

**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, 2019

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

For the transition period from _____ to _____

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

Date of event requiring this shell company report _____

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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(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:

<u>Title of each class</u>	<u>Trading Symbol(s)</u>	<u>Name of each exchange on which registered</u>
American Depositary Shares, each representing one Registered Share	ABB	New York Stock Exchange
Registered Shares, par value CHF 0.12	N/A	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:
2,133,501,111 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,” “the 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, 2019 and 2018, and for each of the years in the three-year period ended December 31, 2019, (our Consolidated Financial Statements) have been prepared in accordance with United States generally accepted accounting principles (U.S. GAAP).

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” and “CNY” refer 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; (viii) “INR” and “Indian Rupee” refer to the lawful currency of India, and (ix) “HKD” refers to the Hong Kong dollar. Information contained on, or that can be accessed through, our Web site does not constitute a part of this annual report and is not incorporated by reference herein.

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. 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 for Swiss francs on December 31, 2019, was \$1.00 = CHF 0.9677. The twelve o’clock buying rate for Swiss francs on February 21, 2020, was \$1.00 = CHF 0.9781.

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, planned divestments, including the expected timing for the closing of the divestment of 80.1 percent of the Power Grids business to Hitachi Ltd., 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, ABB Operating System, 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.
- Our operations in emerging markets expose us to risks associated with conditions in those markets.
- We may encounter difficulty in managing our business due to the global nature of our operations.
- We operate in very competitive and rapidly changing markets and could be adversely affected if we fail to keep pace with technological changes.
- An inability to protect our intellectual property rights could adversely affect our business.
- 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.

- Industry consolidation could result in more powerful competitors and fewer customers.
- 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 historical, existing and potential future mergers, acquisitions, joint ventures or strategic alliances may not be realized.
- There is no guarantee that our ongoing efforts to reduce costs will be successful.
- 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 business subjects us to considerable potential exposure to litigation and legal claims and could be materially adversely affected if we incur legal liability.
- If a material weakness were identified in our internal control over financial reporting, that could result in material inaccuracies in our consolidated financial statements and adversely affect our business and results of operations.
- We may be the subject of product liability claims.
- Examinations by tax authorities and changes in tax regulations could result in lower earnings and cash flows.
- 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 could be affected by future laws or regulations enacted to address climate change concerns as well as the physical effects of climate change.
- 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.
- Increases in costs or limitation of supplies of raw materials may adversely affect our financial performance.
- 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.
- 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.
- 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 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 in the following tables as well as financial information in “Item 5. Operating and Financial Review and Prospects” is presented in accordance with U.S. GAAP and have been derived from our published Consolidated Financial Statements. Our Consolidated Financial Statements as of and for each of the years ended December 31, 2019 and 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 year ended December 31, 2015, have not been audited following the reclassification in 2018 of certain businesses from continuing operations to discontinued operations.

INCOME STATEMENT DATA:

(\$ in millions, except per share data in \$)	<u>unaudited</u>				
	2019	2018	2017	2016	2015
Total revenues	27,978	27,662	25,196	24,929	26,459
Total cost of sales⁽¹⁾	(19,072)	(19,118)	(17,350)	(17,396)	(18,429)
Gross profit	8,906	8,544	7,846	7,533	8,030
Selling, general and administrative expenses ⁽¹⁾	(5,447)	(5,295)	(4,765)	(4,532)	(4,769)
Non-order related research and development expenses ⁽¹⁾	(1,198)	(1,147)	(1,013)	(967)	(1,041)
Other income (expense), net	(323)	124	162	(105)	(102)
Income from operations	1,938	2,226	2,230	1,929	2,118
Interest and dividend income	67	72	73	71	74
Interest and other finance expense	(215)	(262)	(234)	(201)	(240)
Non-operational pension (cost) credit ⁽¹⁾	72	83	33	(38)	(20)
Income from continuing operations before taxes	1,862	2,119	2,102	1,761	1,932
Provision for taxes	(772)	(544)	(583)	(526)	(566)
Income from continuing operations, net of tax	1,090	1,575	1,519	1,235	1,366
Income from discontinued operations, net of tax	438	723	846	799	689
Net income	1,528	2,298	2,365	2,034	2,055
Net income attributable to noncontrolling interests	(89)	(125)	(152)	(135)	(122)
Net income attributable to ABB	1,439	2,173	2,213	1,899	1,933
<i>Amounts attributable to ABB shareholders:</i>					
Income from continuing operations, net of tax	1,043	1,514	1,441	1,172	1,289
Income from discontinued operations, net of tax	396	659	772	727	644
Net income	1,439	2,173	2,213	1,899	1,933
<i>Basic earnings per share attributable to ABB shareholders:</i>					
Income from continuing operations, net of tax	0.49	0.71	0.67	0.54	0.58
Income from discontinued operations, net of tax	0.19	0.31	0.36	0.34	0.29
Net income	0.67	1.02	1.04	0.88	0.87
<i>Diluted earnings per share attributable to ABB shareholders:</i>					
Income from continuing operations, net of tax	0.49	0.71	0.67	0.54	0.58
Income from discontinued operations, net of tax	0.19	0.31	0.36	0.34	0.29
Net income	0.67	1.02	1.03	0.88	0.87
<i>Weighted-average number of shares outstanding (in millions) used to compute:</i>					
Basic earnings per share attributable to ABB shareholders	2,133	2,132	2,138	2,151	2,226
Diluted earnings per share attributable to ABB shareholders	2,135	2,139	2,148	2,154	2,230

BALANCE SHEET DATA:

(\$ in millions)	December 31,			unaudited	
	2019	2018	2017	2016	2015
Cash and equivalents	3,544	3,445	4,526	3,644	4,565
Marketable securities and short-term investments	566	712	1,083	1,953	1,625
Total assets ⁽²⁾⁽³⁾	46,108	44,441	43,458	39,391	41,313
Long-term debt (excluding current maturities of long-term debt)	6,772	6,587	6,682	5,785	5,421
Total debt ⁽⁴⁾	9,059	8,618	7,408	6,783	7,408
Common stock	188	188	188	192	1,440
Total stockholders' equity (including noncontrolling interests)	13,980	14,534	15,349	13,897	14,988

CASH FLOW DATA:

(\$ in millions)					unaudited
	2019	2018	2017	2016	2015
Operating activities:					
Net cash provided by operating activities — continuing operations	1,899	2,352	2,588	2,607	2,700
Net cash provided by operating activities — discontinued operations	426	572	1,211	1,236	1,118
Net cash provided by operating activities	2,325	2,924	3,799	3,843	3,818
Investing activities:					
Net cash used in investing activities — continuing operations	(651)	(2,908)	(1,118)	(1,108)	(801)
Net cash used in investing activities — discontinued operations	(164)	(177)	(332)	(197)	(173)
Net cash used in investing activities	(815)	(3,085)	(1,450)	(1,305)	(974)
Financing activities:					
Net cash used in financing activities — continuing operations	(1,328)	(741)	(1,688)	(3,308)	(3,348)
Net cash used in financing activities — discontinued operations	(55)	(48)	(47)	(47)	(32)
Net cash used in financing activities	(1,383)	(789)	(1,735)	(3,355)	(3,380)

- (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 periods prior to the adoption 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.
- (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 and 2015, have been restated.
- (3) Total assets includes assets held for sale and in discontinued operations. See “Note 3 - Basis of presentation and assets held for sale” to our Consolidated Financial Statements.
- (4) 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 rising, sustainable annual dividend over time.

The unconsolidated statutory financial statements of ABB Ltd are prepared in accordance with the Swiss Code of Obligations. 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, 2019, the total unconsolidated stockholders' equity of ABB Ltd was CHF 8,420 million, including CHF 260 million representing share capital, CHF 8,920 million representing reserves and CHF 760 million representing a reduction of equity for own shares (treasury stock). Of the reserves, CHF 760 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, 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, 2017 and 2018, ABB Ltd paid a dividend of CHF 0.76 (USD 0.76) per share, CHF 0.78 (USD 0.81) per share and CHF 0.80 (USD 0.79) 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 months in which the dividends were paid.

With respect to the year ended December 31, 2019, 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 2020 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, particularly in locations where our customers or operations are located, as well as concerns about global trade, global health crises (including the one related to the coronavirus), 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 Businesses are affected by the level of investments and demand 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 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, including the recent trade tensions between the United States and China. 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 2019, our total revenues from business with countries identified by the U.S. government as state sponsors of terrorism represented significantly less than 1 percent of our total revenues. Based on the amount of revenues and other relevant quantitative and qualitative factors, we have determined that our business in 2019 with countries identified by the U.S. government as state sponsors of terrorism was not material.

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 2019, approximately 48 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.

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, 2019, employed about 144,400 people, of which approximately 47 percent were located in the Europe region, approximately 28 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.

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

We operate in very competitive and rapidly changing 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, 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 remain competitive and maintain acceptable pricing levels. If we fail to keep pace with technological changes in the industrial sectors that we serve, we may experience lower revenues, 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.

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. We also may engage in legal action to protect our own intellectual property rights, and enforcing our rights may require considerable time, money and oversight, and existing laws in the various countries in which we provide services or solutions may offer only limited protection.

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. We have experienced, and may in the future experience, cyber-attacks against us and we have incurred and will continue to incur substantial costs to reduce the cyber risks to our systems, networks, products, solutions and services. 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 or downtime of our systems and networks or those we supplied to our customers, manipulation, corruption, inaccessibility 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. Our insurance coverage may not be adequate to cover all the costs related to cyber security attacks or disruptions resulting from such events. Due to the nature of these security threats, the potential impact of any future incident cannot be predicted.

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 around the world including the General Data Protection Regulation (GDPR) in Europe as well as the California Data Privacy Act in the United States. 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 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 as 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.

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, 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.

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 80.1 percent of our Power Grids business into a minority-owned joint venture which is scheduled to close at the end of the second quarter of 2020. In connection with this sale we are contractually obliged to retain certain liabilities. The transaction may not obtain all relevant approvals or may face other issues that could delay or prevent the closing of the transaction. In July 2019, we also announced the sale of our solar inverters business which is expected to close in the first quarter of 2020. 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 historical, 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, including operating synergies and cost savings, from these transactions, including our acquisition in 2018 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.

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 as part of our ABB-OS program. 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.

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. We are subject to certain ongoing investigations by governmental agencies.

Our business subjects us to considerable potential exposure to litigation and legal claims and could be materially adversely affected if we incur legal liability.

We are subject to, and may become a party to, a variety of litigation or other claims. Our business is subject to the risk of claims involving current and former employees, customers, partners, subcontractors, suppliers, competitors, shareholders, government regulatory agencies or others through private actions, class actions, whistleblower claims, administrative proceedings, regulatory actions or other proceedings. Our acquisition activities have in the past and may in the future be subject to litigation or other claims. While we maintain insurance for certain potential liabilities, such insurance does not cover all types and amounts of potential liabilities and is subject to various exclusions as well as caps on amounts recoverable.

If a material weakness were identified in our internal control over financial reporting, that could result in material inaccuracies in our consolidated financial statements and adversely affect our business and results of operations.

In connection with our financial results for the year ended December 31, 2018, we concluded that our internal control over financial reporting was ineffective as of December 31, 2018, due to a material weakness. Although we have remediated the material weakness as of December 31, 2019, we cannot be certain that the measures we have taken, and expect to take, to strengthen our internal control over financial reporting will be effective to prevent other material weaknesses from developing or being identified in the future. Any occurrence of a new material weakness may result in material inaccuracies in our consolidated financial statements and our business and results of operations may be materially adversely affected.

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-related businesses 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-related businesses 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.

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 laws could result in a higher tax expense and higher tax payments. Furthermore, this could materially impact our tax-related receivables and liabilities as well as deferred income tax assets and liabilities. In addition, the uncertainty of the 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 liabilities, returns 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.

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 and chloroparaffins 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 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 and any non-compliance could adversely affect our reputation and result in significant fines. 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.

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.

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.

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.

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 other defined 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.

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. 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.

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 expenses 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.

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 withdrawn from the European Union and is negotiating 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.

Item 4. Information on the Company

INTRODUCTION

About ABB

ABB is a technology leader that is driving the digital transformation of industries. With a history of innovation spanning more than 130 years, ABB has four, customer-focused, globally leading Businesses: Electrification, Industrial Automation, Motion, and Robotics & Discrete Automation, supported by the ABB Ability™ digital platform. We plan to divest 80.1 percent of ABB's Power Grids business to Hitachi in 2020. ABB has approximately 144,000 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. We are headquartered in Zurich, Switzerland.

We manage our company through our four Businesses. For a breakdown of our consolidated revenues (i) by Business (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" and "Note 23 - Operating segment and geographic data". 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 305 Gregson Drive, Cary, North Carolina 27511. 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).

BUSINESSES

Our markets

ABB is a technology leader that is driving the digital transformation of industries, combining electrification, automation and robotics and digitalization solutions for industrial customers. We operate in attractive, growing markets with a focus on fast-growth segments including software and digital solutions, data centers, EV charging, robotics and machine and factory automation. We believe that our portfolio is well positioned to benefit from secular growth drivers, including urbanization, aging populations, the electrification of transport, the Internet of Things and other data and digitalization trends.

Approximately 40 percent of our orders are for digitally enabled products and services (including ABB Ability™ solutions, software and related services, digitally enabled products). As the end-markets we serve are still at an early stage of digitalization, including food and beverage, rail, buildings, oil and gas, chemicals, marine, utilities, and other discrete markets, we expect the demand for digitally enabled solutions from our customers to grow significantly in the coming years.

ABB Ability™ is our unified, cross-industry digital portfolio, extending from device to edge to cloud on an open architecture platform. ABB Ability™ provides over 160 solutions (excluding the Power Grids business) utilizing the latest software technologies, including artificial intelligence and machine learning, to improve productivity and efficiency, 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. We also have 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. For a discussion of the geographic distribution of our total revenues, see “Item 5. Operating and Financial Review and Prospects—Analysis of Results of Operations—Revenues.”

Utilities Market

Following the agreement to divest the Power Grids business to Hitachi, which we announced on December 17, 2018, the exposure to utility customers for our continuing operations has decreased significantly. In 2019, ABB was focused on delivering solutions in the distribution and renewables segments within the sector, even while continuing to service conventional power generation customers with our control and automation solutions. Our continuing operations are not active in the high-voltage transmission segment. As a proportion of revenues, utility customers accounted for 15 percent in 2019.

Conventional power generation markets were challenged in 2019, with select investments focused in service activities as utilities looked to prolong asset-lives. Renewables investments grew, while capital expenditure in the distribution segment also increased owing to the increased scale of output from renewables assets.

Industry Market

We serve production facilities and factories all around the world from process to discrete industries with a comprehensive automation portfolio including robotics. Automation and digitalized solutions that achieve improved safety, uptime, energy efficiency and productivity are the intended hallmarks of our offerings in this customer segment. As a proportion of revenues, industrial customers accounted for 56 percent in 2019.

Investments in 2019 in robotics and machinery automation solutions were challenged by weak consumer demand for traditional automotive vehicles, a subdued consumer electronics market, and a tough machine builders market. Demand for new EV manufacturing lines and in service areas such as intra-logistics was not able to offset the headwinds from the aforementioned markets. Process industries, including pulp and paper, oil and gas and mining invested more in 2019 than in the prior year, investing predominantly in service and productivity improvements.

Transport & Infrastructure Market

Our expertise provides efficient, reliable and sustainable solutions for transport & infrastructure customers. We believe our offerings are key to 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 and smart buildings. As a proportion of revenues, transport & infrastructure customers accounted for 29 percent in 2019.

Demand in transport & infrastructure markets was solid in 2019. Demand for building automation solutions and from data center customers was strong over the year, with ABB successful in offering bundled solutions to hyperscale and co-location customers in particular. Buildings demand was robust. Activity in rail for electrification and traction solutions grew well, while activity in specialty vessels, particularly cruise ships, was healthy.

EV charging markets accelerated sharply during 2019. We received multiple orders from customers for EV charging infrastructure, including for our high-voltage direct-current (DC) fast-charging station, the Terra HP. As of December 31, 2019, we have more than 11,000 installed fast-chargers in 76 countries.

Since April 1, 2019, we reorganized the compositions of our businesses and commenced serving our customers through four Businesses. Developments in these Businesses are discussed in more detail below. Revenue figures presented in this Business section are before intersegment eliminations.

Electrification Business

Overview

The Electrification Business 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 Business delivers products to customers through a global network of channel partners and end-customers. Most of the Business'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 businesses.

The Electrification Business had approximately 53,000 employees on December 31, 2019, and generated \$12.7 billion of revenues in 2019.

Customers

The Electrification Business 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 Smart Power 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 Smart Buildings 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. During 2019, we reached an agreement to sell our solar inverters business to FIMER S.p.A. and the completion of the sale is expected to be in the first quarter of 2020. The Electrification Business remains fully committed to supporting the renewables industry with its leading energy protection, control and integration products and solutions.

The 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 in the transport & infrastructure sector, as well as other ABB businesses. 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 Business's principal competitors vary by product group and include Eaton, Legrand, Schneider Electric, Siemens, Hubbell, Rittal and Chint.

Capital Expenditures

The Electrification Business's capital expenditures for property, plant and equipment totaled \$279 million in 2019, compared to \$244 million and \$218 million in 2018 and 2017, respectively. Investments in 2019 were primarily related to footprint changes, equipment replacement and upgrades. Geographically, in 2019, Europe represented 49 percent of the capital expenditures, followed by the Americas (36 percent) and Asia, Middle East and Africa (15 percent).

Industrial Automation Business

Overview

The Industrial Automation Business offers customers in process and hybrid industries a broad range of industry-specific integrated automation, electrification and digital solutions that are designed to optimize the productivity, energy efficiency and safety of their industrial processes and operations, based on deep domain knowledge and expertise of each end market. The solutions include turnkey engineering, control technologies, software and lifecycle services, measurement and analytics products, marine and turbocharging offerings, Human Machine Interfaces (HMI) and integrated safety technology. The systems can link various process and information flows allowing customers to manage and control their entire manufacturing and business process based on real-time facility or plant information. Additionally, the systems and solutions enable customers to increase production efficiency, optimize their assets and reduce environmental impact.

The Industrial Automation Business's offerings are available as separately sold products or as part of a total automation, electrification and/or instrumentation solution. For overall solutions, Industrial Automation integrates products and solutions from the Electrification, Motion, and Robotics & Discrete Automation Businesses as well as our Power Grids business. The Business's offering is sold primarily through its direct sales force as well as third-party channels.

The Business had approximately 22,300 employees as of December 31, 2019, and generated revenues of \$6.3 billion in 2019.

Customers

The Industrial Automation Business'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 automation, electrification, instrumentation and digitalization offerings that deliver value mainly through lower capital costs, increased plant availability, lower life-cycle costs and lower project risks.

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 aim to 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's added value is deep industry expertise coupled with the ability to integrate both automation and electrical, resulting in faster start-up times, increased facility 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 integrated 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 control systems, quality control systems, drive systems, on-line sensors, actuators and field instruments.

The Business 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, our technologies are designed to 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.

The Business serves the marine and ports industry through its leading solutions for specialty vessels, as well as container and bulk cargo handling. For the shipping industry, the Business 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 well positioned to help improve the profitability of a customer's business throughout the entire life cycle of a fleet. The Business 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, the Business 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.

The Business serves the hybrid and discrete market, focusing primarily on plastics, food and beverage, packaging and data centers. The Business 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.

The Business 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. The Business 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.

The Business 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 Business 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 Business's own direct sales channels.

Competition

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

Capital Expenditures

The Industrial Automation Business's capital expenditures for property, plant and equipment totaled \$64 million in 2019, compared to \$58 million and \$54 million in 2018 and 2017, respectively. Principal investments in 2019 were in Turbocharging and the Measurement and Analytics business lines. Geographically, in 2019, Europe represented 70 percent of the capital expenditures, followed by the Americas (19 percent) and Asia, Middle East and Africa (11 percent).

Motion Business

Overview

The Motion Business provides pioneering technology, products, solutions and related services to industrial customers to increase energy efficiency, improve safety and reliability, and maintain precise control over processes. The portfolio includes motors, generators and drives for a wide range of applications in all industrial sectors.

The Motion Business had approximately 20,400 employees as of December 31, 2019 and generated around \$6.5 billion of revenue in 2019.

Products and Services

The Motors and Generators business line 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 line 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 line offers digitalized asset management solutions that monitor motor performance and provide vital intelligence on key operating parameters. These products and solutions are designed to help customers improve uptime, extend motor lifetimes, and increase productivity while becoming or remaining digitally connected.

The Drives business line 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, and 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 line also supplies traction converters (propulsion converters and auxiliary converters) for the transportation industry and wind converters.

The Motion Business 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 Motion Business serves a wide range of customers, including OEMs, 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, logistics, utilities as well as customers in the automotive industry.

Sales and Marketing

Sales are made both through direct sales forces and through channel partners, such as distributors and wholesalers, as well as 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 principal competitors of the Motion Business include Siemens, Toshiba, WEG Industries, SEW-EURODRIVE and Danfoss.

Capital Expenditures

Capital expenditures in the Motion Business for property, plant and equipment totaled \$110 million in 2019, compared to \$93 million and \$89 million in 2018 and 2017, respectively. Principal investments in 2019 were primarily related to equipment replacement, footprint adjustments and automation upgrades. Geographically, in 2019, Europe represented 44 percent of the capital expenditures, followed by the Americas (36 percent) and Asia, Middle East and Africa (20 percent).

Robotics & Discrete Automation Business

Overview

The Robotics & Discrete Automation Business provides robotics, and machine and factory automation from single products to complete systems including services.

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

The Robotics & Discrete Automation Business had approximately 10,100 employees as of December 31, 2019 and generated \$3.3 billion of revenues in 2019.

Products and Services

The Robotics business offers a wide range of products, solutions and services such as industrial robots, software, application solutions, engineered solutions and related services. This offering provides flexibility and productivity for operations 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 areas such as press shop, body shop, paint shop, power train assembly, trim and final assembly. Robotics solutions are used in a wide range of segments 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 Machine and Factory Automation business offers automation products and solutions such as programmable logical controllers, industrial PCs, servo motion control systems and track systems. The range of solutions are mainly used by machine builders for various types of series machines, e.g. for plastics, metals, printing and packaging.

