Monte Carlo simulation model. The main inputs to this model are the Company's and external financial analysts' revenue growth rates and Operational EBITA margin expectations. For the net income threshold component of the 2016 LTIP launch, the fair value of the granted shares is based on the probability of reaching the threshold as well as on the market price of the ABB Ltd share at grant date for equity settled awards and at each reporting date for cash settled awards. For the earnings per share component of the LTIP launches, the fair value of granted shares is based on the market price of the ABB Ltd share at grant date for equity settled awards and at each reporting date for cash settled awards, as well as the probable outcome of the earnings per share achievement that would result in the vesting of the highest number of shares, as computed using a Monte Carlo simulation model. The main inputs to this model are the Company's and external financial analysts' revenue growth rates and Operational EBITA margin expectations.

Other share based payments

The Company has other minor share based payment arrangements with certain employees. The compensation cost related to these arrangements in 2018, 2017 and 2016 was not significant.

Note 19—Stockholders' equity

At both December 31, 2018 and 2017, the Company had 2,672 million authorized shares, of which 2,168 million were registered and issued.

At the Annual General Meeting of Shareholders (AGM) in March 2018, shareholders approved the proposal of the Board of Directors to distribute a total of 0.78 Swiss francs per share. The approved dividend distribution amounted to $1,736 million and was paid in April 2018. At the AGM in April 2017, shareholders approved the proposal of the Board of Directors to distribute a total of 0.76 Swiss francs per share. The approved dividend distribution amounted to $1,622 million and was paid in April 2017. At the AGM in April 2016, shareholders approved the proposal of the Board of Directors to distribute a total of 0.74 Swiss francs per share to shareholders by way of a nominal value reduction (reduction in the par value of each share) from 0.86 Swiss francs to 0.12 Swiss francs. In July 2016, the nominal value reduction was registered in the commercial register of the canton of Zurich, Switzerland, and was paid. The Company recorded a reduction in Capital stock and an increase in Additional paid in capital of $1,239 million and $15 million, respectively, and a reduction in Retained earnings of $402 million in relation to the nominal value reduction.

Between September 2014 and September 2016, the Company executed a share buyback program for the purchase of up to $4 billion of its own shares and on September 30, 2016, announced that it had completed this program. Over the period of the share buyback, the Company purchased a total of 146.6 million shares (for approximately $3 billion) for cancellation and 24.7 million shares (for approximately $0.5 billion) to support its employee share programs. The shares acquired for cancellation were purchased through a separate trading line on the SIX Swiss Exchange (on which only the Company could purchase shares), while shares acquired for delivery under employee share programs were acquired through the ordinary trading line. In 2016, under the announced share buyback program, the Company purchased 60.4 million shares for cancellation and 4.9 million shares to support its employee share programs. These transactions resulted in an increase in Treasury stock of $1,280 million.

In the first quarter of 2018, the Company purchased on the open market an aggregate of 10 million of its own shares to be available for delivery under its employee share programs. These transactions resulted in an increase in Treasury stock of $249 million. In the second quarter of 2017, the Company purchased on the open market an aggregate of 10 million of its own shares to be available for delivery under its employee share programs. These transactions resulted in an increase in Treasury stock of $251 million.

At the AGM in April 2017, shareholders approved the proposal of the Board of Directors to reduce the share capital of the Company by cancelling 46,595,000 treasury shares which were acquired under the $4 billion share buyback program. This cancellation was completed in July 2017, resulting in a decrease in Treasury stock of $953 million and a corresponding combined decrease in Capital stock, Additional paid in capital and Retained earnings. At the AGM in April 2016, shareholders approved the proposal of the Board of Directors to reduce the share capital of the Company by cancelling 100,000,000 treasury shares which were acquired under the $4 billion share buyback program. This cancellation was completed in July 2016, resulting in a decrease in Treasury stock of $2,047 million and a corresponding combined decrease in Capital stock, Additional paid in capital and Retained earnings.