Customers

Robotics & Discrete Automation serves a wide range of customers. The main customers are active in industries such as automotive, machine building, metalworking, electronics, food and beverage and logistics. They include end-users such as manufacturers, system integrators and machine builders.

Sales and Marketing

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

Competition

The principal competitors of the Robotics & Discrete Automation Business vary by offering and include companies such as Fanuc, Kuka, Yaskawa, Kawasaki, Dürr, Stäubli, Universal Robots, Rockwell Automation and Siemens.

Capital Expenditures

The Robotics & Discrete Automation Business's capital expenditures for property, plant and equipment totaled \$59 million in 2019, compared to \$74 million and \$43 million in 2018 and 2017, respectively. Principal investments in 2019 were primarily related to production capacity, upgrades and equipment replacement. Geographically, in 2019, Europe represented 78 percent of the capital expenditures, followed by Asia, Middle East and Africa (17 percent) and the Americas (5 percent).

Corporate and Other

Corporate and Other includes headquarters, central research and development, real estate activities, Corporate 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 and 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 Businesses. 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 Businesses in advancing relevant technologies and in developing cross-business technology platforms. We have corporate research centers in seven countries (China, India, Germany, Poland, Sweden, Switzerland and the U.S.).

GBS operates shared service centers globally through a network of five hubs and consists of both expert and transactional services in the areas of human resources, finance, information services, legal, real estate, procurement and logistics, customer contact centers, global travel services and other ancillary activities. GBS also staffs and maintains front offices in most countries.

A significant portion of the costs for GBS and other shared corporate overhead costs are allocated to the operating businesses. 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 and are considered “stranded costs”.

Corporate and Other had approximately 4,200 employees at December 31, 2019.

DISCONTINUED OPERATIONS

In December 2018, the Company announced an agreement to divest 80.1 percent of its Power Grids business to Hitachi valuing the business at \$11 billion. As a result, the Power Grids business is reported as discontinued operations in the Consolidated Financial Statements for all years presented. See “Note 3 - Basis of presentation and assets held for sale” to our Consolidated Financial Statements.

Power Grids business

The Power Grids business is a global leader and aspires to be the partner of choice for enabling a stronger, smarter and greener grid. The Power Grids business provides product, systems, software and service solutions across the power value chain that are designed to help meet 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.

The Power Grids business has a worldwide customer base, with a balanced geographic spread of revenues across the Americas, Europe, and Asia, Middle East and Africa. The business also has a globally diversified manufacturing, engineering, and research and development footprint to serve customers in the most efficient manner. 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 digitalizing and automating the power grid. 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 powerline carrier-based telecommunication technologies for mission-critical applications. The operation offers grid-edge and microgrid solutions that are being increasingly deployed for remote and partially grid-connected applications. Its comprehensive enterprise software portfolio provides solutions 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 integration and transmission solutions such as High Voltage Direct Current (HVDC), a technology pioneered by ABB and now playing a key role around the world in integrating renewables and transmitting electricity efficiently and reliably over ever-increasing distances with minimal losses. Another key part of the portfolio is the Flexible Alternating Current Transmission Systems (FACTS) business, which comprises Static Var Compensation (SVC) and static compensator (STATCOM) technologies to address stability and power quality issues. The Grid Integration operation's portfolio also includes a range of high-power semiconductors, a core technology for power electronics deployed in HVDC, FACTS and rail applications. The Grid Integration operation is also among the world's leading providers of transmission and distribution substations and associated life-cycle services. These substations are used in utility and non-utility applications including rail, data centers and various industries. Battery energy storage solutions and shore-to-ship power supply are also part of the customer offering.

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 reliable, efficient and safe conversion of voltages levels. The product range 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 business is also leading the way in digitalization of its transformer portfolio, equipping them with sensor-based technologies to facilitate asset optimization and enable smarter grids.

The Power Grids business also has an extensive portfolio of service offerings across the value chain. This is a growing focus area, leveraging the significant installed 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 further enhance the portfolio and support the increasing digitalization of grids.

SIMPLIFICATION OF BUSINESS MODEL AND STRUCTURE

In December 2018, as part of our ABB-OS program, we announced our intention to simplify our organizational structure through the discontinuation of the legacy matrix, country and regional structures, including regional Executive Committee roles. These changes were completed by January 1, 2020, and, effective January 1, 2020, the Executive Committee has been streamlined to reflect this new structure.

In addition, effective April 1, 2019, we changed the composition and operating model of our operating Businesses. Our new organization provides each Business with full operational ownership of products, support functions, research and development, and geographic territories. The Businesses are 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, providing a common framework across the group.

In line with the simplification, as of April 1, 2019, we 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 \$762 million, \$772 million and \$752 million in 2019, 2018 and 2017, respectively. In 2019, 2018 and 2017, capital expenditures were 21 percent, 16 percent and 10 percent lower, respectively, than depreciation and amortization. Excluding acquisition-related amortization, capital expenditures were 9 percent, 20 percent and 24 percent higher, respectively, than depreciation and amortization.

Capital expenditures in 2019 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 2019 were driven primarily by upgrades and maintenance of existing production facilities, mainly in the U.S., Switzerland, Germany, Italy, Finland, Sweden and Austria. Expenditures in Austria included amounts for a state-of-the-art innovation and training campus, which is planned to become one of our largest research and development centers. Capital expenditures in emerging markets were highest in China, India and Poland. Capital expenditures in emerging markets were made primarily to increase production capacity by investing in new or expanded facilities. We started construction of 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 2019, 2018 and 2017 was 27 percent, 31 percent and 28 percent, respectively.

At December 31, 2019, construction in progress for property, plant and equipment was \$500 million, mainly in the U.S., Switzerland, Finland, Germany, Austria and Sweden. 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 while 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.

Our capital expenditures relate primarily to property, plant and equipment. For 2020, we estimate the expenditures for property, plant and equipment will be lower 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 take advantage of opportunities to leverage the scale of ABB on a global, business and/or business line level, as appropriate, to optimize the efficiency of our supply networks in a sustainable manner.

Our supply chain management organization's activities and objectives include:

- 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 enterprise resource planning (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, silver 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 2019 supply chain management personnel in our businesses, and in the countries in which we operate, along with the 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 aimed at improving and tailoring 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. As of December 31, 2019, we have approximately 33,500 patent applications and registrations, of which approximately 8,500 are pending applications. These patents include more than 3,800 utility model and design applications and registrations, of which approximately 400 are pending applications. In 2019, we filed more than 1,400 patent, utility model and design applications for more than 1,500 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.

Our eco-efficiency portfolio of products, solutions and services continues to grow in line with our target to account for 60 percent of ABB's total revenue by the end of 2020. This portfolio delivers positive use-phase impacts in three areas: energy efficiency, renewable energy and resource efficiency. In responsible operations all reported measures are on track to achieve the 2020 targets.

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 384 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 2019, approximately 93 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 2019 are not yet covered by our environmental reporting. We expect that this reporting will be implemented in 2020. 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 26 environmental incidents were reported in 2019, none of which had a material environmental impact.

In 2019, 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., several European nations and certain other countries 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. ABB discontinued its Iranian business on November 4, 2018. ABB is completing minor work on a long-term contract which is being performed in line with applicable sanctions. The revenues attributable to these products and services in 2019 amounted to approximately \$1.5 million, of which \$0.8 million is attributable to our discontinued operations.

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 sets forth, as of December 31, 2019, 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 "Businesses" section of Item 4.

<u>Company name/location</u>	<u>Country</u>	<u>ABB interest %</u>
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 AUTOMACAO LTDA, SOROCABA	Brazil	100.00
ABB Ltda., São Paulo	Brazil	100.00
ABB Bulgaria EOOD, Sofia	Bulgaria	100.00
ABB Electrification Canada ULC, Edmonton, Alberta	Canada	100.00
ABB Inc., Saint-Laurent, 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 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	66.52
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
B + R Industrie-Elektronik GmbH, Bad Homburg	Germany	100.00
Busch-Jaeger Elektro GmbH, Lüdenscheid	Germany	100.00
Industrial C&S Hungary Kft., Budapest	Hungary	100.00

Company name/location	Country	ABB interest %
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
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 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	99.93
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 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., Modderfontain	South Africa	100.00
ABB South Africa (Pty) Ltd., Modderfontein	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 Power Grids Sweden AB, Västerås	Sweden	100.00
ABB Asea Brown Boveri Ltd, Zurich	Switzerland	100.00
ABB Capital AG, Zürich	Switzerland	100.00
ABB Information Systems Ltd., Zurich	Switzerland	100.00
ABB Investment Holding 2 GmbH, Zurich	Switzerland	100.00
ABB Management Holding Ltd., Zürich	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

Company name/location	Country	ABB interest %
ABB Industries (L.L.C.), Dubai	United Arab Emirates	49.00
ABB Holdings Limited, Warrington	United Kingdom	100.00
ABB Limited, Warrington	United Kingdom	100.00
ABB Enterprise Software Inc., Atlanta, GA	United States	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
Industrial Connections & Solutions LLC, Cary, NC	United States	100.00
Verdi Holding Corporation, Wilmington, DE	United States	100.00

DESCRIPTION OF PROPERTY

As of December 31, 2019, 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 is situated in the U.S., China, Germany, Italy, Finland, Sweden, India, Switzerland, Canada and Czech Republic. 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, 2019, was \$3,972 million, of which machinery and equipment represented \$1,477 million, land and buildings represented \$1,995 million and construction in progress represented \$500 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

The combined impact of the Energy and Fourth Industrial Revolution is profoundly influencing how we power the world, produce goods, work, live in cities and move in a sustainable way.

On December 17, 2018, we announced an agreed sale of our Power Grids business, expanding our existing partnership with Hitachi Ltd (Hitachi). We also announced our new strategy, with ABB proposing fundamental actions to focus, simplify and lead the digital transformation of industries, for enhanced customer value and shareholder returns. To deliver on our ambitions, we are introducing a new operating model, ABB Operating System (ABB-OS). ABB-OS provides 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. Our new, simplified, operating model also positions the Businesses to be the single interface to customers, maximizing proximity and speed. Each Business is intended to have full entrepreneurial ownership of operations, functions, research and development, and territories. Significant amounts of company resources and management effort were dedicated to both of these areas in 2019.

We plan 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.

Our 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.

In 2019, we successfully began implementing our new strategy.

Power Grids separation

Significant work was undertaken during 2019 to separate the Power Grids business from ABB. By December 31, 2019, the new Power Grids legal structure was substantially complete, allowing the business to commence operations within a stand-alone consolidated business. In addition, the transfer of resources from ABB to the Power Grids business progressed significantly. Overall, the separation of the Power Grids business is proceeding as planned and the divestment is on schedule with closing expected at the end of the second quarter of 2020.

New operating model, ABB-OS

Since April 1, 2019, we have been operating through four customer-focused Businesses: Electrification, Industrial Automation, Motion, and Robotics & Discrete Automation. In particular, ABB has integrated group sales and the vast majority of other centrally managed functional activities into the Businesses, transferred country resources to the Businesses and worked to streamline the corporate center. At the end of 2019, regional structures were dismantled and the new operating model was fully effective as of January 1, 2020.

We reached the run-rate savings targeted for 2019 and continue to target annualized net savings of approximately \$500 million in the medium term from our new operating model. ABB continuing operations headcount was 113,900 at the beginning of the year and 110,000 at the end of 2019, partly also reflecting stranded cost elimination. Continuous improvement plans are now in place within each Business and fully integrated into the annual planning process to support delivery of this objective.

Business progress

During 2019, the Group performed with resilience in the context of a tougher market environment, slightly improving revenues and gross margin while undertaking an extensive transformation.

Orders and revenues were higher in the Electrification and Motion Businesses while they decreased in the Industrial Automation and Robotics & Discrete Automation Businesses. These developments reflect some easing in global economic growth in 2019, while more substantial headwinds in discrete markets, particularly automotive and machine builders, resulted in larger declines in orders and revenues in the Robotics & Discrete Automation Business. During 2019, the order backlog increased 2 percent.

The performance of our Businesses was mixed during 2019 with increases in segment profit (Operational EBITA) in both the Electrification and Motion Businesses and decreases in the other two Businesses. Group profitability was supported by solid execution in the Motion Business, lower losses in non-core businesses and reductions in costs in Corporate, including \$72 million of stranded corporate costs, and some realized savings from the ABB-OS simplification program. Group profitability was hampered by some specific headwinds in other businesses. In the Electrification Business, this included dilutive impact of including a full year of the GEIS business, which was acquired in June 2018 as well as a large loss recorded in connection with the planned divestment of the solar inverters business. In the Industrial Automation Business, the segment profit was impacted specifically by operational challenges in the Kusile power generation project in South Africa as well as adverse mix. The segment profit of the Robotics & Discrete Automation Business was impacted by lower volumes and adverse mix stemming from the downturn in its key end-markets.

Within the Electrification Business, the integration of GEIS progressed well. ABB aims to deliver approximately \$200 million of annual cost synergies by 2022, of which approximately 80 percent is anticipated to come from product and technology portfolio harmonization and footprint optimization. To support this transformation, we plan to expend approximately \$480 million for the GEIS business through 2022. By the end of 2019, the 13,000 employees from GEIS had been transitioned into ABB, while product substitutions were proceeding ahead of plan with 100 new products planned for commercial launch in 2020. In North America, 13 facilities have been designated for closure while 4 facilities have been identified for expansion.

Agreements for a number of divestments and acquisitions were secured in 2019 to strengthen our portfolio. Of note, the Electrification Business announced in July 2019 an agreement to divest the solar inverters business to FIMER S.p.A (Italy). The transaction will enable the Electrification Business to focus its business portfolio on other growth markets. In December 2019, the Electrification Business completed the divestment of two Shanghai-based joint ventures, acquired in 2018 as part of the GEIS transaction, reducing the complexity of the Electrification Business in China. In October 2019, we also announced the planned acquisition of a majority stake in Shanghai Chargedot New Energy Technology Co., Ltd, a leading Chinese e-mobility solution provider. The acquisition will extend our relationships with leading Chinese EV manufacturers and broaden our e-mobility portfolio with hardware and software developed specifically for local requirements.

We also continued to make organic growth investments in a disciplined manner, prioritizing research and development and sales expenditure while reducing administrative costs. Total non-order related research and development was \$1.2 billion in 2019, or approximately 4 percent of revenues. Organic investment highlights from 2019 include the opening of the Robotics business's first dedicated healthcare research center at the Texas Medical Center in Houston, United States. This laboratory will focus on developing non-surgical medical robotics systems. The Motion Business unveiled a semi-autonomous production plant in Baden, Switzerland, that makes energy storage systems for railways, e-buses/trolleybuses and e-trucks, incorporating latest battery technologies that allow diesel engines to be efficiently converted to hybrid.

ABB continued to expand its digital ecosystem, announcing several important partnerships over the year, including entering a global software partnership with Dassault Systèmes, a world-leading provider of 3D and digital twin software, and the establishment of a global alliance with Ericsson, the Swedish networking and telecommunications company, focused on exploring future 5G technologies. We also partnered with Huawei, the Chinese information and communication technology provider, for the industrial cloud in China. Partnerships help ensure ABB Ability™ solutions consistently utilize latest high-tech developments, maximizing the value proposition of digital solutions for our customers.

Capital allocation

The Board of Directors is proposing a dividend of 0.80 Swiss francs per share at the 2020 Annual General Meeting.

Our sustained capital allocation priorities are unchanged:

- funding organic growth, research and development, and capital expenditures at attractive 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 at the end of the second quarter of 2020, valuing the business at \$11 billion, we intend to commence a share buyback program returning to shareholders approximately \$7.6-7.8 billion of proceeds from the divestment. We intend to maintain the level of dividend per share after the divestment and aim to maintain our “single A” credit rating long term.

Short-term outlook

Macroeconomic indicators suggest weaker growth in Europe and the U.S., while China’s stabilizing trend might be impacted by the novel coronavirus outbreak. The global economy remains affected by geopolitical uncertainties.

The end-markets we operate in are showing resilience, with headwinds in some markets, particularly the automotive, machine builders, and conventional power generation sectors. Foreign exchange translation effects are expected to continue to influence our results.

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: fair value of assets and liabilities assumed in business combinations; determination of corporate costs directly attributable to discontinued operations; loss contingencies associated with litigation or threatened litigation and other claims and inquiries, environmental damages, product warranties, self-insurance reserves, regulatory and other proceedings; calculation of pension and postretirement benefits and the fair value of pension plan assets; valuation allowances for deferred tax assets and amounts recorded for uncertain tax positions; assumptions used to determine impairment of long-lived assets and in testing goodwill for impairment; inventory obsolescence and net realizable value; the allowance for doubtful accounts; and the percentage-of-completion of projects as well as the amount of variable consideration the Company expects to be entitled to. 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, 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 stand-alone selling price of each product or service 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, subcontractor and project-related overhead costs as well as estimates of the amount of variable consideration to which we expect to be entitled. 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.

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.

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 \$419 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 \$414 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 2019 by \$24 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, 2019, our defined benefit pension plans (in both continuing and discontinued operations) were \$1,751 million underfunded compared to an underfunding of \$1,677 million at December 31, 2018. Our other postretirement plans were underfunded by \$110 million and \$120 million at December 31, 2019 and 2018, 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 6.3 percent per annum for 2020, 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 indefinitely 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 re-evaluate 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 intangibles 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 Businesses for the Electrification, Motion and Robotics & Discrete Automation Businesses. For the Industrial Automation Business, we determined the reporting units to be one level below the Business, as the different products produced or services provided by this business do not share sufficiently similar economic characteristics to aggregate into a single reporting unit.

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 fair 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 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 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 2019, 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.

In 2018, we performed a quantitative impairment test for all of the reporting units applicable at that time. The test reflected assumptions and forecasts resulting from our strategic plan for the period from 2019 to 2023. We concluded that the estimated fair values for each of our reporting units exceeded their respective carrying values and that none of the reporting units were impaired.

The projected future cash flows used in the 2018 fair value calculation for all reporting units, except for the Machine and Factory Automation business within the Industrial Automation Business, 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 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. Through the use of sensitivity analysis, the assumptions used in the fair value calculation were stressed 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.

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, products and solutions of our businesses that are of strategic importance to our future growth. In 2019, we invested \$1,198 million, or approximately 4.3 percent of our 2019 consolidated revenues, on research and development activities in our continuing operations. We also had expenditures of \$50 million, or approximately 0.2 percent of our 2019 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.

In addition to continuous product development, and order-related engineering work, we develop platforms for technology applications in our businesses in our research and development laboratories, which operate on a global basis, such as our ABB Ability™ platform. 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 multiple 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 to recruit and train new personnel. We have built numerous university collaborations in the U.S., Europe and Asia, including long-term, strategic relationships with 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), Zhejiang University and Xi'an Jiaotong University (XJTU).

We are further leveraging our ecosystem to enhance our innovation efforts and gain speed with strategic partners by investing and collaborating with start-ups worldwide via our corporate venture arm ABB Technology Ventures and our start-up collaboration arm SynerLeap.

Our collaborative research and development projects include research on artificial intelligence, 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, wireless communication processes as well as advanced artificial intelligence solutions are designed to improve efficiency in plants and factories around the world, including our own.

ACQUISITIONS AND DIVESTMENTS

Acquisitions

There were no acquisitions in 2019. During 2018 and 2017, ABB paid \$2,638 million and \$1,992 million to purchase three and four 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 U.S., 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. At the time of the acquisition, GEIS had approximately 13,500 employees.

The principal acquisition in 2017 was Bernecker + Rainer Industrie-Elektronik GmbH (B&R), a worldwide provider of product- and software-based, open-architecture solutions for machine and factory automation. At the time of the acquisition, B&R employed more than 3,000 people, including about 1,000 research and development, and application engineers, and operated across 70 countries in the machine and factory automation market segment.

Divestments

In 2019, we recorded net gains (including transaction costs) of \$55 million, primarily due to the divestment of two businesses in China. There were no significant divestments in 2018.

On March 1, 2017, we divested our 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.

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 at the end of the second quarter 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 - Basis of presentation and assets held for sale" to our Consolidated Financial Statements.

Planned divestment of solar inverters business

During 2019, ABB reached an agreement to sell its solar inverters business to FIMER S.p.A. (Italy) for no consideration. Under the agreement ABB is obligated to transfer cash on the closing date and make additional cash payments to the purchaser through to 2025. As a result, in 2019, we recorded a loss, of \$421 million in "Other income (expense), net", representing the excess of the carrying value over the estimated fair value of this business. The carrying value at December 31, 2019, includes a loss arising from the cumulative translation adjustment of \$99 million. The assets and liabilities of this business are included within assets and liabilities held for sale in our Consolidated Balance Sheet as at December 31, 2019. For more information on assets held for sale, see "Note 3 - Basis of presentation and assets held for sale" 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, 2019, 2018 and 2017, were as follows:

Exchange rates into \$	<u>2019</u>	<u>2018</u>	<u>2017</u>
EUR 1.00	1.12	1.15	1.20
CHF 1.00	1.03	1.02	1.02

The average exchange rates between the USD and the EUR and the USD and the CHF for the years ended December 31, 2019, 2018 and 2017, were as follows:

Exchange rates into \$	<u>2019</u>	<u>2018</u>	<u>2017</u>
EUR 1.00	1.12	1.18	1.13
CHF 1.00	1.01	1.02	1.02

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 2019, approximately 74 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 2019, approximately 72 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 21 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 our subsidiaries outside of the United States are generally accounted for 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 future revenues we expect to generate from our orders at any point in time is represented by our order backlog.

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 larger orders result in revenues in periods after the order is booked. Consequently, the level of orders generally cannot be used to accurately predict future revenues or operating performance. Orders that have been placed can often 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 Businesses 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, related and implementation costs,
- 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 (including fair value adjustment on assets and liabilities held for sale),
- 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, costs for planned divestment of the Power Grids business, certain asset write downs/impairments, non-operational gains, 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 Operational EBITA to income from continuing operations before taxes.

ANALYSIS OF RESULTS OF OPERATIONS

Orders and order backlog were as follows:

ORDERS AND ORDER BACKLOG:

(\$ in millions)	2019	2018	2017
Orders	28,588	28,590	25,034
Order backlog at December 31,	13,324	13,084	12,491

Our consolidated results from operations were as follows:

INCOME STATEMENT DATA:

(\$ in millions, except per share data in \$)	2019	2018	2017
Revenues	27,978	27,662	25,196
Cost of sales	(19,072)	(19,118)	(17,350)
Gross profit	8,906	8,544	7,846
Selling, general and administrative expenses	(5,447)	(5,295)	(4,765)
Non-order related research and development expenses	(1,198)	(1,147)	(1,013)
Other income (expense), net	(323)	124	162
Income from operations	1,938	2,226	2,230
Net interest and other finance expense	(148)	(190)	(161)
Non-operational pension (cost) credit	72	83	33
Provision for taxes	(772)	(544)	(583)
Income from continuing operations, net of tax	1,090	1,575	1,519
Income from discontinued operations, net of tax	438	723	846
Net income	1,528	2,298	2,365
Net income attributable to noncontrolling interests	(89)	(125)	(152)
Net income attributable to ABB	1,439	2,173	2,213

Amounts attributable to ABB shareholders:

Income from continuing operations, net of tax	1,043	1,514	1,441
Income from discontinued operations, net of tax	396	659	772
Net income	1,439	2,173	2,213

Basic earnings per share attributable to ABB shareholders:

Income from continuing operations, net of tax	0.49	0.71	0.67
Income from discontinued operations, net of tax	0.19	0.31	0.36
Net income	0.67	1.02	1.04

Diluted earnings per share attributable to ABB shareholders:

Income from continuing operations, net of tax	0.49	0.71	0.67
Income from discontinued operations, net of tax	0.19	0.31	0.36
Net income	0.67	1.02	1.03

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

Orders

(\$ in millions)	2019	2018	2017	% Change	
				2019	2018
Electrification	13,050	11,867	10,143	10%	17%
Industrial Automation	6,432	6,697	6,113	(4)%	10%
Motion	6,782	6,725	5,966	1%	13%
Robotics & Discrete Automation	3,260	3,808	2,977	(14)%	28%
Operating Businesses	29,524	29,097	25,199	1%	15%
Corporate and Other					
Non-core and divested businesses	(91)	364	643	n.a.	(43)%
Intersegment eliminations and other	(845)	(871)	(808)	n.a.	n.a.
Total	28,588	28,590	25,034	0%	14%

In 2019, total orders remained stable compared to 2018 (increased 4 percent in local currencies). Total orders reflects the moderate organic growth in the Electrification and Motion Businesses, dampened by lower orders in the Industrial Automation and Robotics & Discrete Automation Businesses. Order declines were most significant in the Robotics & Discrete Automation Business as several of its primary industry sectors reduced order levels. Changes in the business portfolio, mainly from the inclusion of GEIS for a full year in 2019, positively impacted total orders by approximately 3 percent. For additional information about Business order performance in all periods, refer to the relevant sections of “Business analysis” below.

In 2018, total orders increased 14 percent (14 percent in local currencies). Orders grew organically in all Businesses with the most significant growth in the Motion Business, while the Industrial Automation Business also received strong order levels in the Marine & Ports business line. Orders increased approximately 6 percent due to changes in the business portfolio including GEIS, acquired at end June 2018 and a full year of contribution from B&R, acquired in July 2017.

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)	2019	2018	2017	% Change	
				2019	2018
Europe	10,509	10,725	9,202	(2)%	17%
The Americas	9,057	8,243	7,006	10%	18%
Asia, Middle East and Africa	9,022	9,622	8,826	(6)%	9%
Total	28,588	28,590	25,034	0%	14%

Orders in 2019 grew in the Americas but decreased in Asia, Middle East and Africa and in Europe. In the Americas orders increased 10 percent (11 percent in local currencies). Orders increased in Chile, Brazil, Argentina, Canada, Mexico, Peru and the United States. In Asia, Middle East and Africa orders declined 6 percent (4 percent in local currencies), negatively impacted by the Motion and Robotics & Discrete Automation Businesses. Orders were higher in Qatar, Singapore, Japan, Australia and South Korea while they declined in China, India, Saudi Arabia, the United Arab Emirates and South Africa. In Europe orders declined 2 percent (increased 4 percent in local currencies). Orders in local currencies increased in the Industrial Automation and Motion Businesses. Orders declined in Norway, the United Kingdom, Switzerland, Finland, Italy and Sweden. Orders remained flat in Switzerland while they increased in France, Denmark, Germany, the Netherlands, Russia and Spain. Growth in the Americas included a 10 percent increase due to changes in the business portfolio, primarily due to the inclusion of GEIS for a full year. In Europe, these changes had a positive impact of 2 percent while these changes had a negative impact of 3 percent in Asia, Middle East and Africa.

Orders in 2018 increased in all regions. In Europe orders grew 17 percent (14 percent in local currencies) and grew in all of the Businesses. 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 & Discrete Automation Business. 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.

Order backlog

(\$ in millions)	December 31,			% Change	
	2019	2018	2017	2019	2018
Electrification	4,488	4,113	3,098	9%	33%
Industrial Automation	5,077	4,986	5,171	2%	(4)%
Motion	2,967	2,740	2,674	8%	2%
Robotics & Discrete Automation	1,356	1,438	1,279	(6)%	12%
Operating Businesses	13,888	13,277	12,222	5%	9%
Corporate and Other					
Non-core and divested businesses	192	555	1,055	(65)%	(47)%
Intersegment eliminations	(756)	(748)	(786)	n.a.	n.a.
Total	13,324	13,084	12,491	2%	5%

Consolidated order backlog increased 2 percent (2 percent in local currencies) from December 31, 2018, to December 31, 2019. Order backlog increased in the Electrification Business, supported by order growth in all regions, especially in Asia, Middle East and Africa as well as in Europe. Order backlog also increased in the Motion Business driven by higher order intake in Europe mainly from Germany, Spain, Russia, Finland and France. Order backlog in the Industrial Automation Business increased slightly due to the order intake in the system business and in Turbocharging. Order backlog declined in the Robotics & Discrete Automation Business as a result of the weak order intake in the Robotics business.

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 Business due to the acquisition of GEIS in June 2018 and in the Motion and Robotics & Discrete Automation Businesses. In the Industrial Automation Business, 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.

Revenues

(\$ in millions)	2019	2018	2017	% Change	
				2019	2018
Electrification	12,728	11,686	10,094	9%	16%
Industrial Automation	6,273	6,500	6,472	(3)%	0%
Motion	6,533	6,463	5,877	1%	10%
Robotics & Discrete Automation	3,314	3,611	2,957	(8)%	22%
Operating Businesses	28,848	28,260	25,400	2%	11%
Corporate and Other					
Non-core and divested businesses	37	273	661	(86)%	(59)%
Intersegment eliminations and other	(907)	(871)	(865)	n.a.	n.a.
Total	27,978	27,662	25,196	1%	10%

In 2019, revenues increased 1 percent (5 percent in local currencies). Revenues were higher in the Electrification and Motion Businesses while revenues decreased in the Industrial Automation and Robotics & Discrete Automation Businesses. In the Electrification Business, higher revenues were mainly attributable to the inclusion of a full year of revenues from GEIS. The revenue decrease in the Robotics & Discrete Automation Business was due to weakness in automotive-related sectors and weak book-and-bill business. For additional information about the Business revenues performance in all periods, please refer to “Business analysis” below.

Revenues in 2018 increased 10 percent (9 percent in local currencies) with growth in all Businesses except Industrial Automation, reflecting the trend in orders during 2018. In Electrification, the increase in revenues was mainly attributable to the acquisition of GEIS in June 2018. The increase in revenues in the Robotics & Discrete Automation Business was mainly attributable to the inclusion of a full year of revenues for B&R which was acquired in July 2017.

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)	2019	2018	2017	% Change	
				2019	2018
Europe	10,097	10,129	9,142	0%	11%
The Americas	8,955	8,042	6,870	11%	17%
Asia, Middle East and Africa	8,926	9,491	9,184	(6)%	3%
Total	27,978	27,662	25,196	1%	10%

In 2019, revenue growth was mixed across the regions. In Europe, revenues remained flat (increased 6 percent in local currencies) with higher local currency revenues in the Electrification, Motion and Robotics & Discrete Automation Businesses and lower revenues in the Industrial Automation Business. Revenues increased in the Netherlands, Spain, Poland, Switzerland and Belgium while they were lower in Finland, Turkey, Italy, Germany and Sweden. Revenues in the Americas increased 11 percent (13 percent in local currencies) largely due to the impact of including GEIS for a full year. Revenues were higher in the U.S., Mexico, Canada, Peru and Chile. In Asia, Middle East and Africa, revenues decreased 6 percent (3 percent in local currencies) due to lower revenues in the Robotics and Energy Industries business lines. Revenues declined in Saudi Arabia, South Korea, South Africa, India and China but increased in Australia, Japan and Singapore.

In 2018, revenues increased in all regions. In Europe, revenues increased 11 percent (9 percent in local currencies) reflecting growth in the Motion Business as well as the Electrification Business, which benefited from the acquisition of GEIS. Revenues grew in the Robotics & Discrete Automation Business 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.

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 2019, cost of sales was steady (increased 3 percent in local currencies) at \$19,072 million and the gross margin improved by 0.9 percent as cost of sales as a percentage of revenues decreased from 69.1 percent in 2018 to 68.2 percent in 2019. Gross margins improved in the Electrification Business, despite the dilutive impacts of the GEIS business and were also higher in the Motion Business. Margins were lower in the Industrial Automation and Robotics & Discrete Automation Businesses. Lower losses in Non-core businesses also reduced cost of sales. Continued price-erosion was lower than in 2018 and we had some positive impacts from changes in commodity prices. We also benefited from the results of supply chain and operational excellence initiatives.

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 Motion Business. 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.

Selling, general and administrative expenses

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

(\$ in millions, unless otherwise stated)	2019	2018	2017
Selling expenses	3,383	3,228	2,864
<i>Selling expenses as a percentage of orders received</i>	<i>11.8%</i>	<i>11.3%</i>	<i>11.4%</i>
General and administrative expenses	2,064	2,067	1,901
<i>General and administrative expenses as a percentage of revenues</i>	<i>7.4%</i>	<i>7.5%</i>	<i>7.5%</i>
Total selling, general and administrative expenses	5,447	5,295	4,765
<i>Total selling, general and administrative expenses as a percentage of revenues</i>	<i>19.5%</i>	<i>19.1%</i>	<i>18.9%</i>
<i>Total selling, general and administrative expenses as a percentage of the average of orders received and revenues</i>	<i>19.3%</i>	<i>18.8%</i>	<i>19.0%</i>

In 2019, general and administrative expenses remained at the same level as in 2018 (increased 3 percent in local currencies). As a percentage of revenues, general and administrative expenses decreased to 7.4 percent from 7.5 percent in 2018. General and administrative expenses were impacted by approximately \$240 million of restructuring and implementation expenses for the OS program and additional general and administrative expenses from the integration of the acquired GEIS business. General and administrative expenses were also impacted by the costs associated with the planned divestment of the Power Grids business. General and administrative expenses in 2019 benefited from a \$72 million reduction of stranded corporate costs compared to 2018. Stranded costs are overhead and other management costs which could previously be allocated to the Power Grids business.

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 2017, 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.

In 2019, selling expenses increased 5 percent compared to 2018 (8 percent in local currencies) and includes \$27 million of restructuring and implementation expenses for the OS program. We also increased investments in sales efforts in selective businesses including Machine and Factory Automation, Process Industries, Installation Products, Measurement & Analytics and Drives and also had higher selling expenses from the impact of including a full year of the acquired GEIS business. These factors resulted in increasing selling expenses as a percentage of orders received from 11.3 percent to 11.8 percent.

In 2018, selling expenses increased 13 percent compared to 2017 (12 percent in local currencies) primarily driven by extended sales activities in selective businesses 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 2019, selling, general and administrative expenses increased 3 percent compared to 2018 (6 percent in local currencies) and as a percentage of the average of orders and revenues, selling, general and administrative expenses increased from 18.8 percent to 19.3 percent mainly from the impact of the higher selling expenses described above.

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.

Non-order related research and development expenses

In 2019, non-order related research and development expenses increased 4 percent (9 percent in local currencies) compared to 2018 driven by a continued focus on investments in promising key technologies.

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.

Non-order related research and development expenses as a percentage of revenues increased in 2019 to 4.3 percent, after increasing to 4.1 percent in 2018 from 4.0 percent in 2017.

Other income (expense), net

(\$ in millions)	2019	2018	2017
Restructuring and restructuring-related expenses ⁽¹⁾	(69)	(37)	(35)
Net gain from sale of property, plant and equipment	51	57	37
Asset impairments	(61)	(36)	(27)
Fair value adjustment on assets and liabilities held for sale	(421)	—	—
Favorable resolution of an uncertain purchase price adjustment	92	—	—
Net gain (loss) from sale of businesses	55	57	252
Gain on liquidation of foreign subsidiary	—	31	—
Income from equity-accounted companies and other income (expense), net	30	52	(65)
Total	(323)	124	162

(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, our share of income or loss from equity-accounted companies as well as other losses.

In 2019, “Other income (expense), net” was a loss of \$323 million, while it was a gain of \$124 million in 2018. In 2019, the amount includes the impact of recording a loss of \$421 million for a fair value adjustment to the net assets of the solar inverters business which was classified as held for sale in June 2019. See “Note 3 - Basis of presentation and assets held for sale” to our Consolidated Financial Statements for additional information. Partially offsetting this was a gain of \$92 million due to a favorable resolution of an uncertain purchase price adjustment relating to the acquisition of GEIS. See “Note 4 - Acquisitions and business divestments” to our Consolidated Financial Statements for additional information.

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) and a currency-related gain on a substantial liquidation of a foreign subsidiary.

Income from operations

(\$ in millions)	2019	2018	2017	% Change	
				2019	2018
Electrification	1,049	1,290	1,352	(19)%	(5)%
Industrial Automation	700	853	829	(18)%	3%
Motion	1,009	924	707	9%	31%
Robotics & Discrete Automation	298	456	387	(35)%	18%
Operating Businesses	3,056	3,523	3,276	(13)%	8%
Corporate and Other	(1,113)	(1,302)	(1,052)	n.a.	n.a.
Intersegment elimination	(5)	5	6	n.a.	n.a.
Total	1,938	2,226	2,230	(13)%	0%

In 2019 and 2018, 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)	2019	2018	2017
Interest and dividend income	67	72	73
Interest and other finance expense	(215)	(262)	(234)
Net interest and other finance expense	(148)	(190)	(161)

In 2019, “Interest and other finance expense” decreased compared to 2018 primarily due to lower foreign exchange losses compared to 2018 as well as lower effective interest rates on outstanding long-term debt.

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.

Non-operational pension (cost) credit

The Non-operational pension credit of \$72 million in 2019 was lower than the \$83 million recorded in 2018 primarily due to a smaller pension asset base used in the computation of the expected return on assets and in increase in the settlement charges, partially offset by the change in approach used to calculate the interest cost as described in “Note 17 - Employee benefits” to our Consolidated Financial Statements.

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.

Provision for taxes

(\$ in millions)	2019	2018	2017
Income from continuing operations before taxes	1,862	2,119	2,102
Provision for taxes	(772)	(544)	(583)
Effective tax rate for the year	41.5%	25.7%	27.7%

In 2019, the effective tax rate increased from 25.7 percent to 41.5 percent. The distribution of income within the group resulted in a lower weighted-average global tax rate, including the impact of recording a loss for the planned sale of the solar inverters business which reduced the weighted-average global tax rate by approximately 2 percent. In connection with this loss, we also recorded a change in a valuation allowance which increased the effective tax rate by approximately 6 percent. During 2019, the effective tax rate also increased further due to impacts relating to the planned divestment of the Power Grids business, primarily including non-deductible expenses, taxes payable due to the reorganization of the business in connection with the planned sale, changes to valuation allowances and additional taxes for unremitted earnings. Additionally, the effective tax rate also increased due to changes in valuation allowances and changes in taxes due to interpretation of tax law and double tax treaty agreements by competent tax authorities. See “Note 3 - Basis of presentation and assets held for sale” to our Consolidated Financial Statements for additional information.

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.

Income from continuing operations, net of tax

As a result of the factors discussed above, income from continuing operations, net of tax, decreased by \$485 million to \$1,090 million in 2019 compared to 2018, and increased by \$56 million to \$1,575 million in 2018 compared to 2017.

Income from discontinued operations, net of tax

Income from discontinued operations, net of tax, was \$438 million, \$723 million and \$846 million for 2019, 2018 and 2017, 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 at the end of the second quarter 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. In addition, consistent with the presentation of the business as discontinued operations, during 2019, we have not recorded depreciation or amortization on the property, plant and equipment, and intangible assets reported as discontinued operations. In 2018 and 2017, respectively, a total of \$258 million and \$265 million of depreciation and amortization expense was recorded for such assets.

Income from discontinued operations excludes certain costs which were previously allocated to the Power Grids business as these costs were not directly attributable to the business. As a result, \$225 million, \$297 million and \$286 million, for 2019, 2018 and 2017, respectively, of allocated overhead and other management costs (stranded corporate costs), which were previously able to be included in the measure of segment profit for the Power Grids business are now reported as part of Corporate and Other. In 2019 and 2018, income from discontinued operations, before taxes, included \$28 million and \$18 million, respectively, for costs incurred to execute the transaction.

Income from discontinued operations for 2019, 2018 and 2017 included income from operations of \$605 million, \$951 million and \$1,119 million, respectively. In addition, in 2019, 2018 and 2017 we recorded \$167 million, \$228 million and \$273 million, respectively, as provision for taxes within discontinued operations.

For additional information on the planned divestment and discontinued operations see “Note 3 - Basis of presentation and assets held for sale” 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 \$734 million to \$1,439 million in 2019 compared to 2018, and decreased by \$40 million to \$2,173 million in 2018 compared to 2017.

Earnings per share attributable to ABB shareholders

(in \$)	2019	2018	2017
<i>Basic earnings per share attributable to ABB shareholders:</i>			
Income from continuing operations, net of tax	0.49	0.71	0.67
Income from discontinued operations, net of tax	0.19	0.31	0.36
Net income	0.67	1.02	1.04
<i>Diluted earnings per share attributable to ABB shareholders:</i>			
Income from continuing operations, net of tax	0.49	0.71	0.67
Income from discontinued operations, net of tax	0.19	0.31	0.36
Net income	0.67	1.02	1.03

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.

Business analysis

Electrification Business

The financial results of our Electrification Business, including the operations of GEIS which was acquired in June 2018, were as follows:

(\$ in millions)	2019	2018	2017	% Change	
				2019	2018
Orders	13,050	11,867	10,143	10%	17%
Order backlog at December 31,	4,488	4,113	3,098	9%	33%
Revenues	12,728	11,686	10,094	9%	16%
Income from operations	1,049	1,290	1,352	(19)%	(5)%
Operational EBITA	1,688	1,626	1,510	4%	8%

Orders

Approximately two-thirds of the Business'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. Approximately half of the Business's orders are received via third-party distributors; as a consequence, end-customer market data is based partially on management estimates.

In 2019, orders increased 10 percent (14 percent in local currencies) with broad-based growth across regions and business lines. The increase in orders was impacted mostly due to acquisitions, primarily as GEIS was included in 2019 for a full year. The order growth was driven mainly by systems and long-cycle businesses, with utilities, oil and gas, renewables, electric vehicle infrastructure and data centers demand contributing strongly to the order intake. Construction demand overall remained positive with signs of easing in some key markets, particularly in terms of residential developments. Demand from transport & infrastructure remained positive with strong demand for electric vehicle infrastructure and continued investment in rail infrastructure. Data centers continued to be an attractive market with key investments in hyperscale and co-location developments. The oil and gas and distribution utilities sectors showed signs of recovery with large project orders in the second half of the year.

In 2018, orders increased 17 percent (16 percent in local currencies) with growth across business lines and regions. The increase in orders was positively impacted by 12 percent due to acquisitions, primarily GEIS. 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 significant 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.

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

(in %)	2019	2018	2017
Europe	33	35	37
The Americas	36	32	27
Asia, Middle East and Africa	31	33	36
Total	100	100	100

In 2019, orders grew in all regions. The relative share of orders from the Americas increased due to strong order growth in the United States driven mainly by the impact of including GEIS for a full year, which has a significant portion of its operations in the United States. Although the share of orders from Europe decreased compared with the previous year, orders in Europe developed positively with order growth led by Germany, Netherlands and Finland. The relative share of orders from Asia, Middle East and Africa decreased slightly compared with 2018, despite an order increase in the region supported by sustained growth in China and India.

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 following the acquisition of GEIS. 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.

Order backlog

In 2019, the order backlog increased 9 percent (9 percent in local currencies) mainly reflecting growth for long-cycle businesses in the Distribution Solutions business. The majority of this order backlog is planned to be converted to revenues during 2020.

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.

Revenues

In 2019, revenues increased 9 percent (12 percent in local currencies). The inclusion of GEIS for a full year contributed 10 percentage points of the revenue growth. Revenues in local currencies grew across all business lines, with long-cycle businesses such as the electric vehicle charging infrastructure business and Solar growing at a higher pace than our short-cycle product businesses. Revenues developed positively in most end-customer sectors, with strong growth in e-mobility, renewables and data centers. Growth in the transportation sectors was driven particularly by investments in urban transport. Revenues also grew in industries such as oil and gas, whereas the construction sector benefited from continued public investments in hospitals and education facilities.

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 business.

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

(in %)	2019	2018	2017
Europe	33	35	37
The Americas	37	32	27
Asia, Middle East and Africa	30	33	36
Total	100	100	100

In 2019, the relative share of revenues from the Americas increased primarily due to the impact of the inclusion of GEIS for a full year, which has a significant portion of its operations in the United States. Although the share of revenues from Europe decreased compared with the previous year, orders in Europe developed positively supported by growth in the Netherlands, Switzerland and Germany. Revenues from Asia, Middle East and Africa decreased compared with 2018 reflecting a lower level of revenues particularly from South Korea.

In 2018, the relative share of revenues from the Americas increased primarily due to the impact of the acquisition of GEIS. 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.