Upon and in connection with each launch of the Company's MIP, the Company sold call options to a bank at fair value, giving the bank the right to acquire shares equivalent to the number of shares represented by the MIP WAR awards to participants. Under the terms of the agreement with the bank, the call options can only be exercised by the bank to the extent that MIP participants have exercised their WARs. At December 31, 2018, such call options representing 13.3 million shares and with strike prices ranging from 19.50 to 23.50 Swiss francs (weighted average strike price of 21.57 Swiss francs) were held by the bank. The call options expire in periods ranging from May 2019 to August 2024. However, only 5.1 million of these instruments, with strike prices ranging from 19.50 to 22.50 Swiss francs (weighted average strike price of 21.12 Swiss francs), could be exercised at December 31, 2018, under the terms of the agreement with the bank.

In addition to the above, at December 31, 2018, the Company had further outstanding obligations to deliver:

- up to 16.2 million shares relating to the options granted under the 2013 launch of the MIP, with a strike price of 21.50 Swiss francs, vested in May 2016 and expiring in May 2019,

- up to 14.5 million shares relating to the options granted under the 2014 launch of the MIP, with a strike price of 21.00 Swiss francs, vested in August 2017 and expiring in August 2020,

- up to 15.6 million shares relating to the options granted under the 2015 launch of the MIP, with a strike price of 19.50 Swiss francs, vested in August 2018 and expiring in August 2021,

- up to 14.8 million shares relating to the options granted under the 2016 launch of the MIP, with a strike price of 21.50 Swiss francs, vesting in August 2019 and expiring in August 2022,

- up to 13.7 million shares relating to the options granted under the 2017 launch of the MIP, with a strike price of 22.50 Swiss francs, vesting in August 2020 and expiring in August 2023,

- up to 14.1 million shares relating to the options granted under the 2018 launch of the MIP, with a strike price of 23.50 Swiss francs, vesting in August 2021 and expiring in August 2024,

- up to 3.6 million shares relating to the ESAP, vesting and expiring in October 2019,

- up to 4.5 million shares to Eligible Participants under the 2018, 2017 and 2016 launches of the LTIP, vesting and expiring in April 2021, June 2020 and June 2019, respectively, and

- less than 1 million shares in connection with certain other share based payment arrangements with employees.

See Note 18 for a description of the above share based payment arrangements.

In 2018, 2017 and 2016, the Company delivered 2.4 million, 6.3 million and 8.9 million shares, respectively, out of treasury stock, for options exercised in relation to the MIP. In addition, in 2017 and 2016 the Company delivered 2.8 million and 2.6 million shares from treasury stock under the ESAP. No shares were delivered in 2018 under the ESAP.

Amounts available to be distributed as dividends to the stockholders of ABB Ltd are based on the requirements of Swiss law and ABB Ltd's Articles of Incorporation, and are determined based on amounts presented in the unconsolidated financial statements of ABB Ltd, prepared in accordance with Swiss law. At December 31, 2018, the total unconsolidated stockholders' equity of ABB Ltd was 8,511 million Swiss francs ($8,652 million), including 260 million Swiss francs ($264 million) representing share capital, 9,045 million Swiss francs ($9,195 million) representing reserves and 794 million Swiss francs ($807 million) representing a reduction of equity for own shares (treasury stock). Of the reserves, 794 million Swiss francs ($807 million) relating to own shares and 52 million Swiss francs ($53 million) representing 20 percent of share capital, are restricted and not available for distribution.

In February 2019, the Company announced that a proposal will be put to the 2019 AGM for approval by the shareholders to distribute 0.80 Swiss francs per share to shareholders.

Note 20—Earnings per share

Basic earnings per share is calculated by dividing income by the weighted average number of shares outstanding during the year. Diluted earnings per share is calculated by dividing income by the weighted average number of shares outstanding during the year, assuming that all potentially dilutive securities were exercised, if dilutive. Potentially dilutive securities comprise outstanding written call options and outstanding options and shares granted subject to certain conditions under the Company's share based payment arrangements. In 2018, 2017 and 2016, outstanding securities representing a maximum of 88 million, 31 million and 87 million shares, respectively, were excluded from the calculation of diluted earnings per share as their inclusion would have been antidilutive.