Income from operations

In 2019, income from operations decreased 19 percent, mainly reflecting a loss of \$421 million recognized to record the solar inverters business at fair value. During 2019, we announced an agreement to sell the solar inverters business to FIMER S.p.A. At December 31, 2019, this business is presented as held-for-sale and completion of the sale is expected in the first quarter of 2020. The loss from this sale was partly offset by gains from sales of businesses of \$42 million. We also recognized a gain of \$92 million relating to the receipt of cash from General Electric for a favorable resolution of an uncertainty with respect to the price paid to acquire GEIS. In 2019, we had \$49 million lower acquisition-related expenses and post-acquisition integration costs compared to 2018, whereas restructuring and related expenses were \$14 million higher than the previous year. 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. In addition, the Business recorded lower warranty costs in the solar inverters business than in 2018, and also benefited from slightly lower commodity prices. These positives were partly offset by pricing pressures in the Distribution Solutions and Solar businesses. Changes in foreign currencies, including the impacts from FX/commodity timing differences summarized in the table below, negatively affected income from operations by 1 percent.

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 Business 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 Business also recorded significant warranty costs for certain solar inverters. In addition, restructuring, related and implementation costs 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.

Operational EBITA

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

(\$ in millions)	2019	2018	2017
Income from operations	1,049	1,290	1,352
Acquisition-related amortization	115	106	98
Restructuring, related and implementation costs ⁽¹⁾	112	98	28
Changes in pre-acquisition estimates	22	19	8
Gains and losses from sale of businesses	(42)	(81)	—
Fair value adjustment on assets and liabilities held for sale	421	—	—
Favorable resolution of an uncertain purchase price adjustment	(92)	—	—
Acquisition- and divestment-related expenses and integration costs	119	168	23
Certain other non-operational items	3	(2)	21
FX/commodity timing differences in income from operations	(19)	28	(20)
Operational EBITA	1,688	1,626	1,510

(1) Amount in 2017 also includes the incremental implementation costs in relation to the White Collar Productivity program.

In 2019, Operational EBITA increased 4 percent (8 percent excluding the impacts from changes in foreign currencies) compared to 2018, primarily due to the reasons described under “Income from operations”, excluding the explanations related to the reconciling items in the table above.

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.

Industrial Automation Business

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

(\$ in millions)	2019	2018	2017	% Change	
				2019	2018
Orders	6,432	6,697	6,113	(4)%	10%
Order backlog at December 31,	5,077	4,986	5,171	2%	(4)%
Revenues	6,273	6,500	6,472	(3)%	0%
Income from operations	700	853	829	(18)%	3%
Operational EBITA	732	914	902	(20)%	1%

Orders

Orders in 2019 decreased 4 percent (flat in local currencies) primarily reflecting the impact of selective large capital expenditure projects in oil and gas, and mining which continued to be at low levels. The underlying base business continued to be strong as investment in maintenance activities, digitalization upgrades and other discretionary projects improved, in particular for oil and gas, chemical and process industry customers. Orders were steady in almost all industries with the exception of conventional power generation which was depressed as seen in the order levels for Energy Industries and Turbocharging.

Orders in 2018 increased 10 percent (8 percent in local currencies) and was 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. In 2018, demand for Measurement and Analytics products was quite strong. Demand for ABB Ability™ solutions and services contributed to positive order momentum.

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

(in %)	<u>2019</u>	<u>2018</u>	<u>2017</u>
Europe	40	42	40
The Americas	25	23	24
Asia, Middle East and Africa	35	35	36
Total	<u>100</u>	<u>100</u>	<u>100</u>

In 2019, orders decreased slightly in Europe reflecting the larger orders in 2018 from the cruise ship sector and resulted in a reduction in the share of orders in Europe. The share of orders in the Americas increased slightly, supported by positive development in Marine and Ports business in the U.S., as well as the Process Industries business in South America. In Asia, Middle East and Africa, the share of orders remained stable as a result of large capital expenditures for specialty vessels and strong demand in China.

In 2018, orders from all regions increased. In Europe, the share of orders increased due to strong demand for cruise and specialty vessels. Orders in the Americas grew but the share of orders decreased as Europe had significant increases. In Asia, Middle East and Africa, growth was steady but lower than the other regions, thus reducing this region's share.

Order backlog

The order backlog at the end of 2019 was 2 percent higher (2 percent higher in local currencies) than at the end of 2018. The backlog continued to benefit from orders for specialty vessels which are executed over multiple years. In addition, the Business continued to see recovery in demand for oil and gas, chemical and the Process Industries as well as strong demand for shorter cycle products. Demand for conventional power generation was depressed putting negative pressure on the positive order backlog development.

The order backlog at the end of 2018 was 4 percent lower (1 percent higher in local currencies) than at the end of 2017. The local currency increase reflects the benefit from orders for cruise and specialty vessels which are executed over multiple years.

Revenues

In 2019, revenues decreased 3 percent (flat in local currencies). Process Industries realized high revenue levels benefiting from strong book-and-bill business and good execution of the order backlog. This was offset by lower revenues across other businesses predominantly in Energy Industries and Turbocharging driven by weaknesses in the conventional power generation market. Energy Industries were also impacted by the project-related challenges in the Kusile power generation project in South Africa.

In 2018, revenues were steady (steady in local currencies). The majority of the business lines recorded higher revenues, especially the Process Industries, Measurement and Analytics and Turbocharging business lines. Revenues were lower in the Energy Industries business line. During the year, the Business 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.

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

(in %)	<u>2019</u>	<u>2018</u>	<u>2017</u>
Europe	40	39	39
The Americas	25	23	21
Asia, Middle East and Africa	35	38	40
Total	<u>100</u>	<u>100</u>	<u>100</u>

In 2019, revenues were higher in the Americas, slightly weaker in Europe and grew strongly in Asia, Middle East and Africa. Despite revenue declines in Europe across most business lines, the share of revenues in Europe increased slightly. In the Americas, the share of revenues grew benefiting from strong book-and-bill business and higher execution from the order backlog compared to a year ago. Revenues in the U.S. grew primarily on strong development in Process Industries and Marine and Ports. In Asia, Middle East and Africa, weaker revenues were impacted by slower growth in Energy Industries and Turbocharging. The Process Industries business was lower in China and South Korea while the Marine and Ports business declined in the United Arab Emirates. Revenues in the Energy Industries business were negatively impacted by project-related challenges in the Kusile power generation project in South Africa.

In 2018, revenues improved in the Americas, benefiting from a selective market recovery in Process Industries. The share of revenues from Europe was steady. The Americas increased their share of revenues benefiting 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.

Income from operations

In 2019, income from operations decreased 18 percent compared to 2018 on weaker sales volumes in the Turbocharging business and losses resulting from project-related challenges in the Kusile power generation project in South Africa. Income from operations was also impacted by legal costs relating to challenges in certain projects, unfavorable business mix as well as investments in growth. These impacts could not be offset by the positive results of ongoing business rationalization efforts and other cost saving measures. The impact from changes in foreign currencies, including the impact from changes in the FX/commodity timing differences summarized in the table below, negatively impacted income from operations by 2 percent.

In 2018, income from operations increased 3 percent compared to 2017, benefiting from an improved revenue mix, ongoing progress in the Business'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, negatively impacted income from operations by 4 percent.

Operational EBITA

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

(\$ in millions)	2019	2018	2017
Income from operations	700	853	829
Acquisition-related amortization	4	6	7
Restructuring, related and implementation costs ⁽¹⁾	21	35	85
Gains and losses from sale of businesses	—	3	(2)
Acquisition- and divestment-related expenses and integration costs	—	4	9
Certain other non-operational items	2	3	—
FX/commodity timing differences in income from operations	5	10	(26)
Operational EBITA	732	914	902

(1) Amount in 2017 also includes the incremental implementation costs in relation to the White Collar Productivity program.

In 2019, Operational EBITA decreased 20 percent (18 percent excluding the impacts from changes in foreign currencies) compared to 2018. The change is due to the reasons described under "Income from operations", excluding the explanations related to the reconciling items in the table above.

In 2018, Operational EBITA increased 1 percent (1 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.

Motion Business

The financial results of our Motion Business were as follows:

(\$ in millions)	2019	2018	2017	% Change	
				2019	2018
Orders	6,782	6,725	5,966	1%	13%
Order backlog at December 31,	2,967	2,740	2,674	8%	2%
Revenues	6,533	6,463	5,877	1%	10%
Income from operations	1,009	924	707	9%	31%
Operational EBITA	1,082	1,023	838	6%	22%

Orders

In 2019, orders increased 1 percent (4 percent in local currencies). Order growth was driven by increased demand from process industries such as oil, gas and chemicals as well as rising demand from transport & infrastructure sectors with rail, water and waste water, and wind growing strongly. The Business experienced a slightly slower demand from traditional heavy industries such as mining and metals, minerals, and pulp and paper.

In 2018, orders increased 13 percent (12 percent in local currencies). Order growth was driven by demand from process industries such as oil, gas, mining and metals as well as demand from discrete industries such as food and beverage. The Business noted rising demand from light industries for smaller-sized drives and motor solutions as well as solid significant order intake for traction solutions from the rail industry.

The geographic distribution of orders for our Motion Business was as follows:

(in %)	2019	2018	2017
Europe	35	34	33
The Americas	36	37	39
Asia, Middle East and Africa	29	29	28
Total	100	100	100

In 2019, Europe increased its relative share of orders on growth across the main countries including Germany, Italy and Spain. The Asia, Middle East and Africa share remained stable with good performance in China which was partly offset by other markets. The Americas share of orders declined as a result of slight decrease of the orders in the United States.

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.

Order backlog

The order backlog in 2019 increased 8 percent (9 percent in local currencies) compared to 2018. The order backlog increased in all business lines, reflecting strong long-cycle order growth in 2019.

The order backlog in 2018 increased 2 percent (7 percent in local currencies) compared to 2017. The backlog improved in all business lines on strong order growth in 2018.

Revenues

In 2019, revenues grew 1 percent (4 percent in local currencies) compared to 2018. Revenue growth was driven by Drives while revenues in Motors & Generators decreased slightly. The revenue increase was driven by strong execution of the order backlog as well as book-and-bill business. Service revenues continued to improve as the Business continued to leverage its installed base and increased customer demand for ABB Ability™ solutions.

In 2018, revenues increased 10 percent (10 percent in local currencies) compared to 2017. Revenues grew in all business lines driven by steady execution of the order backlog as well as book-and-bill business. Service revenues improved as the Business leveraged its installed base with increased customer demand for ABB Ability™ solutions.

The geographic distribution of revenues for our Motion Business was as follows:

(in %)	2019	2018	2017
Europe	33	33	33
The Americas	36	38	39
Asia, Middle East and Africa	31	29	28
Total	100	100	100

In 2019, revenue growth in Asia, Middle East and Africa is reflected in the increase in the relative share of revenues from this region as revenues grew in China, India and Japan. The share of revenues from Europe remained stable despite revenue growth across many countries including Germany and France. Revenues from the Americas declined as revenues were lower in the U.S., lowering the relative market share of the region compared to 2018.

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 U.S.

Income from operations

In 2019, income from operations increased 9 percent compared to 2018 driven by higher sales volumes, continued cost discipline and operational performance. In 2019, the Business also benefited from lower restructuring and restructuring-related expenses. Changes in foreign currencies, including the impacts from FX/commodity timing differences summarized in the table below, negatively impacted income from operations by 3 percent.

In 2018, income from operations increased 31 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 higher 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.

Operational EBITA

The reconciliation of Income from operations to Operational EBITA for the Motion Business was as follows:

(\$ in millions)	2019	2018	2017
Income from operations	1,009	924	707
Acquisition-related amortization	53	61	64
Restructuring, related and implementation costs ⁽¹⁾	12	17	63
Gains and losses from sale of businesses	—	4	—
Acquisition- and divestment-related expenses and integration costs	—	2	—
Certain other non-operational items	14	10	—
FX/commodity timing differences in income from operations	(6)	5	4
Operational EBITA	1,082	1,023	838

(1) Amount in 2017 also includes the incremental implementation costs in relation to the White Collar Productivity program.

In 2019, Operational EBITA increased 6 percent (9 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 2018, Operational EBITA increased 22 percent (21 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.

Robotics & Discrete Automation Business

The financial results of our Robotics & Discrete Automation Business were as follows:

(\$ in millions)	2019	2018	2017	% Change	
				2019	2018
Orders	3,260	3,808	2,977	(14)%	28%
Order backlog at December 31,	1,356	1,438	1,279	(6)%	12%
Revenues	3,314	3,611	2,957	(8)%	22%
Income from operations	298	456	387	(35)%	18%
Operational EBITA	393	528	473	(26)%	12%

Orders

In 2019, orders decreased 14 percent (11 percent in local currencies). Demand was weakened by headwinds in traditional automotive and automotive-related sectors as well as in the machine builders and electronics markets. Demand for warehouse automation was strong in 2019. The Business continued to benefit from a large order intake for robot systems from certain parts of the automotive sector, including for new electric vehicle manufacturing lines, although on lower levels than in 2018.

In 2018, orders grew 28 percent (25 percent in local currencies), primarily due to the impact of including B&R for a full year in 2018 which contributed 15 percent to order growth. Order growth was also driven by demand from discrete industries such as automotive and food and beverage as well as machine builders. The Business also benefited from solid order intake for robot systems from the automotive sector.

The geographic distribution of orders for our Robotics & Discrete Automation Business was as follows:

(in %)	<u>2019</u>	<u>2018</u>	<u>2017</u>
Europe	53	49	45
The Americas	14	13	16
Asia, Middle East and Africa	33	38	39
Total	<u>100</u>	<u>100</u>	<u>100</u>

In 2019, orders decreased in all regions. The relative share of orders from Asia, Middle East and Africa decreased due to weak demand in China which then resulted in an increase in the relative share of orders from both the Americas and Europe.

In 2018, orders grew in all regions. The relative share of orders from Europe increased, reflecting the impact of including B&R for a full year in 2018. The relative share of orders from Asia, Middle East and Africa remained steady due to strong growth in China. The relative share of orders from the Americas decreased.

Order backlog

The order backlog in 2019 decreased 6 percent (5 percent in local currencies) compared to 2018. The backlog decrease reflected the reduced order intake in all businesses due to a decline in market demand in 2019.

The order backlog in 2018 increased 12 percent (18 percent in local currencies) compared to 2017. The backlog improved in all businesses on strong order growth in 2018.

Revenues

In 2019, revenues decreased 8 percent (4 percent in local currencies) compared to 2018. Revenues decreased in all businesses due to lower volumes from book-and-bill business, partially offset by steady execution of the order backlog. Service revenues decreased, driven by weak demand from automotive and automotive-related sectors.

In 2018, revenues increased 22 percent (20 percent in local currencies) compared to 2017, partially due to the impact of including B&R for a full year in 2018 which contributed 14 percent to the revenue increase. Revenues grew in all businesses driven by steady execution of the order backlog as well as book-and-bill business. Service revenues continued to improve as the Business leveraged its installed based and increased customer demand for ABB Ability™ solutions.

The geographic distribution of revenues for our Robotics & Discrete Automation Business was as follows:

(in %)	<u>2019</u>	<u>2018</u>	<u>2017</u>
Europe	51	49	43
The Americas	14	13	18
Asia, Middle East and Africa	35	38	39
Total	<u>100</u>	<u>100</u>	<u>100</u>

In 2019, revenues decreased in all regions. The relative share of revenues from Asia, Middle East and Africa decreased due to weak demand in China which resulted in a shift in the relative share of revenues to both the Americas and Europe.

In 2018, revenues were higher in all regions. The relative share of revenues from Europe increased, reflecting the impact of including B&R for a full year in 2018. The relative share of revenues from Asia, Middle East and Africa remained steady following strong growth in China. The relative share of revenues from the Americas decreased.

Income from operations

In 2019, income from operations decreased 35 percent compared to 2018, driven by lower sales volumes, an adverse change in the revenue mix, partially offset by benefits of cost reduction measures. Acquisition-related amortization was slightly lower than 2018. Changes in foreign currencies, including the impacts from FX/commodity timing differences summarized in the table below, negatively impacted income from operations by 4 percent.

In 2018, income from operations increased 18 percent compared to 2017. Of this increase, B&R contributed approximately 17 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. Restructuring and restructuring-related expenses were slightly higher in 2018 than in 2017, negatively impacting income from operations. Acquisition-related amortization was higher as certain acquired intangible assets were fully amortized in 2017. There was no significant impact on income from operations due to changes in foreign currencies.

Operational EBITA

The reconciliation of Income from operations to Operational EBITA for the Robotics & Discrete Automation Business was as follows:

(\$ in millions)	2019	2018	2017
Income from operations	298	456	387
Acquisition-related amortization	77	82	42
Restructuring, related and implementation costs ⁽¹⁾	12	4	1
Changes in pre-acquisition estimates	—	(11)	—
Acquisition- and divestment-related expenses and integration costs	1	—	45
Certain other non-operational items	4	1	1
FX/commodity timing differences in income from operations	1	(4)	(3)
Operational EBITA	393	528	473

(1) Amount in 2017 also includes the incremental implementation costs in relation to the White Collar Productivity program.

In 2019, Operational EBITA decreased 26 percent (22 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 2018, Operational EBITA increased 12 percent (10 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. 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.

Corporate and Other

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

(\$ in millions)	2019	2018	2017
Corporate headquarters and stewardship	(407)	(496)	(430)
Stranded corporate costs	(225)	(297)	(286)
Corporate research and development	(155)	(170)	(128)
Costs for planned divestment of Power Grids	(141)	—	—
OS program costs	(83)	(11)	—
Corporate real estate	60	75	45
Net gain (loss) from sale of businesses	13	(17)	250
White Collar Productivity program costs	—	—	(107)
Other corporate costs	(11)	(70)	(92)
Divested businesses and other non-core activities	(164)	(316)	(304)
Total Corporate and Other	(1,113)	(1,302)	(1,052)

In 2019, the net loss from operations within Corporate and Other decreased by \$189 million to \$1,113 million. This reflected corporate cost decreases offset by costs for current strategic projects while the losses incurred within the non-core businesses decreased significantly. Costs were lower for corporate headquarters and stewardship costs and corporate research and development expenses while the amount recorded for stranded corporate costs also decreased. In 2019, we incurred restructuring and implementation costs for the OS program and also incurred costs relating to the planned divestment of the Power Grids business.

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 for the increase 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 2019, corporate headquarters and stewardship costs declined by \$89 million to \$407 million from \$496 million, benefiting from savings generated from results of the OS restructuring program efforts. Costs were lower for communications and information technology and also reflected the benefits of a reduction in country-level general management costs. 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.

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 is presented as discontinued operations. These allocated costs do not qualify for being reported as costs within the discontinued operation. During 2019, we reduced the amount of stranded corporate costs by eliminating certain costs and transferring certain previously centralized functions directly to the Power Grids business.

At the end of 2018, we announced the OS program and the implementation of the program in 2019 resulted in higher costs than were incurred in 2018. As of December 31, 2017, we had incurred substantially all costs related to the White Collar Productivity program which we executed from 2015 through 2017. In 2017, costs incurred in connection with this program amounted to \$107 million, including program implementation costs. 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 OS Program and the White Collar Productivity program see “Restructuring and other cost savings initiatives” below.

Corporate real estate primarily includes income from property rentals and gains from the sale of real estate properties. In 2019, 2018 and 2017, income from operations in Corporate real estate included gains from the sale of real estate properties of \$48 million, \$49 million and \$28 million, respectively.

Other corporate costs consist of operational costs of our Corporate Treasury Operations and certain other charges such as costs and penalties associated with legal cases, environmental expenses and impairment charges related to investments.

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 and gas industry were divested to an unconsolidated joint venture at the end of 2017. In addition, in 2018 and 2019, we transferred 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.

In 2019, Divested businesses and other non-core activities reflects challenges in winding down several legacy projects as well as charges for certain retained liabilities of divested businesses. In 2019, we recorded additional losses for legacy substations, plant electrification EPC contracts and the full train retrofit business, which were driven by additional project cost overruns. We also incurred certain customer credit-related losses and a contract termination loss resulting from an unfavorable legal decision.

In 2018, the amount 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, 2019, 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.

Restructuring and other cost savings initiatives

OS program

In December 2018, ABB announced a two-year restructuring program with the objective of simplifying 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 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, core technologies and the ABB Ability™ platform.

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 ⁽¹⁾		Cumulative costs	Total expected costs ⁽¹⁾
	2019	2018	incurred up to December 31, 2019 ⁽¹⁾	
Electrification	18	32	50	80
Industrial Automation	3	21	24	40
Motion	6	1	7	50
Robotics & Discrete Automation	8	—	8	20
Corporate and Other	54	11	65	160
Total	89	65	154	350

(1) Amounts in the table above have been recast to reflect the reorganization of the Company's operating segments in 2019. See "Note 23 - Operating segment and geographic data" to our Consolidated Financial Statements..

By the completion of the program, we estimate that we will achieve a run-rate cost savings of approximately \$500 million, impacting all Businesses and Corporate and Other. These cost savings are expected to mainly impact cost of sales, selling, general and administrative expenses, and non-order related research and development expenses, and are planned to be achieved during 2021. In 2019, we achieved cost savings of approximately \$160 million in line with the target set for the program.

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.

The majority of the remaining cash payments, primarily for employee severance benefits, are expected to occur in 2020 and 2021. We expect that our cash provided by operating activities will be sufficient to cover any expenditures for this restructuring program.

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 the Businesses 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 as well as the cumulative amount of costs incurred under the program:

(\$ in millions)	Net costs incurred in 2017 ⁽¹⁾	Cumulative costs incurred up to December 31, 2017 ⁽¹⁾
Electrification	(17)	72
Industrial Automation	(23)	106
Motion	(10)	42
Robotics & Discrete Automation	(4)	14
Corporate and Other	(32)	91
Total	(86)	325

(1) Amounts in the table above 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 Businesses as well as for corporate functions.

In 2017, a change in estimate of \$118 million was recorded to adjust the amount of our estimated liability for restructuring which was recorded in 2016 and 2015. This change in estimate 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.

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.