Basic earnings per share:

($ in millions, except per share data in $)	2018	2017	2016
Amounts attributable to ABB shareholders:			
Income from continuing operations, net of tax	1,514	1,441	1,172
Income from discontinued operations, net of tax	659	772	727
Net income	**2,173**	**2,213**	**1,899**
Weighted-average number of shares outstanding (in millions)	**2,132**	**2,138**	**2,151**
Basic earnings per share attributable to ABB shareholders:			
Income from continuing operations, net of tax	0.71	0.67	0.54
Income from discontinued operations, net of tax	0.31	0.36	0.34
Net income	**1.02**	**1.04**	**0.88**

Diluted earnings per share:

($ in millions, except per share data in $)	2018	2017	2016
Amounts attributable to ABB shareholders:			
Income from continuing operations, net of tax	1,514	1,441	1,172
Income from discontinued operations, net of tax	659	772	727
Net income	**2,173**	**2,213**	**1,899**
Weighted-average number of shares outstanding (in millions)	2,132	2,138	2,151
Effect of dilutive securities:			
Call options and shares	7	10	3
Adjusted weighted-average number of shares outstanding (in millions)	**2,139**	**2,148**	**2,154**
Diluted earnings per share attributable to ABB shareholders:			
Income from continuing operations, net of tax	0.71	0.67	0.54
Income from discontinued operations, net of tax	0.31	0.36	0.34
Net income	**1.02**	**1.03**	**0.88**

Note 21—Other comprehensive income

The following table includes amounts recorded within "Total other comprehensive income (loss)" including the related income tax effects:

	2018			2017			2016		
($ in millions)	Before tax	Tax effect	Net of tax	Before tax	Tax effect	Net of tax	Before tax	Tax effect	Net of tax
Foreign currency translation adjustments:									
Foreign currency translation adjustments	(641)	14	**(627)**	911	1	**912**	(469)	(12)	**(481)**
Gain on liquidation of foreign subsidiary	(31)	—	**(31)**	—	—	**—**	—	—	**—**
Changes attributable to divestments[1]	12	—	**12**	12	—	**12**	7	—	**7**
Net change during the year	**(660)**	**14**	**(646)**	**923**	**1**	**924**	**(462)**	**(12)**	**(474)**
Available-for-sale securities:									
Net unrealized gains (losses) arising during the year	(5)	1	**(4)**	1	—	**1**	—	—	**—**
Reclassification adjustments for net (gains) losses included in net income	1	—	**1**	—	—	**—**	—	—	**—**
Net change during the year	**(4)**	**1**	**(3)**	**1**	**—**	**1**	**—**	**—**	**—**
Pension and other postretirement plans:									
Prior service (costs) credits arising during the year	(11)	4	**(7)**	(20)	4	**(16)**	(46)	6	**(40)**
Net actuarial gains (losses) arising during the year	(411)	59	**(352)**	(184)	45	**(139)**	38	6	**44**
Amortization of prior service cost (credit) included in net income	(19)	(5)	**(24)**	6	—	**6**	28	(2)	**26**
Amortization of net actuarial loss included in net income	91	(22)	**69**	90	(27)	**63**	85	(23)	**62**
Net losses from pension settlements included in net income	23	(4)	**19**	13	(4)	**9**	37	(11)	**26**
Changes attributable to divestments[1]	—	—	**—**	8	(2)	**6**	—	—	**—**
Net change during the year	**(327)**	**32**	**(295)**	**(87)**	**16**	**(71)**	**142**	**(24)**	**118**
Cash flow hedge derivatives:									
Net gains (losses) arising during the year	(51)	2	**(49)**	45	(7)	**38**	21	(5)	**16**
Reclassification adjustments for net (gains) losses included in net income	20	1	**21**	(26)	4	**(22)**	(7)	1	**(6)**
Changes attributable to divestments[1]	—	—	**—**	(4)	1	**(3)**	—	—	**—**
Net change during the year	**(31)**	**3**	**(28)**	**15**	**(2)**	**13**	**14**	**(4)**	**10**

Total other comprehensive income (loss)	**(1,022)**	**50**	**(972)**	**852**	**15**	**867**	**(306)**	**(40)**	**(346)**

(1) Changes attributable to divestments are included in the computation of the net gain or loss on sale of businesses (see Note 4).

The following table shows changes in "Accumulated other comprehensive loss" (OCI) attributable to ABB, by component, net of tax:

($ in millions)	Foreign currency translation adjustments	Unrealized gains (losses) on available-for-sale securities	Pension and other post-retirement plan adjustments	Unrealized gains (losses) of cash flow hedge derivatives	Accumulated other comprehensive loss
Balance at January 1, 2016	**(3,135)**	**7**	**(1,719)**	**(11)**	**(4,858)**
Other comprehensive (loss) income before reclassifications	(481)	—	4	16	**(461)**
Amounts reclassified from OCI	—	—	114	(6)	**108**
Changes attributable to divestments	7	—	—	—	**7**
Total other comprehensive (loss) income	(474)	—	118	10	**(346)**
Less:					
Amounts attributable to noncontrolling interests	(17)	—	—	—	**(17)**
Balance at December 31, 2016	**(3,592)**	**7**	**(1,601)**	**(1)**	**(5,187)**
Other comprehensive (loss) income before reclassifications	912	1	(155)	38	**796**
Amounts reclassified from OCI	—	—	78	(22)	**56**
Changes attributable to divestments	12	—	6	(3)	**15**
Total other comprehensive (loss) income	924	1	(71)	13	**867**
Less:					
Amounts attributable to noncontrolling interests	25	—	—	—	**25**
Balance at December 31, 2017	**(2,693)**	**8**	**(1,672)**	**12**	**(4,345)**
Cumulative effect of changes in accounting principles[(1)]	—	(9)	—	—	**(9)**
Other comprehensive (loss) income before reclassifications	(627)	(4)	(359)	(49)	**(1,039)**
Amounts reclassified from OCI	(31)	1	64	21	**55**
Changes attributable to divestments	12	—	—	—	**12**
Total other comprehensive (loss) income	(646)	(3)	(295)	(28)	**(972)**
Less:					
Amounts attributable to noncontrolling interests	(15)	—	—	—	**(15)**
Balance at December 31, 2018	**(3,324)**	**(4)**	**(1,967)**	**(16)**	**(5,311)**

(1) See "New accounting pronouncements, Applicable for the current period" section of Note 2 for more details.

The following table reflects amounts reclassified out of OCI in respect of Foreign currency translation adjustments and Pension and other postretirement plan adjustments:

($ in millions) Details about OCI components	Location of (gains) losses reclassified from OCI	2018	2017	2016
Foreign currency translation adjustments:				
Gain on liquidation of foreign subsidiary	Other income (expense), net	(31)	—	—
Pension and other postretirement plan adjustments:				
Amortization of prior service cost (credit)	Non-operational pension (cost) credit[1]	(19)	6	28
Amortization of net actuarial loss	Non-operational pension (cost) credit[1]	91	90	85
Net losses from pension settlements	Non-operational pension (cost) credit[1]	23	13	37
Total before tax		**95**	**109**	**150**
Tax	Provision for taxes	(31)	(31)	(36)
Amounts reclassified from OCI		**64**	**78**	**114**

(1) Amounts include a total of $12 million, $9 million and $0 million in 2018, 2017 and 2016, respectively, reclassified from OCI to Income from discontinued operations (see Note 3).

The amounts reclassified out of OCI in respect of Unrealized gains (losses) on available for sale securities and Unrealized gains (losses) of cash flow hedge derivatives were not significant in 2018, 2017 and 2016.

Note 22—Restructuring and related expenses

White Collar Productivity program

From September 2015 to December 2017, the Company executed a restructuring program to make the Company leaner, faster and more customer-focused. The program involved the rapid expansion and use of regional shared service centers as well as a streamlining of global operations and head office functions, with business units moving closer to their respective key markets. The program involved various restructuring initiatives across all operating segments and regions.

As of December 31, 2017, the Company had incurred substantially all costs related to the White Collar Productivity program.

Liabilities associated with the White Collar Productivity program are primarily included in “Other provisions”. The following table shows the activity from the beginning of the program to December 31, 2018:

($ in millions)	Employee severance costs	Contract settlement, loss order and other costs	Total
Liability at January 1, 2015	**—**	**—**	**—**
Expenses	300	3	**303**
Cash payments	(27)	—	**(27)**
Liability at December 31, 2015	**273**	**3**	**276**
Expenses	182	3	**185**
Cash payments	(91)	(2)	**(93)**
Change in estimates	(85)	(1)	**(86)**
Exchange rate differences	(17)	(1)	**(18)**
Liability at December 31, 2016	**262**	**2**	**264**
Expenses	28	3	**31**
Cash payments	(92)	(4)	**(96)**
Change in estimates	(118)	—	**(118)**
Exchange rate differences	21	—	**21**
Liability at December 31, 2017	**101**	**1**	**102**
Cash payments	(55)	—	**(55)**
Change in estimates and exchange rate differences	(13)	—	**(13)**
Liability at December 31, 2018	**33**	**1**	**34**