Other restructuring-related activities and cost savings initiatives

In 2019, 2018 and 2017, 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 \$114 million, \$116 million and \$181 million in 2019, 2018 and 2017, 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 2019, 2018 and 2017, our financial position benefited from positive cash flow from operating activities (both from continuing and discontinued operations) of \$2,325 million, \$2,924 million and \$3,799 million, respectively.

Our net debt is shown in the table below:

(\$ in millions)	December 31,	
	2019	2018
Short-term debt and current maturities of long-term debt	2,287	2,031
Long-term debt	6,772	6,587
Cash and equivalents	(3,544)	(3,445)
Marketable securities and short-term investments	(566)	(712)
Net debt (defined as the sum of the above lines)	4,949	4,461

Net debt at December 31, 2019, increased \$488 million compared to December 31, 2018, as cash flows from operating activities during 2019 of \$2,325 million was more than offset by cash outflows for the dividend payment to our shareholders (\$1,675 million) and net purchases of property, plant and equipment and intangible assets (\$839 million for both continuing and discontinued operations). We also made payments of dividends to noncontrolling shareholders totaling \$90 million. In addition, net debt decreased by \$32 million due to movements in foreign exchange rates. See “Financial position”, “Investing activities” and “Financing activities” for further details.

Our Corporate 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, 2019 and 2018, the proportion of our aggregate “Cash and equivalents” and “Marketable securities and short-term investments” managed by our Corporate Treasury Operations amounted to approximately 34 percent and 38 percent, respectively.

Throughout 2019 and 2018, 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 the first quarter of 2019, we also continued to place limited funds in connection with reverse repurchase agreements. We actively monitor credit risk in our investment portfolio and derivative portfolio. 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 22 percent of our cash and cash equivalents held at December 31, 2019, was in U.S. dollars, while other significant amounts were held in Chinese renminbi (24 percent), euro (15 percent) and Indian rupee (8 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 12 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:

(\$ in millions)	December 31,	
	2019	2018
Short-term debt and current maturities of long-term debt	2,287	2,031
Long-term debt:		
Bonds	6,587	6,411
Other long-term debt	185	176
Total debt	9,059	8,618

The increase in short-term debt in 2019 was due to the reclassification to short-term of the USD 300 million 2.8% Notes, the issuance of EUR 1,000 million floating rate notes, an increase in outstanding commercial paper of \$244 million mostly offset by the repayment at maturity of the EUR 1,250 million 2.625% instruments. Commercial paper outstanding was \$706 million at December 31, 2019, compared to \$464 million outstanding at December 31, 2018.

At December 31, 2019, Long-term debt increased \$185 million compared to the end of 2018 due primarily to the issuance in 2019 of two new long-term notes with net proceeds totaling \$449 million partially offset by the reclassification to short-term debt of the USD 300 million notes discussed above.

Our debt has been obtained in a range of currencies and maturities and with 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, at December 31, 2019, the effective average interest rate on our floating rate long-term debt (including current maturities) of \$2,221 million and our fixed rate long-term debt (including current maturities) of \$6,000 million was 1.1 percent and 2.4 percent, respectively. This compares with an effective rate of 1.1 percent for floating rate long-term debt of \$3,106 million and 3.6 percent for fixed rate long-term debt of \$4,951 million at December 31, 2018.

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

In December 2019, we replaced our \$2 billion multicurrency revolving credit facility, maturing in 2021, with a new \$2 billion multicurrency revolving credit facility, maturing in 2024. In 2020 and 2021, we have the option to extend the maturity of the new facility to 2025 and 2026, respectively.

No amount was drawn under either of the committed credit facilities at December 31, 2019 and 2018. The replacement facility is for general corporate purposes and 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, 2019, 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, 2019, \$706 million was outstanding under the \$2 billion program in the United States, compared to \$292 million outstanding at December 31, 2018.

At December 31, 2019, no amount was outstanding under the \$2 billion Euro-commercial paper program compared to \$172 million outstanding at December 31, 2018.

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. At December 31, 2019, two bonds (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 \$1,658 million, were outstanding under the program. At December 31, 2018, in addition to these two bonds, one additional bond (principal amount of EUR 1,250 million due in 2019) was outstanding and the combined carrying amount of the three bonds was \$3,100 million.

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, 2019 and 2018, 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, Malaysia, Russian Federation, South Africa, South Korea, Taiwan (Chinese Taipei), Thailand, Turkey and Viet Nam. 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 Corporate 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, 2019 and 2018, 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 \$1,843 million and \$1,796 million, respectively.

During 2019, 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,		% Change
	2019	2018	
Current assets			
Cash and equivalents	3,544	3,445	3%
Marketable securities and short-term investments	566	712	(21)%
Receivables, net	6,434	6,386	1%
Contract assets	1,025	1,082	(5)%
Inventories, net	4,184	4,284	(2)%
Prepaid expenses	191	176	9%
Other current assets	674	616	9%
Assets held for sale and in discontinued operations	9,840	5,164	91%
Total current assets	26,458	21,865	21%

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 2019. The reduction primarily reflects lower amounts placed in reverse repurchase agreements (see “Note 5 - Cash and equivalents, marketable securities and short-term investments” to our Consolidated Financial Statements).

Contract assets decreased 5 percent (4 percent in local currencies). The decrease reflects lower amounts in the non-core businesses and the Robotics & Discrete Automation Business. This was partially offset by higher levels in the Industrial Automation Business.

Inventories, net, decreased 2 percent (1 percent in local currencies). The decrease primarily reflects the impact of the reclassification to held for sale of the inventory in the solar inverters business which decreased inventory by 3 percent.

Current assets held for sale and in discontinued operations increased to \$9,840 million from \$5,164 million due to the reclassification from non-current assets to current assets of the non-current assets in the Power Grids business, which is reported as discontinued operations. This reclassification reflects that this business is expected to be divested within the next 12 months. For the details of the assets of the Power Grids business see “Note 3 - Basis of presentation and assets held for sale” to our Consolidated Financial Statements.

(\$ in millions)	December 31,		% Change
	2019	2018	
Current liabilities			
Accounts payable, trade	4,353	4,424	(2)%
Contract liabilities	1,719	1,707	1%
Short-term debt and current maturities of long-term debt	2,287	2,031	13%
Current operating leases	305	—	n.a.
Provisions for warranties	816	948	(14)%
Other provisions	1,375	1,372	0%
Other current liabilities	3,761	3,780	(1)%
Liabilities held for sale and in discontinued operations	5,650	4,185	35%
Total current liabilities	20,266	18,447	10%

Accounts payable, trade, decreased 2 percent (1 percent in local currencies) primarily reflecting the impact of reclassifying payables of the solar inverters business to liabilities held for sale, which decreased Accounts payable, trade, by 2 percent.

The increase in Short-term debt and current maturities of long-term debt was primarily due a net increase in the balance for the U.S. and Euro commercial paper programs of \$242 million, the amount outstanding for the newly-issued EUR 1,000 million floating-rate notes of \$1,122 million and the reclassification to short-term debt and current maturities of long-term debt of the USD 300 million Notes. This was mostly offset by the repayment in 2019 of the EUR 1,250 million Instruments (\$1,431 million at December 31, 2018).

Current operating leases includes the portion of the operating lease liabilities that are due to be paid in the next 12 months. The amount in 2019 reflects the adoption of a new accounting standard on leases. For a description of the adoption of the new accounting standard and summary of operating lease liabilities, see “Note 2 - Significant accounting policies” and “Note 14 - Leases” to our Consolidated Financial Statements.

Provisions for warranties decreased 14 percent (13 percent in local currencies). The decrease was mainly due to the reclassification of the solar inverters business to held for sale which resulted in a decrease of 11 percent. The remaining decrease was due to cash payments for warranties exceeding the expense recognized in the period. For details on the change in the Provision for warranties, see “Note 15 - Commitments and contingencies” to our Consolidated Financial Statements.

Current liabilities held for sale and in discontinued operations increased to \$5,650 million from \$4,185 million due to the reclassification from non-current liabilities to current liabilities of the non-current liabilities in the Power Grids business, which is reported as discontinued operations. For the details of the liabilities of the Power Grids business see “Note 3 - Basis of presentation and assets held for sale” to our Consolidated Financial Statements.

(\$ in millions)	December 31,		% Change
	2019	2018	
Non-current assets			
Property, plant and equipment, net	3,972	4,133	(4)%
Operating lease right-of-use assets	994	—	n.a.
Goodwill	10,825	10,764	1%
Other intangible assets, net	2,252	2,607	(14)%
Prepaid pension and other employee benefits	133	83	60%
Investments in equity-accounted companies	33	87	(62)%
Deferred taxes	910	1,006	(10)%
Other non-current assets	531	469	13%
Assets held for sale and in discontinued operations	—	3,427	n.a.
Total non-current assets	19,650	22,576	(13)%

In 2019, Property, plant and equipment, net decreased 4 percent (3 percent in local currencies) partly due to the reclassification of the assets of the solar inverters business to held for sale.

In 2019, Goodwill increased 1 percent (1 percent in local currencies). The local increase was due to adjustments recorded to the purchase price of GEIS before the end of the measurement period.

Other intangible assets, net decreased 14 percent (14 percent in local currencies) due to the amortization recorded during the year. For additional information on goodwill and other intangible assets see “Note 11 - Goodwill and other intangibles assets” to our Consolidated Financial Statements.

In 2019, Deferred taxes, decreased 10 percent (7 percent in local currencies). For details on deferred tax assets (see “Note 16 - Income taxes” to our Consolidated Financial Statements).

(\$ in millions)	December 31,		% Change
	2019	2018	
Non-current liabilities			
Long-term debt	6,772	6,587	3%
Non-current operating leases	717	—	n.a.
Pension and other employee benefits	1,793	1,828	(2)%
Deferred taxes	911	927	(2)%
Other non-current liabilities	1,669	1,689	(1)%
Liabilities held for sale and in discontinued operations	—	429	n.a.
Total non-current liabilities	11,862	11,460	4%

Long-term debt increased 3 percent. During 2019, we issued two CHF-denominated bonds having a value of \$463 million at December 31, 2019. This was mostly offset by the reclassification to Short-term debt and current maturities of long-term debt of the USD 300 million Notes. There were no significant impacts from changes in foreign currency rates on Long-term debt. For additional information on Long-term debt, see “Liquidity and Capital Resources—Debt and interest rates”.

Non-current operating leases includes the portion of the operating lease liabilities that are due to be paid in more than 12 months. The amount in 2019 reflects the adoption of a new accounting standard on leases as described above.

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)	2019	2018	2017
Net cash provided by operating activities	2,325	2,924	3,799
Net cash used in investing activities	(815)	(3,085)	(1,450)
Net cash used in financing activities	(1,383)	(789)	(1,735)
Effects of exchange rate changes on cash and equivalents	(28)	(131)	268
Net change in cash and equivalents	99	(1,081)	882

Operating activities

(\$ in millions)	2019	2018	2017
Net income	1,528	2,298	2,365
Less: Income from discontinued operations, net of tax	(438)	(723)	(846)
Depreciation and amortization	961	916	836
Total adjustments to reconcile net income to net cash provided by operating activities (excluding depreciation and amortization)	220	(189)	(406)
Total changes in operating assets and liabilities	(372)	50	639
Net cash provided by operating activities — continuing operations	1,899	2,352	2,588
Net cash provided by operating activities — discontinued operations	426	572	1,211

Cash flows from operating activities of continuing operations in 2019 provided net cash of \$1,899 million, a decrease of 19 percent from 2018 mainly due to a lower cash effective net income (net income adjusted for depreciation, amortization and other non-cash items) which includes the impacts of the costs associated with the planned divestment of the Power Grids business as well as the OS restructuring program. The amount in 2019 also includes the impacts of net cash outflows for an increase in working capital. The higher amount in 2018 also reflected the impacts from extending payment terms with suppliers and the changes in our supplier payment process, which resulted in an increase in trade payables and this impact was not repeated in 2019. The cash flows from operating activities in 2019 was also lower due to the timing of cash payments for accrued liabilities. This was partially offset by more favorable timing of income tax payments which negatively impacted cash flows from operating activities in 2018.

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 was offset by a lower improvement in working capital. Cash flow impacts from changes in working capital showed the impact of extending payment terms with suppliers and the changes in our supplier payment process. 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 of discontinued operations in 2019 decreased to \$426 million from \$572 million in 2018. The primary reason was lower net income from discontinued operations in 2019, mostly offset by more favorable changes in working capital in 2019 compared to 2018, including the impacts in 2018 of the timing of cash collections on large projects and other receivables. 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 net income from discontinued operations as well as negative impacts from the timing of cash collections on large projects and other receivables. 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)	<u>2019</u>	<u>2018</u>	<u>2017</u>
Purchases of investments	(748)	(322)	(666)
Purchases of property, plant and equipment and intangible assets	(762)	(772)	(752)
Acquisition of businesses (net of cash acquired) and increases in cost- and equity-accounted companies	(22)	(2,664)	(2,011)
Proceeds from sales of investments	749	567	1,443
Proceeds from maturity of investments	80	160	100
Proceeds from sales of property, plant and equipment	82	72	61
Proceeds from sales of businesses (net of transaction costs and cash disposed) and cost- and equity-accounted companies	69	113	607
Net cash from settlement of foreign currency derivatives	(76)	(30)	63
Other investing activities	(23)	(32)	37
Net cash used in investing activities — continuing operations	<u>(651)</u>	<u>(2,908)</u>	<u>(1,118)</u>
Net cash used in investing activities — discontinued operations	<u>(164)</u>	<u>(177)</u>	<u>(332)</u>

Net cash used in investing activities for continuing operations in 2019 was \$651 million, compared to \$2,908 million in 2018. The decrease in 2019 was due to the higher amounts for acquisitions of businesses in 2018 (primarily GEIS). This was offset partially by lower net sales of marketable securities and short-term investments and slightly lower purchases of property, plant and equipment in 2019 compared to 2018.

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 the higher amounts used to fund acquisitions of businesses. 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 higher spending on information technology as well as large investments in the U.S. and China. We also had higher 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.

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

(\$ in millions)	<u>2019</u>	<u>2018</u>	<u>2017</u>
Construction in progress	536	523	520
Purchase of machinery and equipment	156	152	125
Purchase of land and buildings	26	28	32
Purchase of intangible assets	44	69	75
Purchases of property, plant and equipment and intangible assets	<u>762</u>	<u>772</u>	<u>752</u>

In 2019, we reduced the level of our excess liquidity invested in marketable securities and short-term investments with net cash inflows of \$81 million. 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. In 2018 and 2017, the net decrease in investments during the year resulted in inflows of \$405 million and \$877 million, respectively. Marketable securities and short-term investments at December 31, 2019 and 2018, consisted primarily of money market funds, and U.S. Government and other corporate bonds. The balance at December 31, 2018, also included amounts placed in reverse repurchase agreements.

In 2019, there were no significant business acquisitions or divestments while 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.

Cash used in investing activities from discontinued operations primarily represents net purchases of property, plant and equipment. The higher amount in 2017 was due to cash paid for acquisition of a business.

Financing activities

(\$ in millions)	2019	2018	2017
Net changes in debt with maturities of 90 days or less	164	221	204
Increase in debt	2,406	1,914	920
Repayment of debt	(2,156)	(830)	(1,000)
Delivery of shares	10	42	163
Purchase of treasury stock	—	(250)	(251)
Dividends paid	(1,675)	(1,717)	(1,635)
Dividends paid to noncontrolling shareholders	(90)	(86)	(83)
Other financing activities	13	(35)	(6)
Net cash used in financing activities — continuing operations	(1,328)	(741)	(1,688)
Net cash used in financing activities — discontinued operations	(55)	(48)	(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 2019, 2018 and 2017, the net inflow for debt with maturities of 90 days or less related primarily to net increases of commercial paper borrowings.

In 2019, the increase in debt was due primarily to the issuance of the following: CHF 280 million 0.3% Notes due 2024, CHF 170 million 1.0% Notes due 2029 and EUR 1,000 million floating rate notes due 2020. 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 2019 and 2018, the increase also included \$774 million and \$316 million, respectively, 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.

During 2019, \$2,156 million of debt was repaid, reflecting primarily the repayment at maturity of the EUR 1,250 million 2.625% Instruments as well as repayments at maturity of \$606 million in commercial paper borrowings having an original maturity of more than 90 days. 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. 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).

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.

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. These amounts may differ from those reported in our Consolidated Balance Sheet at December 31, 2019. 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 below. 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, 2019:

(\$ 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	8,019	1,433	2,532	2,373	1,681
Interest payments related to long-term debt obligations	1,952	179	343	199	1,231
Operating lease obligations ⁽¹⁾	1,125	308	377	209	231
Finance lease obligations ⁽¹⁾	233	37	66	46	84
Purchase obligations	2,380	2,043	332	5	—
Total	13,709	4,000	3,650	2,832	3,227

(1) Lease obligations represent total cash payments to be made in the future, and include an implied interest expense, being the difference between undiscounted cash flows and discounted cash flows, of \$103 million and \$61 million, for operating and finance leases, respectively, as well as including executory costs of \$1 million for finance leases. See “Note 14 - Leases” to our Consolidated Financial Statements.

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, finance 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 \$1,294 million unrecognized tax benefits (net of deferred tax assets) at December 31, 2019, it is expected that \$76 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,	
	2019	2018
	Maximum potential payments⁽¹⁾	
(\$ in millions)		
Performance guarantees	1,860	1,584
Financial guarantees	10	10
Indemnification guarantees	64	64
Total	1,934	1,658

(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, 2019 and 2018, 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, 2019 and 2018, the total outstanding performance bonds aggregated to \$6.8 billion and \$7.4 billion, respectively, of which \$3.7 billion and \$4.3 billion, respectively, relate to discontinued operations. There have been no significant amounts reimbursed to financial institutions under these types of arrangements in 2019, 2018 and 2017.

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 <https://new.abb.com/about/events/corporate-governance>. 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 is provided in the Compensation Report that can be found in the section titled "Compensation" below.

BOARD OF DIRECTORS

Board and Board committees (2019 - 2020 board term)

Board of Directors		
Chairman: Peter R. Voser	Matti Alahuhta	Jennifer Xin-Zhe Li
Vice-Chairman: Jacob Wallenberg	Gunnar Brock	Geraldine Matchett
	David Constable	David Meline
	Frederico Fleury Curado	Satish Pai
	Lars Förberg	
Finance, Audit and Compliance Committee	Governance and Nomination Committee	Compensation Committee
David Meline (chairman)	Jacob Wallenberg (chairman)	David Constable (chairman)
Gunnar Brock	Matti Alahuhta	Frederico Fleury Curado
Geraldine Matchett	Lars Förberg	Jennifer Xin-Zhe Li
Satish Pai		

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 (available at <https://new.abb.com/about/events/corporate-governance>).

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 & Corporate Governance Guidelines (available at <https://new.abb.com/about/events/corporate-governance>) 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) overseeing corporate social responsibility (including health, safety and environment as well as sustainability), (3) nominating candidates for the Board, the role of CEO and other positions on the Executive Committee, and (4) 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, a copy of which has been filed as Exhibit 1.1 to this Annual Report, 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) (available at <https://new.abb.com/about/events/corporate-governance>). 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 (2019-2020 board term):

Board Member	Board Experience		Corporate Officer Experience		Other Business Experience				Global Experience	Country of Origin / Nationality	Gender	Non-Executive	Independent
	ABB Board Tenure (years)	Other Public Board Experience	CEO	CFO	Operations	Risk Management	Sustainability	Digital / Technology					
Peter R. Voser	5	●	●	●	●	●	●	●	●	CH	M	No	No
Jacob Wallenberg	21	●	●		●	●	●	●	●	SE	M	Yes	Yes
Matti Alahuhta	6	●	●		●	●	●	●	●	FI	M	Yes	Yes
Gunnar Brock	2	●	●		●	●	●		●	SE	M	Yes	Yes
David Constable	5	●	●		●	●	●		●	CA	M	Yes	Yes
Frederico Fleury Curado	4	●	●		●	●	●	●	●	BR	M	Yes	Yes
Lars Förberg	3	●	●			●	●		●	SE	M	Yes	Yes
Jennifer Xin-Zhe Li	2	●		●	●	●	●	●	●	CN, CA	F	Yes	Yes
Geraldine Matchett	2			●		●	●		●	UK, FR, CH	F	Yes	Yes
David Meline	4	●		●		●			●	US, CH	M	Yes	Yes
Satish Pai	5	●	●		●	●	●	●	●	IN	M	Yes	Yes

Peter R. Voser has been a member and Chairman of ABB’s Board of Directors since April 2015 and ABB’s Chief Executive Officer since April 2019. He is a member of the board of directors of IBM Corporation (U.S.). He is also a member of the board of directors of Temasek Holdings (Private) Limited (Singapore) as well as 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 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 Fluor 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 co-chief executive officer (since February 2020), 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 (Switzerland) 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. From 2014 through 2019, he was 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, 2019, none of the Board members 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 link (available at <https://new.abb.com/about/events/corporate-governance>).

Board 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. 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. Each board meeting has a private session without management or others being present. Decisions made at the Board meetings are recorded in written minutes of the meetings. Some decisions are also taken by circular resolution.

2019 was an intensive year for the Board and its committees. The table below shows the number of meetings held during 2019 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.

2019 Board and Board Committee Meetings

Meetings and attendance	Pre annual general meeting 2019					Post annual general meeting 2019				
	Board		FACC	GNC	CC	Board		FACC	GNC	CC
	Mtg.	Conf. Call				Mtg.	Conf. Call			
Average duration (hours)	7	1	2.38	1.5	1.75	7	1	2.75	1.75	2
Number of meetings	2	3	6	2	4	5	1	4	3	3
Meetings attended:										
Peter R. Voser	2	3		2		5	1		3	
Jacob Wallenberg	2	3		2		5	1		3	
Matti Alahuhta	2	3		2		5	1		3	
Gunnar Brock	2	3	6	2		5	1	4	3	
David Constable	2	3		2	4	5	1		3	3
Frederico Fleury Curado	2	3		2	4	5	1		3	3
Lars Förberg	2	3		2		5	1		3	
Jennifer Xin-Zhe Li	2	3		2	4	5	1		3	3
Geraldine Matchett	2	3	6	2		5	1	4	3	
David Meline	2	3	6	2		5	1	4	3	
Satish Pai	2	3	6	2		5	1	4	3	

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 (available at <https://new.abb.com/about/events/corporate-governance>).