The change in estimates during 2017 of $118 million is mainly due to higher than expected rates of attrition and internal redeployment. The reduction in the liability was recorded in income from operations, primarily as reductions in “Total cost of sales” of $53 million and in “Selling, general and administrative expenses” of $55 million.

The change in estimates during 2016 of $86 million is due to significantly higher than expected rates of attrition and internal redeployment and a lower than expected severance cost per employee for the employee groups affected by the first phase of restructuring initiated in 2015. The reduction in the liability was recorded in income from operations, primarily as reductions in “Total cost of sales” of $38 million and in “Selling, general and administrative expenses” of $35 million.

The following table outlines the net costs incurred in 2017 and 2016 and the cumulative net costs incurred up to December 31, 2017:

($ in millions)	Net costs incurred in 2017[1]	Net costs incurred in 2016[1]	Cumulative costs incurred up to December 31, 2017[1]
Electrification Products	(17)	15	72
Industrial Automation	(23)	34	106
Robotics and Motion	(14)	26	56
Corporate and Other	(32)	32	91
Total	**(86)**	**107**	**325**

(1) Amounts in the table above have been recast to reflect the reorganization of the Company’s operating segments in 2018 as outlined in Note 23.

The Company recorded the following expenses, net of changes in estimates, under this program:

($ in millions)	2017	2016	Cumulative costs incurred up to December 31, 2017
Employee severance costs	(90)	97	307
Estimated contract settlement, loss order and other costs	3	2	8
Inventory and long-lived asset impairments	1	8	10
Total	**(86)**	**107**	**325**

Expenses, net of changes in estimates, associated with this program are recorded in the following line items in the Consolidated Income Statements:

($ in millions)	2017	2016
Total cost of sales	(47)	57
Selling, general and administrative expenses	(35)	35
Non-order related research and development expenses	(5)	1
Other income (expense), net	1	14
Total	**(86)**	**107**

OS program

In December 2018, the Company announced a two-year restructuring program with the objective to simplify its business model and structure through the implementation of a new organizational structure driven by its businesses. The program includes the planned elimination of the country and regional structures within the current matrix organization, including the elimination of the three regional Executive Committee roles. The operating businesses will each be responsible for both their customer-facing activities and business support functions, while the remaining Group-level corporate activities will primarily focus on Group strategy, portfolio and performance management, capital allocation and core technologies. The program is expected to be performed over two years and incur restructuring expenses of $350 million.

The following table outlines the costs incurred in 2018, the cumulative costs incurred to date and the total amount of costs expected to be incurred under the program per operating segment:

($ in millions)	Costs incurred in 2018	Cumulative costs incurred up to December 31, 2018	Total expected costs
Electrification Products	32	32	40
Industrial Automation	21	21	60
Robotics and Motion	1	1	50
Corporate and Other	11	11	200
Total	**65**	**65**	**350**

In 2018, restructuring expenses recorded for this program relate to employee severance costs and are included in the following line items in the Consolidated Income Statements:

($ in millions)	2018
Total cost of sales	35
Selling, general and administrative expenses	23
Non-order related research and development expenses	3

Other income (expense), net	4
Total	**65**

At December 31, 2018, liabilities associated with the program amount to $65 million and are primarily included in “Other provisions”.

Other restructuring-related activities

In 2018, 2017 and 2016, the Company executed various other restructuring related activities and incurred charges of $116 million, $181 million and $133 million, respectively.

($ in millions)	2018	2017	2016
Employee severance costs	74	130	66
Estimated contract settlement, loss order and other costs	29	32	32
Inventory and long-lived asset impairments	13	19	35
Total	**116**	**181**	**133**

Expenses associated with these activities are recorded in the following line items in the Consolidated Income Statements:

($ in millions)	2018	2017	2016
Total cost of sales	24	119	69
Selling, general and administrative expenses	52	10	4
Non-order related research and development expenses	2	—	5
Other income (expense), net	38	52	55
Total	**116**	**181**	**133**

At December 31, 2018 and 2017, $245 million and $246 million, respectively, was recorded for other restructuring-related liabilities and is primarily included in “Other provisions”.

Note 23—Operating segment and geographic data

The Chief Operating Decision Maker (CODM) is the Chief Executive Officer. The CODM allocates resources to and assesses the performance of each operating segment using the information outlined below. The Company is organized into operating segments based on products and services and the operating segments consist of Electrification Products, Industrial Automation and Robotics and Motion. The remaining operations of the Company are included in Corporate and Other. As the Power Grids business is reported as discontinued operations, it no longer is reported as an operating segment. In addition, certain real estate assets previously included in Corporate and Other are included in this planned business divestment and have also been reported in discontinued operations (see Note 3).

Effective January 1, 2018, management responsibility and oversight of certain remaining engineering, procurement and construction (EPC) businesses, previously included in the Industrial Automation and Robotics and Motion operating segments as well as the former Power Grids business, were transferred to a new non-core operating business within Corporate and Other. During 2018, the Company also changed the presentation of Cash and cash equivalents within the reported total segment assets such that all amounts are now considered as part of Corporate and Other.

The segment information for 2017 and 2016, and at December 31, 2017 and 2016, has been recast to reflect these changes.

A description of the types of products and services provided by each reportable segment is as follows:

- *Electrification Products:* manufactures and sells products and solutions which are designed to provide smarter and safer electrical flow from the substation to the socket. The portfolio of increasingly digital and connected solutions includes electric vehicle charging infrastructure, solar power solutions, modular substation packages, distribution automation products, switchboard and panelboards, switchgear, UPS solutions, circuit breakers, measuring and sensing devices, control products, wiring accessories, enclosures and cabling systems and intelligent home and building solutions, designed to integrate and automate lighting, heating, ventilation, security and data communication networks.

- *Industrial Automation:* develops and sells integrated automation and electrification systems and solutions, such as process and discrete control solutions, advanced process control software and manufacturing execution systems, sensing, measurement and analytical instrumentation and solutions, electric ship propulsion systems, as well as solutions for modern machine and factory automation and large turbochargers. In addition, the division offers a comprehensive range of services ranging from repair to advanced services such as remote monitoring, preventive maintenance and cybersecurity services.

- *Robotics and Motion:* manufactures and sells robotics, motors, generators, drives, wind converters, components and systems for railways and related services and digital solutions for a wide range of applications in industry, transportation and infrastructure, and utilities.

- *Corporate and Other:* includes headquarters, central research and development, the Company's real estate activities, Group Treasury Operations, historical operating activities of certain divested businesses and other non-core operating activities.

The primary measure of profitability on which the operating segments are evaluated is Operational EBITA, which represents income from operations excluding:

- amortization expense on intangibles arising upon acquisition (acquisition-related amortization),

- restructuring and restructuring-related expenses,

- changes in the amount recorded for obligations related to divested businesses occurring after the divestment date (changes in obligations related to divested businesses),

- changes in estimates relating to opening balance sheets of acquired businesses (changes in pre-acquisition estimates),

- gains and losses from sale of businesses,

- acquisition- and divestment-related expenses and integration costs,

- certain other non-operational items, as well as

- foreign exchange/commodity timing differences in income from operations consisting of: (a) unrealized gains and losses on derivatives (foreign exchange, commodities, embedded derivatives), (b) realized gains and losses on derivatives where the underlying hedged transaction has not yet been realized, and (c) unrealized foreign exchange movements on receivables/payables (and related assets/liabilities).

Certain other non-operational items generally includes: certain regulatory, compliance and legal costs, certain asset write downs/impairments as well as other items which are determined by management on a case by case basis.

The CODM primarily reviews the results of each segment on a basis that is before the elimination of profits made on inventory sales between segments. Segment results below are presented before these eliminations, with a total deduction for intersegment profits to arrive at the Company's consolidated Operational EBITA. Intersegment sales and transfers are accounted for as if the sales and transfers were to third parties, at current market prices.

The following tables present segment revenues for 2018, 2017 and 2016.