Fluor Corporation (Fluor) is an important customer of ABB. ABB supplies Fluor mainly through its Industrial Automation, Electrification and Power Grids businesses. David Constable is a director of Fluor.

Rio Tinto, including Rio Tinto plc and Rio Tinto Limited, is an important customer of ABB. ABB supplies Rio Tinto mainly through its Industrial Automation and Power Grids businesses. David Constable is a director of Rio Tinto plc and Rio Tinto Limited.

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

After reviewing the level of ABB's business with Fluor and Rio Tinto 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, except for Peter Voser who was also CEO for most of 2019. This determination was made in accordance with ABB Ltd's 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.

Information and control systems of the Board vis-a-vis the Executive Committee

Information from the Executive Committee

In accordance with the ABB Board Regulations and Corporate Governance Guidelines (available at <https://new.abb.com/about/events/corporate-governance>), the CEO reports regularly to the Board about ABB's overall business and when circumstances require on any extraordinary events that may arise. This includes

- Reports on financial results (including profit and loss, balance sheet and cash flows)
- Changes in key members of management
- Information that may affect the supervisory or monitoring function of the Board (including on matters of strategy and compliance)
- Significant developments in legal matters

At each Board meeting, Board members are briefed by the Chairman, CEO, CFO and other EC members on ABB's business performance and on material developments affecting ABB. Outside of Board meetings, Board members generally channel any requests for information through the Chairman. Board members also obtain information through offsite retreats with the Executive Committee and visits to ABB sites. In addition, Board members obtain information through the Board committees in which they participate and which are also attended by relevant EC members and management representatives from human resources, finance, legal and the business.

Internal Audit

ABB has an Internal Audit team that provides independent objective assurance and other services to help ensure that ABB operates in accordance with applicable laws as well as internal policies and procedures. Internal Audit reports to the FACC and to the CFO. The FACC reviews and approves the internal audit plan, and material changes to the plan. Investigations of potential fraud and inappropriate business conduct are an integral part of the internal audit process. Depending on circumstances Internal Audit may act together with ABB's Office of Special Investigations which is part of ABB's integrity function. Internal Audit reports on a regular basis its main observations and recommendations to the relevant members of the EC and to the FACC as appropriate.

Risk Management

ABB has an enterprise risk management program (ERM) in place which takes into account ABB's size and complexity. ERM provides the EC and the Board with a comprehensive and holistic view of the risks facing the business. ERM involves managing the acceptance of risk to achieve the objectives of the business. The ERM process is typically cyclical in nature, conveying the idea of continuous refinement of the risk management approach in a dynamic business environment. Furthermore, ABB runs a mitigation process for the identified risks that is key to the success of this process. ERM assessments are both top down and bottom up. They cover strategic, financial, and operational risks, both current and long term. Key risks identified and managed in 2019 were those related to the transformation of the group (both the elimination of the regional matrix and the shift of most corporate resources into the businesses) as well as the activities related to the separation, and the preparation for the sale, of the Power Grids business. ERM results are reported to the FACC and the entire Board. This information becomes part of the overall strategic and risk discussions by the Board to help create value for stakeholders.

Information to the Board and the Finance, Audit and Compliance Committee

Supervisory and control instruments vis-à-vis the auditors

Our auditors, KPMG, attend each meeting of the FACC and each meeting includes a private session between the auditors and the FACC without the management being present. In 2019, the FACC had 10 meetings (either in person or via telephone call). On at least an annual basis, the FACC reviews and discusses with the external auditors all significant relationships that the auditors have with the Company that could impair their independence. The FACC reviews the auditor engagement letter and the audit plan including discussion of scope, staffing, locations and general audit approach. The FACC also reviews and evaluates the auditors' judgment on the quality and appropriateness of the company's accounting principles as applied in the financial reporting. In addition, the FACC approves in advance any non-audit services to be performed by the auditors.

At least annually, the FACC obtains and reviews a report by the auditors that includes discussion on:

- the company's internal control procedures
- material issues, if any, raised by the most recent internal quality control review
- critical accounting policies and practices of the company
- all alternative accounting treatments of financial information that were discussed between the auditors and management as well as the related ramifications
- material communications between the auditors and management such as any management letter or schedule of audit differences.

Taking into account the opinions of management the FACC evaluates the qualifications, independence and performance of the auditors. The FACC reports the material elements of its supervision of the auditors to the Board and on an annual basis recommends to the Board the auditors to be proposed for election at the shareholders meeting.

EXECUTIVE COMMITTEE

Composition of the Executive Committee (as at December 31, 2019)

Peter R. Voser

Chief Executive Officer

Corporate Officers

Timo Ihamuotila
Chief Financial Officer

Sylvia Hill
Chief Human Resources Officer

Maria Varsellona
General Counsel

Business Presidents

Tarak Mehta
Electrification

Peter Terwiesch
Industrial Automation

Morten Wierod
Motion

Sami Atiya
Robotics & Discrete Automation

Claudio Facchin
Power Grids

Region Presidents

Frank Duggan
Europe

Chunyuan Gu
Asia, Middle East and Africa

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, 2019):

Peter R. Voser was appointed Chief Executive Officer in April 2019 and is chairman of ABB's Board of directors. Additional information can be found together with the other members of the Board of directors.

Timo Ihamuotila was appointed Chief Financial Officer and member of the Executive Committee in April 2017. He is a member of the board of directors of SoftwareONE AG (Switzerland). 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.

Sylvia Hill was appointed Chief Human Resources Officer and member of the Executive Committee effective June 2019. From 2014 until June 2019 she was ABB's Head of Global HR Services and HR Transformation. From 2011 to 2014 Ms. Hill was the Head of HR for ABB's Discrete Automation division. During 2005 to 2010 she was the Head of HR and Organization Health & Safety for ABB in France and for part of that time she was also the Head of HR for the Mediterranean region. From 1993 through 2005 she held various HR roles with ABB. Ms. Hill was born in 1960 and is a German citizen.

Maria Varsellona was appointed General Counsel and member of the Executive Committee effective November 2019. She is a member of the board of directors of Nordea Bank Abp (Finland). From 2014 to 2019 she was the Chief Legal Officer of Nokia Corporation and from 2018 to 2019 she was also the president of Nokia Technologies. From 2013 to 2014 she was the General Counsel of Nokia Siemens Networks. During the period from 2011 to 2013 Ms. Varsellona was the Group General Counsel of Tetra Pak and from 2009 to 2010 she was the Group General Counsel of Sidel, both part of the Tetra Leval Group. From 2001 to 2009 she held various senior legal roles mainly with GE Oil & Gas. Ms. Varsellona was born in 1970 and is an Italian citizen.

Tarak Mehta was appointed President of the Electrification Business effective April 2019 and has been a member of the Executive Committee since October 2010. He had previously been President of the Electrification Products division since January 2016. 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.

Peter Terwiesch was appointed President of the Industrial Automation Business (formerly 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.

Morten Wierod was appointed President of the Motion Business and member of the Executive Committee effective April 2019. From 2015 until April 2019 he was the Managing Director of the drives business unit in the Robotics and Motion division. During 2011 to 2015, Mr. Wierod was the Managing Director of the control products business unit in the Low Voltage Products division. Between 1998 to 2011, Mr. Wierod held various management roles with ABB. Mr. Wierod was born in 1972 and is a Norwegian citizen.

Sami Atiya was appointed President of the Robotics & Discrete Automation Business effective April 2019 and has been a member of the Executive Committee since June 2016. He had previously been President of the Robotics and Motion division since January 2017. 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.

Claudio Facchin was appointed President of the Power Grids business (formerly 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. Between 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 division 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.

As separately announced, as of December 31, 2019, *Claudio Facchin, Frank Duggan, and Chunyuan Gu* stepped down from their roles on the Executive Committee.

Effective as of March 1, 2020, and previously reported on Form 6-K furnished to the SEC in August 2019, *Bjorn Rosengren* has been appointed as Chief Executive Officer of ABB. He was previously the president and chief executive officer of Sandvik AB. Mr. Rosengren was born in 1959 and is a Swedish citizen.

Further information about the members of the Executive Committee can be found by clicking on the Executive Committee link (available at <https://new.abb.com/about/events/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 (available at <https://new.abb.com/about/events/corporate-governance>).

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, (available at <https://new.abb.com/about/events/corporate-governance>).

ABB has an unsecured syndicated \$2 billion, revolving credit facility. As of December 31, 2019, Nordea Bank Abp (Nordea) had committed to approximately \$105.7 million out of the \$2 billion total. In addition, ABB has regular banking business with Nordea. Maria Varsellona is a director of Nordea.

After reviewing the banking commitments of Nordea, the Board has determined that ABB's business relationships with Nordea 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 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.

SHARES

Share capital of ABB

At December 31, 2019, 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, 2019, ABB Ltd had a market capitalization based on outstanding shares (total number of outstanding shares: 2,133,501,111) of approximately CHF 50 billion (\$51 billion, SEK 480 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, 2019, 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 272 billion.

Stock exchange listings (at December 31, 2019)

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 2019, ABB paid a dividend of 0.80 Swiss francs per share relating to the year 2018. 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.

Except for the share cancellation described above, there were no other changes to ABB's ordinary share capital during 2019, 2018 and 2017.

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, 2019, 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. If this contingent share capital were fully issued this would increase the existing share capital by approximately 9.2 percent. The contingent share capital has not changed during the last three years.

At December 31, 2019, 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. If this contingent share capital were fully issued this would increase the existing share capital by approximately 0.5 percent. This contingent share capital has not changed during the last three years. 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) (available at <https://new.abb.com/about/events/corporate-governance>).

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, 2019, 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. If this contingent share capital were fully issued this would increase the existing share capital by approximately 4.3 percent. This contingent share capital has not changed during the last three years. 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, 2019, 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 May 2, 2021. If the authorized share capital were fully issued, this would increase the existing share capital by approximately 9.2 percent. Aside from renewal at the 2019 AGM, the authorized share capital has not changed during the last three years. 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 (available at <https://new.abb.com/about/events/corporate-governance>).

SHAREHOLDERS

Shareholder structure

As of December 31, 2019, the total number of shareholders directly registered with ABB Ltd was approximately 109,000 and another 369,000 shareholders held shares indirectly through nominees. In total as of that date, ABB had approximately 478,000 shareholders.

Significant shareholders

Investor AB, Sweden, held 254,915,142 ABB shares as of December 31, 2019. This holding represents approximately 11.8 percent of ABB's total share capital and voting rights as registered in the Commercial Register on December 31, 2019. 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, 2019.

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, 2019.

Artisan Partners Limited Partnership, U.S., disclosed that as per April 10, 2019 it held 65,721,454 ABB Ltd shares. This position represents approximately 3.03 percent of ABB Ltd's total share capital and voting rights as registered in the Commercial Register on December 31, 2019.

At December 31, 2019, 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.

Announcements related to disclosure notifications made by shareholders during 2019 can be found via the search facility on the platform of the Disclosure Office of the SIX Swiss Exchange: <https://www.six-exchange-regulation.com/en/home/publications/significant-shareholders.html>.

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 2 trading days after the shareholders’ resolution and the ex-date for dividends is normally 2 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 5 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 2019. 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 135 of the Swiss Act on Financial Market Infrastructures and Market Conduct in Securities and Derivatives Trading.

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 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 new Compensation Policy sections of this Report describe the compensation policies and programs as well as the governance framework related to the compensation of the Board and EC. The new Compensation Implementation sections of this Report provide details of the compensation paid to the members of the Board and of the EC in the prior calendar year.

The Compensation Report is prepared in accordance with the Ordinance against Excessive Remuneration in Listed Stock Corporations (Ordinance), the Directive on Information relating to Corporate Governance of the SIX Exchange Regulation, 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 members	●	●	●	
Shareholding requirements CEO and EC members		●	●	
Maximum aggregate compensation amount Board		●	●	●
Individual compensation Board members		●	●	
Compensation Report		●	●	Consultative vote

● Proposal ● Recommendation ● Approval

Activities of the CC in 2019

The CC meets as often as business requires but at least four times a year. In 2019, 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” of the Corporate Governance Report.

Compensation Exhibit 2: CC activities during 2019

EC Compensation
Review of benchmark data and recommendations on individual compensation for EC members
Review of the share ownership of EC members
Review and approval of compensation for new and departing EC members (including foregone benefits)
Performance – relating to past performance cycle
Assessment of STI for 2018
Assessment of achievement of performance targets for LTIP awards vesting in 2019
Performance – relating to forthcoming performance cycle
Setting of STI targets for 2019 and 2020
Setting of performance targets for LTIP awards granted in 2019
Review impact of Power Grids joint venture on LTIP targets
Updates on achievement against performance targets for 2019 STI and unvested LTIP awards
Compliance
Review of the LTIP rules
Review of feedback from Investor Engagement meetings
Regulatory and market updates
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.

The CC retains independent, external advisors for compensation matters. In 2019, PricewaterhouseCoopers (PwC) were mandated to provide services related to executive compensation matters. Apart from its CC advisory role, PwC also provides human resources, tax and advisory services to ABB.

The CEO, the CHRO and the Head of Performance and Reward also attend all or 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.

Board compensation policy

Overview

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 (i.e. Credit Suisse Group, Geberit, Givaudan, Lafarge Holcim, Nestle, Novartis, Richemont, Roche, SGS, Swatch, Swiss Re, Swisscom and UBS).

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 2019 AGM to the 2020 AGM is described in Compensation Exhibit 3 below.

Compensation Exhibit 3: Structure of Board compensation (and current fees)

	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 2019 and for the term of office from the 2019 AGM to the 2020 AGM are disclosed in Compensation Exhibits 23 and 24, respectively, in the section "Compensation and share ownership tables".

Implementation of Board compensation policy

At the 2019 AGM, the shareholders approved a maximum aggregate compensation amount of CHF 4.70 million for the 2019-2020 Board term, the same as was approved for the previous Board term. The compensation agreed to be paid for that period amounts to CHF 4.67 million, unchanged from the amount paid for the previous Board term. The Board compensation is therefore within the amount approved by the shareholders. See Compensation Exhibit 4 below and Compensation Exhibit 24 in the section “Compensation and share ownership tables”.

The Board compensation paid during the calendar year 2019 was slightly higher than the compensation paid during 2018. This was a result of the smaller Board size in the first part of 2018. See Compensation Exhibit 23 in the section “Compensation and share ownership tables”.

Compensation Exhibit 4: Board compensation (in CHF)

Board of Directors	Board term	
	2019–2020	2018–2019
Number of members	11	11
Total compensation	4,670,000	4,670,000
Maximum aggregate compensation amount approved at AGM	4,700,000	4,700,000

Shareholdings of Board members

The members of the Board collectively owned less than 1 percent of ABB’s total shares outstanding at December 31, 2019.

Compensation Exhibit 25 in the section “Compensation and share ownership tables” below, shows the number of ABB shares held by each Board member at December 31, 2019 and 2018. 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 2019, 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 2019, no payment was made to any former Board member.

Executive Committee compensation policy

Overview

ABB’s compensation system reflects its commitment to attract, motivate and retain people with the talent necessary to strengthen ABB’s position as a pioneering technology leader in electrification products, industrial automation, robotics & discrete automation, motion, and power grids, 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;
- short-term and long-term incentives;
- the recognition of Group, business and individual performance.

Compensation structure – overview

The structure for EC members consists of an annual base salary, a STI based on annual performance targets, a LTI based on three-year performance targets, and benefits.

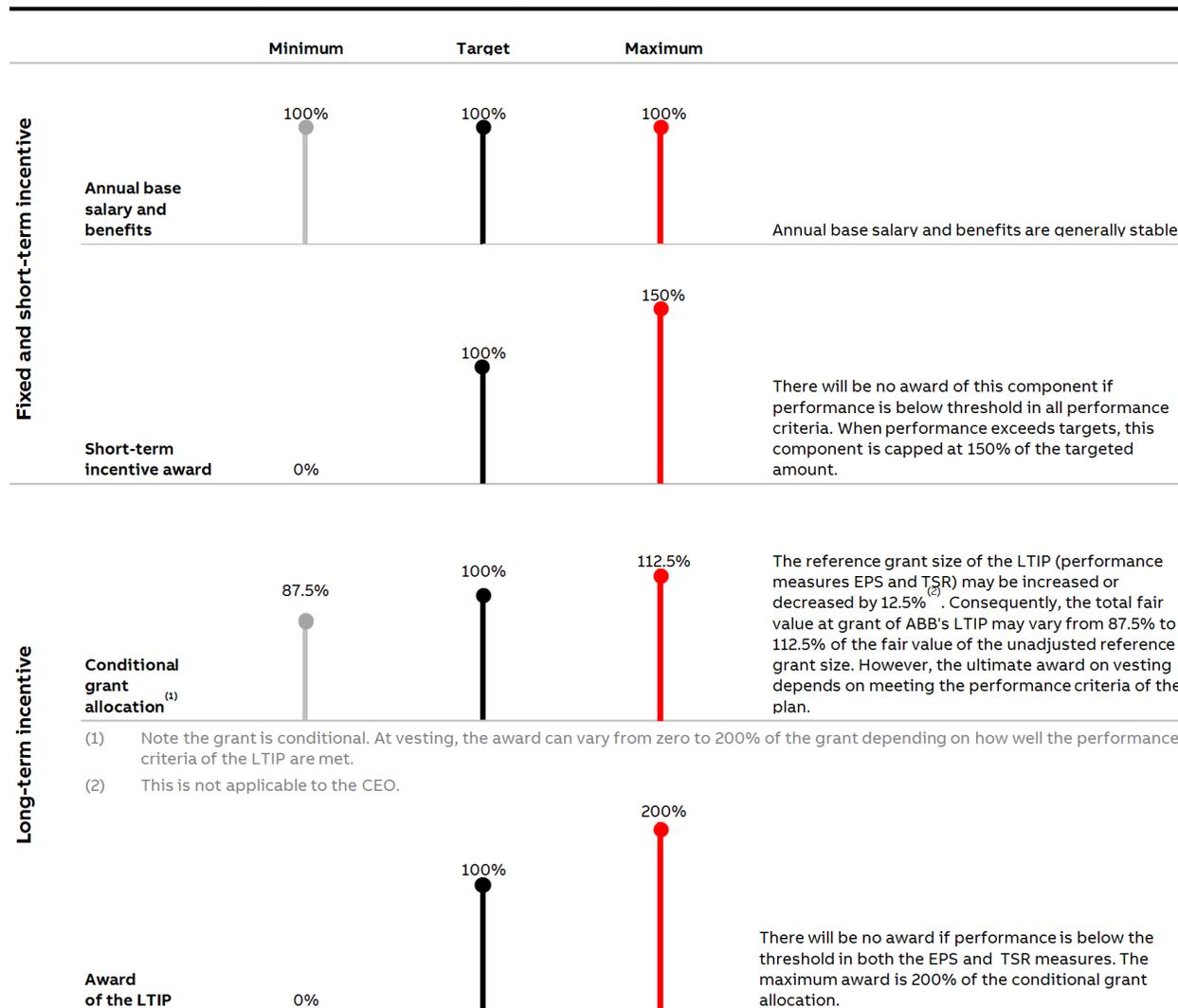
This structure is linked to our strategy and, as illustrated in Compensation Exhibits 5 and 6, a significant portion of total compensation depends on variable pay components which require the achievement of challenging performance targets.

Compensation Exhibit 5: Structure of EC compensation as from 2020

Compensation structure	Fixed compensation - annual base salary and benefits	Short-term incentive	Long-term incentive	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 may vest after 3 years subject to performance conditions	Individuals required to hold ABB shares
Opportunity level (as % of annual base salary)	Based on scope of responsibilities, individual experience and skillset	Target: 100% Maximum: 150%	CEO Target at grant: 150% Vesting: 0-300% EC Target at grant: 100% Vesting: 0-200%	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 annual base salary takes into account the executive's performance in the preceding year and potential for the future	All: Group ROCE (20-25%); Business/function measures, which may include, for example: Revenue, Op. EBITA %, Op. net income, OFCF (55-60%), All: individual objectives (20%)	Relative TSR (50%) Average EPS (50%)	Direct link to ABB share price

From 2020, the STI opportunity for the CEO has been aligned to the rest of the EC, moving from a target of 150 percent and a maximum of 225 percent of annual base salary in 2019, to a target of 100 percent and a maximum of 150 percent of annual base salary in 2020. In addition, to better align with competitive market practice, the LTI opportunity has been moved from a target of 200 percent and a maximum of 400 percent of annual base salary in 2019 to a target of 150 percent and a maximum of 300 percent of annual base salary in 2020.

Compensation Exhibit 6: Compensation components under various scenarios



Competitive positioning of compensation

The Board considers competitive market data when setting the compensation policy for the EC. This led to the downward adjustment of the target and maximum compensation for the CEO position from 2020 as described above. It is also one of several factors in positioning the target compensation for individual EC members which include:

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

The primary source of competitive market data used to assess the EC compensation is the general Pan-European Market. The EC compensation is benchmarked between the median to upper quartile of competitive market data. Comparisons are also made against Swiss and U.S. peers, as well as a global industry peer group (see Compensation Exhibit 7 below).

Compensation Exhibit 7: Compensation benchmarking

REFERENCE	COMPOSITION	RATIONALE
Main benchmark		
General Pan-European Market	399 largest European companies, of the FT Europe 500 listing. Represents companies in 20 countries and 16 different industries. The market cap of the companies represent a range from EUR 5 billion to EUR 217 billion	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 ⁽²⁾	Comparison with other multinational Swiss companies
U.S. market	U.S. peers of similar size and industry ⁽³⁾	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.

(2) Credit Suisse Group, Geberit, Givaudan, Julius Baer, Lafarge Holcim, Nestle, Novartis, Richemont, Roche, SGS, Swatch, Swiss Re, Swisscom and UBS.

(3) 3M, Boeing, Caterpillar, Danaher, Deer & Co., Eaton, Emerson Electric, General Dynamics, General Electric, Honeywell, Johnson Controls, Lockheed Martin and United Technologies.

Compensation elements – overview

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.
- 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 26: EC compensation in 2019.

Performance measures

- When considering changes in annual 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 incentive

Purpose and link to strategy

- The STI is designed to reward EC members for the Group's results, the results of their business or function and their individual performance over a time horizon of one year.

Operation

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

Opportunity levels

Compensation Exhibit 8: Opportunity level (% of annual base salary)

	Target	Maximum
CEO ⁽¹⁾	100%	150%
EC	100%	150%

⁽¹⁾ From 2020, the STI opportunity for the CEO has been aligned to the rest of the EC, lowering the target from 150 percent and the maximum from 225 percent of annual base salary in 2019, in order to more closely represent competitive market practice.

Performance measures

- The STI structure has been revised for 2020 in the light of feedback from shareholders and other stakeholders, the new ABB operating model, and to further increase the focus on operational delivery and underpin our performance culture.
- The new Plan, called the 2020 Annual Incentive Plan (AIP), is designed to create focus on key priorities, with a maximum of five measures, compared to up to twelve measures under the prior plan.
- All members of the EC have a common Group return measure (ROCE), with a 20 percent to 25 percent weighting. This is to help create a greater focus on profitability and the efficiency with which capital is used.
- Up to three measures will be linked to specific business or functional needs, rather than having largely common measures for all EC members.
- The remaining measure, with a 20 percent weighting, will be an individual component informed by a limited number of KPIs which, for all EC members, will include safety performance.

- For each performance measure, a target is set corresponding to the expected level of performance that will generate a target (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 threshold, target and the cap are determined by linear interpolations between these points.
- An illustration of the measures to be applied to the CEO for 2020 is set out in Compensation Exhibit 9 below. Note that the definition of free cash flow includes the impact of non-operational charges to reflect full accountability for cash performance and greater shareholder alignment. This principle will also be applied to the CFO. Also note that outcomes may be subject to appropriate adjustments (e.g. formulaic safety outcomes may be adjusted to reflect overall safety performance).

Compensation Exhibit 9: 2020 Annual Incentive Plan for CEO – Measures and Weightings

Measure	Weighting (total 100%)	Description	Link to Strategy
Group ROCE %	25.00%	Operational EBITA after tax divided by the average of the period's opening and closing Capital employed, adjusted (as needed) to reflect impacts from significant acquisitions/divestments occurring during the same period	Introduction of ROCE reflects the strong focus on delivering high return on capital employed in both business operations and corporate portfolio management
Group Revenues	10.00%	Revenues realized from executing and fulfilling customer orders, before any costs or expenses are deducted	Focus on value enhancing revenue streams and therefore decreasing the weighting on Group Revenues compared to 2019
Group Operational EBITA %	25.00%	Operational EBITA margin is Operational EBITA (as defined in "Note 23 – Operations segment and geographic data" 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	Increased weighting on Group Operational EBITA to focus on strategic execution and improving margin, resulting in a strong bottom line
Group FCF (Free cash flow)	20.00%	Cash generated by the Company that can either be distributed to the shareholders (e.g. as dividends or share buy-backs), used to reduce debt (e.g. pay back bank loans or repurchase bonds) or spent on acquisitions	Operating cash flow has been replaced with free cash flow to better focus on cash available to return to shareholders
Individual Measure	20.00%	Linked to a maximum of three KPIs, which will include safety improvement targets for the Total Recordable Incident Frequency Rate (TRIFR). This is defined as the number of recordable incidents (fatal, serious injury, lost time, restricted work day case, medical treatment incidents and occupational diseases) * 200,000 / work hours (employees + contractors)	Reflecting importance of safety agenda in keeping with the commitment to achieve excellence in health, safety and the environment at ABB

Long-term incentive

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 annual base salary.

Compensation Exhibit 10: Reference grant value (% of annual base salary)

	EPS measure	TSR measure	Total
CEO	75%	75%	150%
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. This does not apply to the CEO.
- 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 claw back rules. 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 (claw back).
- For awards from 2019, malus and claw back is expanded from illegal activities to cover a serious financial misstatement of the Group's accounts. This to give the Board greater discretion to adjust the vesting of awards in line with business and shareholder interests and is more closely aligned to market practice.
- The Committee also has the ability to suspend the payment of awards if it is likely that the Board determines that the malus or claw back provisions may potentially apply (e.g. if the employee is subject to an external investigation), in line with leading market practice.

Performance measures

TSR

- Achievement against this measure is determined by ABB's relative 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 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 target 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. LTIPs).

Share ownership program

- EC members are required to retain all shares vested from the Company’s LTIP program 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 11).
- 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 11: 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.
- 5 out of 11 EC members have achieved and exceeded their share ownership requirement. 3 EC members have just been newly appointed to the EC in 2019. See Compensation Exhibits 30 and 31 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 annual base salary, benefits and STI. 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.

Implementation of 2019 executive compensation policy

Overview

EC members received total compensation of CHF 51.4 million in 2019 compared with CHF 39.8 million in 2018, as summarized in Compensation Exhibit 12 below and presented in detail in Compensation Exhibits 26 and 27.

The increase in total compensation in 2019 was principally due to the change of 3 EC members (the CEO, the GC and the CHRO) plus the addition of one EC member to lead the Motion Business, which was spun off from the former Robotics division. Further details are provided in the footnote to Compensation Exhibit 13.

Compensation Exhibit 12: Total compensation of EC members (in CHF millions)

	2019	2018
Base salaries	12.1	9.9
Pension benefits	5.5	4.7
Other benefits	6.9	5.5
Total fixed compensation	24.5	20.1
Short-term incentive	12.7	9.1
Long-term incentive (fair value at grant)	12.6	10.6
Replacement share grant	1.6	0.0
Total variable compensation	26.9	19.7
Total compensation	51.4	39.8

For an overview of compensation by individual and component, please refer to Compensation Exhibit 26 and Compensation Exhibit 27 in "Compensation and share ownership tables" below.

At the 2018 AGM, the shareholders approved a maximum aggregate compensation amount of CHF 52 million for the EC for the year 2019. The EC compensation for 2019 amounted to CHF 51.4 million and is within the approved amount. See Compensation Exhibit 13 below.

Compensation Exhibit 13: EC compensation (in CHF)

Executive Committee	Calendar year	
	2019	2018
Number of members	11	11
Total compensation	51,355,121 ⁽¹⁾	39,773,211
Maximum aggregate compensation amount approved at AGM	52,000,000	52,000,000

(1) This amount includes CHF 1.6 million for the grant fair value of the replacement share grant provided to the incoming GC and CHF 0.5 million representing 10 months of a lost STI award, to compensate for benefits foregone from her previous employer. It also includes another CHF 8.7 million representing the additional cost related to the overlap in EC positions due the departure of 3 EC members plus the addition of one EC member to lead the Motion Business. Excluding these effects, the total would have been CHF 40.6 million.

Overall positioning of compensation

The ratio of fixed to variable components in any given year depends on the performance of the Company and individual EC members against predefined performance objectives.

In 2019, the outgoing CEO's variable compensation was 52 percent of his total compensation (previous year: 61 percent) which is the direct result of the absence of an LTI grant. For the other EC members the variable compensation represented an average of 45 percent (previous year: 46 percent).

Changes to CEO compensation structure

The compensation structure and levels for the CEO were changed during 2019, to reflect the appointment of an interim CEO, and will change again in 2020 to reflect the newly appointed CEO. This is summarized in Compensation Exhibit 14 below.

The interim CEO, Peter Voser, receives a monthly payment equivalent to the same annual base salary and annual target STI as the former CEO. He does not receive any LTI grants or benefits, except legally required pension and social security contributions, as specified in Compensation Exhibit 26. This compensation is in addition to his fees as Chairman, given he is currently performing both roles.

Compensation Exhibit 14: CEO Total Annual Direct Compensation overview (in CHF)

	Ulrich Spiesshofer	Peter Voser⁽¹⁾	Björn Rosengren⁽²⁾
Annual Total Direct Compensation at target level	7,582,500	4,212,500	5,950,000
Annual Total Direct Compensation at maximum opportunity level	12,216,250	4,212,500	9,350,000
Annual Base Salary (ABS)	1,685,000	1,685,000	1,700,000
Short-term Incentive (STI)			
Target STI	2,527,500	2,527,500	1,700,000
Target STI as % of ABS	150%	150% ⁽³⁾	100%
Maximum STI opportunity	3,791,250	N/A	2,550,000
Maximum STI opportunity as a % of ABS	225%	N/A	150%
Long-term Incentive (LTI)			
Target LTI	3,370,000	N/A	2,550,000
Target LTI as % of ABS	200%	N/A	150%
Maximum LTI opportunity	6,740,000	N/A	5,100,000
Maximum LTI opportunity as a % of ABS	400%	N/A	300%

(1) In addition to the compensation for the interim CEO position, Peter Voser received payments related to his Board membership. See Compensation Exhibit 23.

(2) Björn Rosengren will receive, at the time joining ABB, a one-time replacement share grant representing 149,054 ABB shares, to compensate for his foregone Sandvik shares.

(3) STI is guaranteed at target level and paid monthly.

Terms of appointment for Chief Executive Officer

As noted in the Compensation Committee Chairman's letter, the compensation package for the incoming CEO, Björn Rosengren, constitutes a 21.5 percent reduction in TTDC compared to that of Ulrich Spiesshofer. This is driven by reducing the target STI from 150 percent to 100 percent of annual base salary and the target LTI from 200 percent to 150 percent of annual base salary. In addition, the Company will not be required to provide compensation for any contractually agreed one year non-compete period, following his employment with the Company.

He will receive standard EC benefits, including membership in the ABB Global Retirement Savings Plan. He will receive standard relocation support commensurate with a senior executive transfer to Switzerland, including temporary accommodation. There will be no ongoing housing allowance payments, again consistent with senior executives in Switzerland.

The Company will replace his forfeited, unvested LTI awards from 2017 to 2019, with a one-time replacement share grant, representing 149,054 ABB shares. The first tranche of this award, representing 130'150 ABB shares, will vest two years after grant and the second tranche of the award, representing 18,904 shares, will vest three years after grant. This award is subject to certain forfeiture clauses (e.g. employee giving notice of termination before vesting of awards).

Terms of appointment for other Executive Committee members

The President, Motion Business, Morten Wierod, was appointed to the EC on April 1, 2019, with an annual base salary of CHF 700,000, a target short-term and long-term incentive each of 100 percent of annual base salary, leading to a TTDC of CHF 2,100,000. He is eligible for standard EC benefits.

The CHRO, Sylvia Hill, was appointed to the EC on June 1, 2019, with an annual base salary of CHF 700,000, a target short-term and long-term incentive each of 100 percent of annual base salary, leading to a TTDC of CHF 2,100,000. This represents a reduction in TTDC compared to the prior incumbent. She is eligible for standard EC benefits.

The GC, Maria Varsellona, was appointed to the EC on November 1, 2019 with an annual base salary of CHF 800,000, a target short-term and long-term incentive each of 100 percent of annual base salary, leading to a TTDC of CHF 2,400,000. This represents a reduction in TTDC compared to the prior incumbent. She is eligible for standard EC benefits and received standard relocation support commensurate with a senior executive transfer to Switzerland, including temporary accommodation.

Maria Varsellona is eligible to receive compensation of CHF 0.5 million for 10 months of forfeited STI, representing the time served with her former employer in 2019, payable at the time of payment of the STI award to other EC members in 2020. This payment is subject to forfeiture clauses (e.g. employee giving notice of termination within 12 months of starting employment with ABB).

The Company has replaced her forfeited unvested LTI awards from her former employer, with a one-time ABB share grant representing a value of CHF 1.6 million. The foregone LTI awards have been valued applying a discount factor of 42 percent. The award will vest in two equal tranches, the first two years, and the second three years after the date of grant. Each tranche is subject to certain forfeiture clauses (e.g. employee giving notice of termination before vesting of awards).

Compensation elements – overview

Annual base salary

In 2019, four out of eleven EC members received an adjustment of annual base salary, which ranged from 1.9 percent to 11.1 percent, the latter being for an exceptional performance and market adjustment.

2019 Short-term incentive - design

STI awards were set in 2019 under the previous Incentive Plan. This has been redesigned for 2020, as described in the Executive Committee Compensation Policy.

Awards for all EC members were subject to the achievement of common Group objectives, as set out in Compensation Exhibit 15 below.

Compensation Exhibit 15: Group objectives and weighting in 2019

Objective	Weighting	Description
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 – Operating segment and geographic data” 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
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
Operational net income (ONC)	15%	Operational net income is calculated as net income attributable to ABB after adjustments ⁽¹⁾
Cost savings	15%	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, related and implementation costs, non-operational pension cost (credit), changes in obligations related to divested businesses, changes in pre-acquisition estimates, gains and losses from sale of businesses (including fair value adjustment on assets and liabilities held for sale), acquisition- and divestment-related expenses and integration costs, certain other non-operational items and foreign exchange/commodity timing differences in income from operations, as well as certain other non-operational amounts recorded within Provision for taxes.

These Group objectives were complemented by individual objectives by EC member. For Business and Regional Presidents, the majority were 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 measures included items such as Business or Regional Revenue, Operational EBITA Margin, Operating cash flow, Demand Orders and safety. Qualitative individual metrics include items such as the creation of the new ABB operating model, internal controls and functional effectiveness.

For each performance objective (Group and Individual), a target was 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), were 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 16 below. The majority of objectives for all EC members are quantitative in nature.

Compensation Exhibit 16: Weighting and composition of objectives for EC members for 2019

	CEO	Business and Region Presidents	Corporate Officers⁽¹⁾
Group objectives	80%	35%	35%
Individual objectives	20%	65%	65%
<i>Typical composition of objectives:</i>			
- Qualitative	20%	10%	35%
- Quantitative	80%	90%	65%

(1) CFO, CHRO and GC.

2019 Short-term incentive – outcomes

In 2019, the achievement against most objectives were below the challenging targets set by the Board. The award under the Revenue measure, with a weighting of 25 percent, amounted to 89.1 percent of target (2018: 99.3 percent).

The award under Operating cash flow, with a weighting of 30 percent, was 93.1 percent of target, an improvement against 2018, where the award amounted to 56.6 percent of target.

Operational EBITA margin and Operational net income, both with a weighting of 15 percent, led to awards of 82.8 percent and 79.4 percent respectively, compared to the prior year of 81.1 percent and 82.6 percent, respectively.

The Group continues to deliver very strong operational Cost savings, which were above target. The Cost savings parameter, weighted at 15 percent, achieved a 149.0 percent award (2018: 150.0 percent).

The combined achievement of these performance measures resulted in a 96.9 percent (2018: 85.5 percent) achievement level at the Group level in 2019.

With respect to individual/team objectives for each EC member, the achievement ranges between 58.6 percent to 111.3 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. This compared to a range of 35.5 percent to 112.0 percent in 2018.

The overall average award of STI for the entire EC was 94.7 percent of target (2018: 85.1 percent) with a range from 72.0 percent (lowest achievement) to 106.2 percent of target (highest achievement). This compared to a range of 52.3 percent to 102.4 percent in 2018.

These outcomes are summarized in Compensation Exhibit 17 below.

Compensation Exhibit 17: 'At a Glance' STI 2019 outcomes (rounded, with 2018 comparisons)

	2019 (% of target)	2018 (% of target)
Group Objectives		
<i>Revenues</i>	89%	99%
<i>Op EBITA %</i>	83%	81%
<i>Operational Cash Flow</i>	93%	57%
<i>Operational Net Income</i>	79%	83%
<i>Cost savings</i>	149%	150%
Overall Group Result	97%	86%
EC Individual Objectives		
Range of outcomes	58.6% – 111.3%	35.5% – 112.0%
Average	93%	88%
Combined Overall Group Result and EC Individual Objectives		
Range of outcomes	72.0% – 106.2%	52.3% – 102.4%
Overall Average	95%	85%

2019 Long-term incentive

The estimated value at grant of the share-based grants to EC members under the 2019 LTIP award was CHF 12.6 million, compared with CHF 10.6 million in 2018.

The 2019 LTIP comprises of two equally weighted performance factors, a three year average EPS and relative 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.

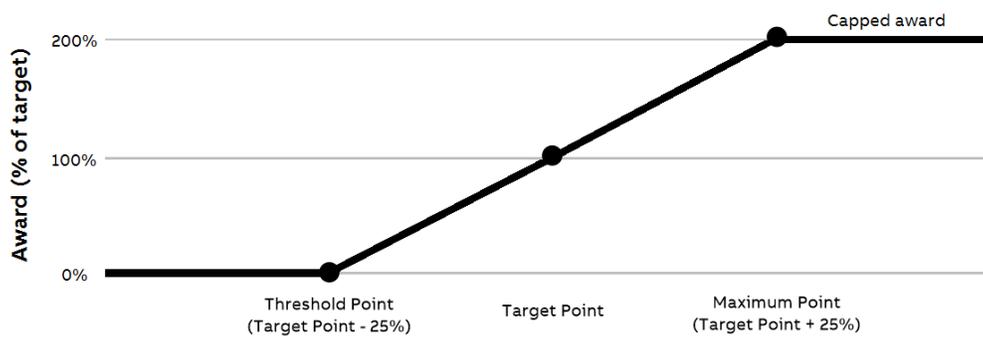
The companies approved by the Board to determine ABB's relative TSR performance for the 2019 LTIP were: 3M, Danaher, Eaton, Emerson Electric, Honeywell, United Technologies, General Electric, Rockwell, Rolls Royce, Schneider Electric, Siemens, ThyssenKrupp, Legrand, Yokogawa and Mitsubishi Electric. These were selected to provide an appropriate and very challenging set of peers, and influenced the payment point setting accordingly (see Compensation Exhibit 18 below).

The 2019 LTIP award curves are also illustrated in Compensation Exhibit 18 below.

The EPS performance target for vesting LTIP awards will be retrospectively disclosed in future ABB Compensation Reports.

Compensation Exhibit 18: 2019 LTIP Targets

EPS award curve for the 2019 LTIP



Threshold point: no award; Target point: 100% award; Maximum Point: capped at 200% award; linear award between point: The actual EPS target is not disclosed for reasons of commercial sensitivity.

TSR award curve for the 2019 LTIP



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 in the upper (75-100%) quartile: 200% award.
 Linear award between points.

2016 LTIP outcome

The 2016 LTIP, which vested in 2019, was comprised of two measures - P1 (net income) and P2 (cumulative weighted EPS) measures.

The net income measure fully vested at 100 percent, same as in previous year. The cumulative weighted EPS measure vested at 85 percent (previous year: 61 percent) out of a potential 200 percent.

Historical vesting outcomes

The historical vesting percentages for the prior five years are shown in Compensation Exhibit 19 below.

Compensation Exhibit 19: LTIP historical actual vesting percentages⁽¹⁾

	Plan Year of Award				
	2012	2013	2014	2015	2016
Vesting in % of target award	80.4%	77.2%	74.8%	80.5%	92.5%
Vesting in % of maximum potential award	57.4%	55.1%	53.4%	53.7%	61.7%

(1) Average of P1 and P2 components

Shareholdings of EC members

The EC members owned collectively less than 1 percent of ABB's total shares outstanding at December 31, 2019.

At December 31, 2019, members of the EC held ABB shares and conditional rights to receive shares, as shown in Compensation Exhibit 30 in the section "Compensation and share ownership tables" below. Their holdings at December 31, 2018, are shown in Compensation Exhibit 31 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" in our Consolidated Financial Statements.

Except as described in Compensation Exhibits 30 and 31, 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, 2019 and 2018.

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. Four members of the EC participated in the 16th annual launch of the plan in 2019. EC members who participated will, upon vesting, each be entitled to acquire up to 480 ABB shares at CHF 20.78 per share, the market share price at the start of the 2019 launch.

For a more detailed description of the ESAP, please refer to "Note 18 – Share-based payment arrangements" in our Consolidated Financial Statements.

In 2019, 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" in the Corporate Governance Report, ABB did not pay any additional fees or compensation in 2019 to persons closely linked to a member of the EC for services rendered to ABB.

Terms of departure for former Chief Executive Officer

The terms of departure of the former CEO, Ulrich Spiesshofer, were as per his existing contractual arrangements.

He continues to receive annual base salary and benefits during his 12 months' notice period until April 30, 2020.

He will receive a STI payment for 2019, and a pro-rata payment until the end of his notice period in 2020, based on the average STI award percentages achieved in 2017 and 2018, at the time it is paid to the Company's EC members.

As per his contract Ulrich Spiesshofer is subject to non-competition obligations, which will be effective from the end of his notice period, i.e. from May 1, 2020 to April 30, 2021. During this time, he will receive 12 monthly payments equivalent to his last annual base salary and the average of STI award percentages made in 2017 and 2018.

Outstanding and unvested LTI grants made for the years 2017-2019 will vest, according to the normal vesting schedule, subject to achievement against the relevant performance conditions.

The indicative total costs are summarized in Compensation Exhibit 20 below.

Compensation Exhibit 20: Indicative cost of departure arrangements for former CEO (in CHF)

	Notice Period May 1, 2019 – April 30, 2020	Non-compete Period May 1, 2020 – April 30, 2021
ABS	1,685,000	1,685,000
STI	2,249,475	2,249,475
LTI Grant	2,967,911	N/A
Total Direct Compensation	6,902,386	3,934,475
Pension	639,222	N/A
Other Benefits ⁽¹⁾	1,033,613	540,000
Total Compensation	8,575,221	4,474,475

⁽¹⁾ These are indicative values mainly representing mandatory social security payments and school fees. Actual figures which will be disclosed in future ABB Compensation Reports, may deviate, depending on the final value of the LTIP at vesting. In 2021 and 2022 there will also be additional charges representing mandatory social security payments related to the vesting of the LTIP 2018 and 2019, respectively. Note, all numbers are indicative.

Terms of departure for other Executive Committee members

The terms of retirement from ABB of Greg Scheu, President, The Americas, on October 31, 2019, were as per his contractual arrangements.

As previously advised, Frank Duggan, President, Europe, and Chunyuan Gu, President, AMEA, and Claudio Facchin, President, Power Grids business stepped down from the EC on December 31, 2019 to take other positions within ABB.

The terms of departure from ABB of Jean-Christophe Deslarzes, CHRO on February 29, 2020, and Diane de Saint Victor on March 31, 2020, will be as per their contractual arrangements.