	2018				
($ in millions)	**Electrification Products**	**Industrial Automation**	**Robotics and Motion**	**Corporate and Other**	**Total**
Geographical markets					
Europe	3,881	3,145	2,929	58	**10,013**
The Americas	3,650	1,544	2,788	21	**8,003**
Asia, Middle East and Africa	3,680	2,565	2,922	236	**9,403**
	11,211	7,254	8,639	315	**27,419**
End Customer Markets					
Utilities	2,452	1,168	749	176	**4,545**
Industry	4,395	4,447	6,529	98	**15,469**
Transport and infrastructure	4,364	1,639	1,361	41	**7,405**
	11,211	7,254	8,639	315	**27,419**
Product type					
Products	9,679	2,391	6,206	118	**18,394**
Systems	617	1,853	1,062	197	**3,729**
Services and software	915	3,010	1,371	—	**5,296**
	11,211	7,254	8,639	315	**27,419**
Third-party revenues	11,211	7,254	8,639	315	**27,419**
Intersegment revenues[1]	475	140	508	(880)	**243**
Total Revenues	**11,686**	**7,394**	**9,147**	**(565)**	**27,662**

	2017				
($ in millions)	**Electrification Products**	**Industrial Automation**	**Robotics and Motion**	**Corporate and Other**	**Total**
Geographical markets					
Europe	3,514	2,773	2,613	132	**9,032**
The Americas	2,613	1,381	2,721	116	**6,831**
Asia, Middle East and Africa	3,464	2,570	2,543	493	**9,070**
	9,591	6,724	7,877	741	**24,933**
End Customer Markets					
Utilities	2,597	1,270	633	575	**5,075**
Industry	4,022	3,796	5,991	155	**13,964**
Transport and infrastructure	2,972	1,658	1,253	11	**5,894**
	9,591	6,724	7,877	741	**24,933**
Product type					
Products	8,322	1,796	5,661	169	**15,948**
Systems	614	2,089	959	565	**4,227**
Services and software	655	2,839	1,257	7	**4,758**
	9,591	6,724	7,877	741	**24,933**

Third-party revenues	9,591	6,724	7,877	741	**24,933**
Intersegment revenues[1]	503	155	519	(914)	**263**
Total Revenues	**10,094**	**6,879**	**8,396**	**(173)**	**25,196**

	2016				
($ in millions)	Electrification Products	Industrial Automation	Robotics and Motion	Corporate and Other	Total
Geographical markets					
Europe	3,309	2,398	2,571	541	**8,819**
The Americas	2,571	1,420	2,588	182	**6,761**
Asia, Middle East and Africa	3,457	2,673	2,227	692	**9,049**
	9,337	6,491	7,386	1,415	**24,629**
End Customer Markets					
Utilities	2,568	1,236	657	1,189	**5,650**
Industry	4,083	3,625	5,351	200	**13,259**
Transport and infrastructure	2,686	1,630	1,378	26	**5,720**
	9,337	6,491	7,386	1,415	**24,629**
Product type					
Products	8,042	1,355	5,366	434	**15,197**
Systems	656	2,364	853	957	**4,830**
Services and software	639	2,772	1,167	24	**4,602**
	9,337	6,491	7,386	1,415	**24,629**
Third-party revenues	9,337	6,491	7,386	1,415	**24,629**
Intersegment revenues[1]	583	163	502	(948)	**300**
Total Revenues	**9,920**	**6,654**	**7,888**	**467**	**24,929**

(1) Intersegment revenues include sales to the Power Grids business which is presented as discontinued operations and are not eliminated from Total revenues.

Revenues by geography reflect the location of the customer. Approximately 22 percent, 20 percent and 19 percent of the Company's total revenues in 2018, 2017 and 2016, respectively, came from customers in the United States. Approximately 15 percent, 15 percent and 14 percent of the Company's total revenues in 2018, 2017 and 2016, respectively, were generated from customers in China. In 2018, 2017 and 2016 more than 98 percent of the Company's total revenues were generated from customers outside Switzerland.

The following tables present Operational EBITA, the reconciliations of consolidated Operational EBITA to Income from continuing operations before taxes, as well as Depreciation and amortization, and Capital expenditure for 2018, 2017 and 2016, as well as Total assets at December 31, 2018, 2017 and 2016.

($ in millions)	2018	2017	2016
Operational EBITA:			
Electrification Products	1,626	1,510	1,459
Industrial Automation	1,019	953	897
Robotics and Motion	1,447	1,260	1,232
Corporate and Other:			
— Non-Core and divested businesses	(291)	(163)	(30)
— Stranded corporate costs	(297)	(286)	(252)
— Corporate costs and other intersegment elimination	(499)	(457)	(378)
Consolidated Operational EBITA	**3,005**	**2,817**	**2,928**
Acquisition-related amortization	(273)	(229)	(245)
Restructuring and restructuring-related expenses[1]	(172)	(300)	(442)
Changes in obligations related to divested businesses	(106)	(94)	—
Changes in pre-acquisition estimates	(8)	(8)	(131)
Gains and losses on sale of businesses	57	252	(10)
Acquisition- and divestment-related expenses and integration costs	(204)	(81)	(9)
Foreign exchange/commodity timing differences in income from operations:			
Unrealized gains and losses on derivatives where the underlying hedged transaction has not yet been realized	(1)	56	(19)
Realized gains and losses on derivatives where the underlying hedged transaction has not yet been realized	(23)	8	(1)
Unrealized foreign exchange movements on receivables/payables (and related assets/liabilities)	(9)	(30)	(8)
Certain other non-operational items:			
Regulatory, compliance and legal costs	(34)	(102)	(10)
Asset write downs/impairments	(25)	—	(16)
Gain on liquidation of foreign subsidiary	31	—	—
Corporate re-branding and marketing costs	—	—	(30)
Losses and other (costs) recoveries on Korea fraud	8	(40)	(73)
Other non-operational items	(20)	(19)	(5)
Income from operations	**2,226**	**2,230**	**1,929**
Interest and dividend income	72	73	71
Interest and other finance expense	(262)	(234)	(201)
Non-operational pension cost	83	33	(38)
Income from continuing operations before taxes	**2,119**	**2,102**	**1,761**

(1) Amounts in 2017 and 2016 also include the incremental implementation costs in relation to the White Collar Productivity program.

	Depreciation and amortization			Capital expenditure[1]			Total assets(1), (2) at December 31,		
($ in millions)	2018	2017	2016	2018	2017	2016	2018	2017	2016
Electrification Products	355	315	348	244	218	215	12,049	8,881	8,343
Industrial Automation	160	112	71	104	71	53	6,669	6,961	4,294
Robotics and Motion	208	216	249	123	118	112	8,397	8,416	7,870
Corporate and Other	193	193	202	301	345	252	17,326	19,200	18,884
Consolidated	**916**	**836**	**870**	**772**	**752**	**632**	**44,441**	**43,458**	**39,391**

(1) Capital expenditure and Total assets are after intersegment eliminations and therefore reflect third-party activities only.

(2) Assets held for sale of $8,591 million, $8,603 million and $8,504 million are included in Corporate and Other at December 31, 2018, 2017 and 2016, respectively (see Note 3).

Other geographic information

Geographic information for long-lived assets was as follows:

	Long-lived assets at December 31,	
($ in millions)	**2018**	**2017**
Europe	2,110	2,040
The Americas	1,168	934
Asia, Middle East and Africa	855	830
Total	**4,133**	**3,804**

Long lived assets represent "Property, plant and equipment, net" and are shown by location of the assets. At December 31, 2018, approximately 22 percent, 11 percent and 11 percent of the Company's long lived assets were located in the U.S., Switzerland and China, respectively. At December 31, 2017, approximately 19 percent, 13 percent and 10 percent of the Company's long lived assets were located in the U.S., Switzerland and China, respectively.

2019 Realignment of segments

On December 17, 2018, the Company announced a planned reorganization of its operating segments into four customer-focused, entrepreneurial businesses. With effect from April 1, 2019:

- the Electrification Products segment will be renamed the Electrification segment,
- the Industrial Automation segment will remain unchanged except that it will now exclude the Machine and Factory Automation business, which will be transferred to the new Robotics & Discrete Automation segment,
- the new Robotics & Discrete Automation segment will include the combined businesses of the Machine and Factory Automation business, previously included in the Industrial Automation segment, and the Robotics business from the former Robotics and Motion segment, and
- the new Motion segment will contain the remaining businesses of the former Robotics and Motion segment.