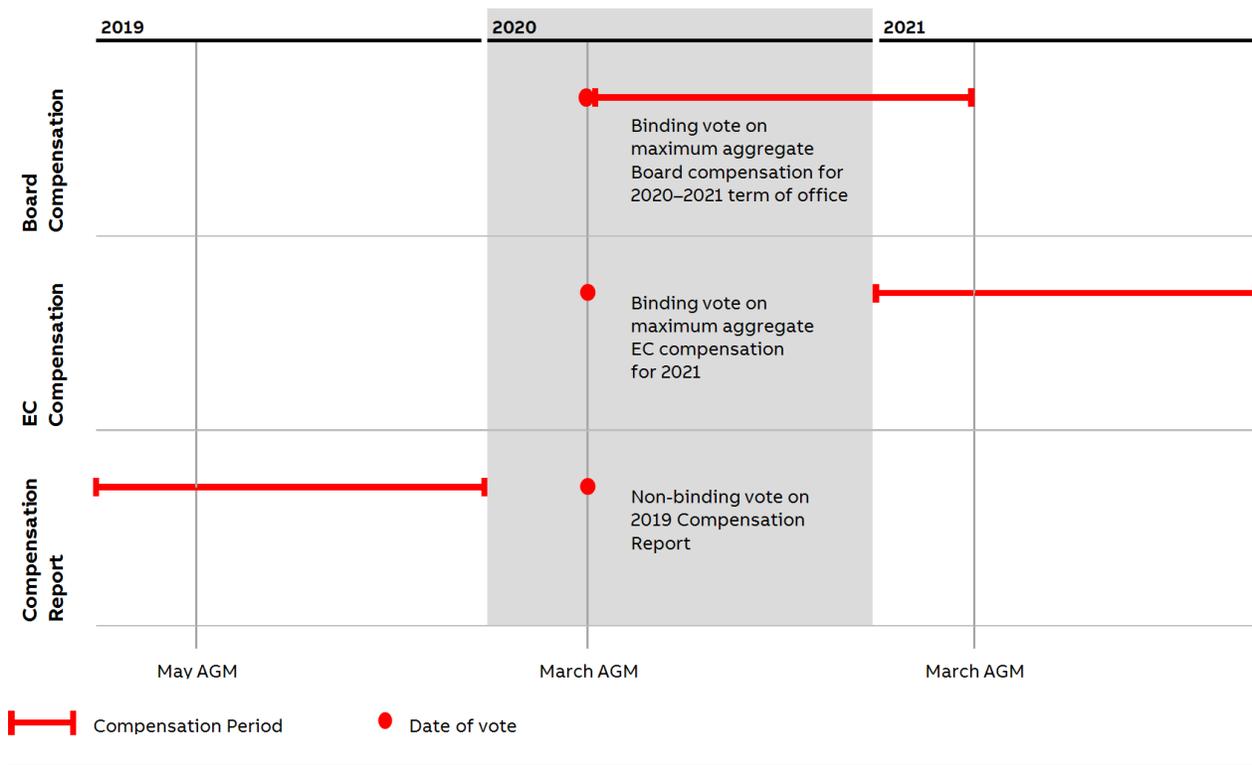
Compensation of former EC members

In 2019, certain former EC members received contractual compensation for the period after leaving the EC, as shown in Compensation Exhibit 26, footnote (5).

Votes on compensation at the 2020 AGM

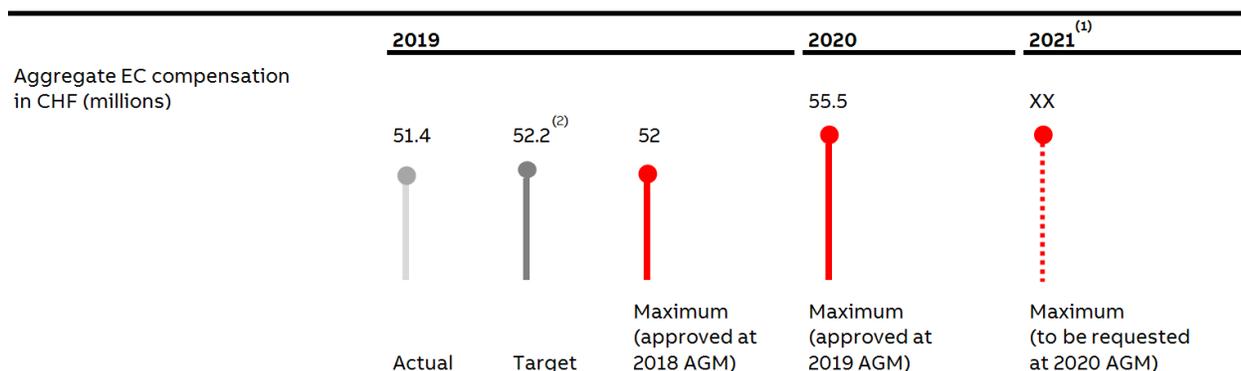
As illustrated in Compensation Exhibit 21, the Board’s proposals to shareholders at the 2020 AGM will relate to Board compensation for the 2020–2021 term of office and EC compensation for the calendar year 2021. There will also be a non-binding vote on the 2019 Compensation Report.

Compensation Exhibit 21: Shareholders will have three separate votes on compensation at the 2020 AGM



In determining the proposed maximum aggregate EC compensation, the Board takes into consideration the criteria illustrated in Compensation Exhibit 22. 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 compensation paid or awarded, as it must cover the potential maximum value of each component of compensation.

Compensation Exhibit 22: Overview of key factors affecting the determination of maximum aggregate EC compensation



Assumptions

Short-term incentive award percentage ⁽³⁾	95%	100%	150%	150%	150%
Adjustment of LTIP grant size	0%	0%	+12.5% ⁽⁴⁾	+12.5% ⁽³⁾	+12.5% ⁽³⁾
Number of EC members	11	11	11	12	9

(1) Numbers will be provided in the AGM invitation.

(2) The 2019 target amount was higher than the maximum approved, as it included CHF 8.7 million representing the additional cost related to overlapping EC positions, due the departure of three EC members, plus an additional EC member to lead the Motion Business. It also included CHF 1.6 million for the grant fair value of the replacement share grant provided to the incoming GC and CHF 0.5 million representing 10 months of a lost STI award, to compensate for benefits foregone from her previous employer.

(3) For full description, see section “Executive Committee compensation”.

(4) This 12.5 percent applied on the entire LTIP for EC members only and is not applicable to the CEO.

Compensation and share ownership tables

Compensation Exhibit 23: Board compensation in 2019 and 2018

Name	Paid in 2019					Paid in 2018				
	November Board term 2019-2020		May Board term 2018-2019		Total compensation paid in 2019 ⁽³⁾	November Board term 2018-2019		May Board term 2017-2018		Total compensation paid in 2018 ⁽³⁾
	Settled in cash ⁽¹⁾	Settled in shares - number of shares received ⁽²⁾	Settled in cash ⁽¹⁾	Settled in shares - number of shares received ⁽²⁾		Settled in cash ⁽¹⁾	Settled in shares - number of shares received ⁽²⁾	Settled in cash ⁽¹⁾	Settled in shares - number of shares received ⁽²⁾	
CHF	CHF	CHF	CHF	CHF	CHF	CHF	CHF	CHF	CHF	
Peter Voser, Chairman ⁽⁴⁾	-	29,156	-	29,943	1,200,000	-	24,777	-	25,133	1,200,000
Jacob Wallenberg ⁽⁵⁾	112,500	4,397	112,500	4,515	450,000	112,500	3,737	112,500	3,789	450,000
Matti Alahuhta ⁽⁶⁾	-	6,384	80,000	3,210	320,000	80,000	2,657	80,000	2,694	320,000
Gunnar Brock ⁽⁷⁾	-	6,584	82,500	3,311	330,000	82,500	2,740	-	-	165,000
David Constable ⁽⁸⁾	87,500	3,420	87,500	3,511	350,000	87,500	2,906	87,500	2,947	350,000
Frederico Curado ⁽⁹⁾	-	5,934	80,000	2,973	320,000	80,000	2,457	80,000	2,495	320,000
Lars Förberg ⁽¹⁰⁾	-	7,755	-	7,970	320,000	-	6,590	-	6,690	320,000
Louis R. Hughes ⁽¹¹⁾	-	-	-	-	-	-	-	100,000	3,099	200,000
Jennifer Xin-Zhe Li ⁽¹²⁾	80,000	2,892	80,000	2,973	320,000	80,000	2,454	-	-	160,000
Geraldine Matchett ⁽¹³⁾	82,500	4,213	82,500	4,326	330,000	82,500	3,380	-	-	165,000
David Meline ⁽¹⁴⁾	100,000	3,908	100,000	4,013	400,000	100,000	3,321	82,500	2,779	365,000
Satish Pai ⁽¹⁵⁾	82,500	2,983	82,500	3,066	330,000	82,500	2,535	82,500	2,574	330,000
Ying Yeh ⁽¹⁶⁾	-	-	-	-	-	-	-	80,000	2,281	160,000
Total	545,000	77,626	787,500	69,811	4,670,000	787,500	57,554	705,000	54,481	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, in 2018 and 2019 the Company paid CHF 288,408 and CHF 270,993, respectively, in related mandatory social security payments.

(4) Chairman of the ABB Ltd Board for the 2017-2018, 2018-2019 and 2019-2020 board terms and Chairman of the Governance and Nomination Committee for the 2017-2018 and the 2018-2019 board terms; is receiving 100 percent of his compensation in the form of ABB shares.

(5) Vice-Chairman of the ABB Ltd Board for the 2017-2018, 2018-2019 and 2019-2020 board terms; Chairman of the Governance and Nomination Committee for the 2019-2020 board term and member of that committee for the 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 and Nomination Committee for the 2017-2018, 2018-2019 and 2019-2020 board terms; received 50 percent of his compensation in the form of ABB shares for the 2017-2018 and 2018-2019 board terms and is receiving 100 percent of his compensation in shares for the 2019-2020 board term.

(7) Member of the Finance, Audit and Compliance Committee for the 2018-2019 and 2019-2020 board terms; received 50 percent of his compensation in shares for the 2018-2019 board term and is receiving 100 percent of his compensation in the form of ABB shares for the 2019-2020 board term.

(8) Chairman of the Compensation Committee for the 2017-2018, 2018-2019 and 2019-2020 board terms; is receiving 50 percent of his compensation in the form of ABB shares.

(9) Member of the Compensation Committee for the 2017-2018, 2018-2019 and 2019-2020 board terms; received 50 percent of his compensation in the form of ABB shares for the 2017-2018 and 2018-2019 board terms and is receiving 100 percent of his compensation in shares for the 2019-2020 board term.

(10) Member of the Governance and Nomination Committee for the 2017-2018, 2018-2019 and 2019-2020 board terms; is receiving 100 percent of his compensation in the form of ABB shares.

(11) Did not stand for re-election at the ABB Ltd 2018 AGM; Chairman of the Finance, Audit and Compliance Committee for the 2017-2018 board term; received 50 percent of his compensation in the form of ABB shares.

(12) Member of the Compensation Committee for the 2018-2019 and 2019-2020 board term; is receiving 50 percent of her compensation in the form of ABB shares.

(13) Member of the Finance, Audit and Compliance Committee for the 2018-2019 and 2019-2020 board terms; is receiving 50 percent of her compensation in the form of ABB shares.

(14) Chairman of the Finance, Audit and Compliance Committee for 2018-2019 and 2019-2020 board terms and member of that committee for the 2017-2018 board term; is receiving 50 percent of his compensation in the form of ABB shares.

(15) Member of the Finance, Audit and Compliance Committee for the 2017-2018, 2018-2019 and 2019-2020 board terms; is receiving 50 percent of his compensation in the form of ABB shares.

(16) Did not stand for re-election at the ABB Ltd 2018 AGM; member of the Compensation Committee for the 2017-2018 board term; received 50 percent of her compensation in the form of ABB shares.

Compensation Exhibit 24: Board compensation for the Board terms 2019-2020 and 2018-2019

Name	Specific Board Roles	Board term	Board term
		2019-2020	2018-2019
		CHF	CHF
Peter Voser	Chairman of the Board, Chairman of GNC (Board term 2018-2019)	1,200,000	1,200,000
Jacob Wallenberg ⁽¹⁾	Vice-Chairman of the Board, Chairman of GNC (Board term 2019-2020)	450,000	450,000
Matti Alahuhta	Member GNC	320,000	320,000
Gunnar Brock	Member FACC	330,000	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
Jennifer Xin-Zhe Li	Member CC	320,000	320,000
Geraldine Matchett	Member FACC	330,000	330,000
David Meline	Chairman of FACC	400,000	400,000
Satish Pai	Member FACC	330,000	330,000
Total		4,670,000	4,670,000

(1) Member of GNC for the 2018-2019 Board term.

Key:

CC: Compensation Committee

FACC: Finance, Audit & Compliance Committee

GNC: Governance & Nomination Committee

Compensation Exhibit 25: Board ownership of ABB shares

Name	Total number of shares held	
	December 31, 2019	December 31, 2018
Peter Voser ⁽¹⁾	260,175	201,076
Jacob Wallenberg	226,021	217,109
Matti Alahuhta	51,466	41,872
Gunnar Brock	14,635	4,740
David Constable	27,581	20,650
Frederico Curado	21,298	12,391
Lars Förberg	35,499	19,774
Jennifer Xin-Zhe Li	8,319	2,454
Geraldine Matchett	11,919	3,380
David Meline ⁽²⁾	25,463	17,542
Satish Pai	19,047	12,998
Total	701,423	553,986

(1) Includes 2,000 shares held by spouse.

(2) Includes 3,150 shares held by spouse.

Compensation Exhibit 26: EC compensation in 2019

Name	Cash Compensation					Estimated value of share-based grants under the LTIP in 2019 ⁽⁴⁾	Estimated value of replacement share-based grant in 2019	2019 Total (incl. conditional share-based grants) ⁽⁵⁾
	Base salary	Short-term incentive ⁽¹⁾	Pension benefits	Other benefits ⁽²⁾	2019 Total cash-based compensation ⁽³⁾			
	CHF	CHF	CHF	CHF	CHF			
Peter Voser (CEO as of April 17, 2019)	1,187,167	1,780,739	149,772	320,688	3,438,366	-	-	3,438,366
Timo Ihamuotila	945,005	960,450	500,830	581,983	2,988,268	836,661	-	3,824,929
Sylvia Hill (EC member as of June 1, 2019)	408,334	433,650	268,643	198,236	1,308,863	616,494	-	1,925,357
Maria Varsellona (EC member as of November 1, 2019) ⁽⁶⁾	133,335	133,333	40,619	472,088	779,375	822,328	1,624,386	3,226,089
Frank Duggan ⁽⁷⁾	667,708	707,103	363,173	552,220	2,290,204	704,559	-	2,994,763
Chunyuan Gu ⁽⁸⁾	685,847	685,963	263,125	708,252	2,343,187	616,494	-	2,959,681
Sami Atiya	786,676	602,400	467,214	528,033	2,384,323	845,459	-	3,229,782
Tarak Mehta	860,004	747,340	478,990	570,644	2,656,978	757,396	-	3,414,374
Claudio Facchin	810,006	583,200	469,271	404,865	2,267,342	713,355	-	2,980,697
Peter Terwiesch	795,009	668,800	460,453	389,694	2,313,956	704,559	-	3,018,515
Morten Wierod (EC member as of April 1, 2019)	525,000	516,600	304,632	200,336	1,546,568	616,494	-	2,163,062
Total current Executive Committee members at December 31, 2019	7,804,091	7,819,578	3,766,722	4,927,039	24,317,430	7,233,799	1,624,386	33,175,615
Ulrich Spiesshofer (EC member until April 16, 2019)	1,685,010	2,249,475	639,222	979,554	5,553,261	2,967,911	-	8,521,172
Jean-Christophe Deslarzes (EC member until May 31, 2019)	940,007	998,280	513,258	522,119	2,973,664	827,846	-	3,801,510
Diane de Saint Victor (EC member until October 31, 2019)	1,000,001	1,062,000	298,242	246,441	2,606,684	880,685	-	3,487,369
Greg Scheu (EC member until October 31, 2019) ⁽⁹⁾	661,604	557,123	228,298	199,474	1,646,499	722,956	-	2,369,455
Total departing Executive Committee members	4,286,622	4,866,878	1,679,020	1,947,588	12,780,108	5,399,398	-	18,179,506
Total	12,090,713	12,686,456	5,445,742	6,874,627	37,097,538	12,633,197	1,624,386	51,355,121

- (1) Represents accrued STI for the year 2019, which will be paid in 2020, after the publication of ABB's financial results. STI is linked to the objectives defined in each EC member's scorecard. Upon full achievement of these objectives, the STI of the EC members represents 100 percent of their respective annual base salary. The STI of the former CEO, Ulrich Spiesshofer, corresponds to the contractually agreed average of the year 2017 and 2018 STI award. Peter Voser received his STI payment monthly at target achievement level. Greg Scheu received a pro-rata STI payment for his 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. Other benefits for Peter Voser include mandatory social security payments only.
- (3) Prepared on an accrual basis.
- (4) On the day of vesting (May 16, 2022), 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 the price of ABB shares on the grant date, adjusted for expected foregone dividends during the vesting period.
- (5) Payments totaling CHF 216,069 were made in 2019 on behalf of certain other former EC members, mainly representing mandatory social security payments.
- (6) In addition to the replacement share grant, Maria Varsellona will receive compensation in the amount of CHF 445,939 for 10 months of foregone STI payments from her previous employer, which is shown under other benefits.
- (7) 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 0.2635992 per AED.
- (8) Chunyuan Gu received for the period January to February 2019, 100 percent of his compensation in CNY and for the period March to December 2019, 100 percent of his base salary in HKD. All CNY amounts were converted into Swiss francs using a rate of CHF 0.1391052 per CNY and all HKD amounts were converted into Swiss francs using a rate of CHF 0.12434741 per HKD.
- (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 0.9682 per USD.

Compensation Exhibit 27: EC compensation in 2018

Name	Cash Compensation					Estimated value of share-based grants under the LTIP in 2018 ⁽⁴⁾	2018 Total (incl. conditional share-based grants) ⁽⁵⁾
	Base salary	Short-term incentive ⁽¹⁾	Pension benefits	Other benefits ⁽²⁾	2018 Total cash-based compensation ⁽³⁾		
	CHF	CHF	CHF	CHF	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 STI for the year 2018 for all current EC members, which will be paid in 2019, after the publication of ABB's financial results. STI is linked to the objectives defined in each EC member's scorecard. Upon full achievement of these objectives, the STI of the CEO corresponds to 150 percent of his annual base salary, while for each other EC member it represents 100 percent of their respective annual 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 accrual 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 258,585 were made in 2018 on behalf of certain other former EC members, mainly representing mandatory social security payments.

(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 28: LTIP grants in 2019

Name	Reference number of shares under the EPS performance factor of the 2019 launch of the LTIP ⁽¹⁾	Total estimated value of share-based grants under the EPS performance factor of the 2019 launch of the LTIP ^{(2),(3)}	Reference number of shares under the TSR performance factor of the 2019 launch of the LTIP ⁽¹⁾	Total estimated value of share-based grants under the TSR performance factor of the 2019 launch of the LTIP ^{(2),(3)}	Total number of shares granted under the 2019 launch of the LTIP ^{(1),(2)}	Total estimated value of share-based grants under the LTIP in 2019 ^{(2),(3)}
		CHF		CHF		CHF
Timo Ihamuotila ⁽⁴⁾	24,535	418,322	24,536	418,339	49,071	836,661
Sylvia Hill (EC member as of June 1, 2019)	18,079	308,247	18,079	308,247	36,158	616,494
Maria Varsellona (EC member as of November 1, 2019)	20,661	411,154	20,662	411,174	41,323	822,328
Frank Duggan ⁽⁴⁾	20,661	352,271	20,662	352,288	41,323	704,559
Chunyuan Gu	18,079	308,247	18,079	308,247	36,158	616,494
Sami Atiya	24,793	422,721	24,794	422,738	49,587	845,459
Tarak Mehta	22,211	378,698	22,211	378,698	44,422	757,396
Claudio Facchin	20,919	356,669	20,920	356,686	41,839	713,355
Peter Terwiesch ⁽⁴⁾	20,661	352,271	20,662	352,288	41,323	704,559
Morten Wierod (EC member as of April 1, 2019) ⁽⁴⁾	18,079	308,247	18,079	308,247	36,158	616,494
Total current Executive Committee members at December 31, 2019	208,678	3,616,847	208,684	3,616,952	417,362	7,233,799
Ulrich Spiesshofer (EC member until April 16, 2019)	87,035	1,483,947	87,036	1,483,964	174,071	2,967,911
Jean-Christophe Deslarzes (EC member until May 31, 2019)	24,277	413,923	24,277	413,923	48,554	827,846
Diane de Saint Victor (EC member until October 31, 2019)	25,826	440,334	25,827	440,351	51,653	880,685
Greg Scheu (EC member until October 31, 2019)	21,201	361,478	21,201	361,478	42,402	722,956
Total departing Executive Committee members	158,339	2,699,682	158,341	2,699,716	316,680	5,399,398
Total	367,017	6,316,529	367,025	6,316,668	734,042	12,633,197

(1) Vesting date May 16, 2022.

(2) The valuation method of the share grant has been adjusted to reflect best practice, according to which, it is not recommended to use a Monte Carlo simulation at the time of grant to determine the fair value of a share grant. In response to that, 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 adjusted for expected foregone dividends during the vesting period. Applying the 2019 valuation method to the 2018 LTIP grant, would lead to a CHF 1.4 million lower grant fair value for 2018, representing a reduction from CHF 10.6 million to CHF 9.2 million.

(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, four members of the EC participated in the 16th launch of the ESAP in 2019, which will allow them to save over a 12-month period and, in November 2020, use their savings to acquire ABB shares under the ESAP. Each EC member who participated in ESAP will be entitled to acquire up to 480 ABB shares at an exercise price of CHF 20.78 per share.

Compensation Exhibit 29: 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 ^{(2),(3)}	Reference number of shares under the TSR performance factor of the 2018 launch ⁽¹⁾	Total estimated value of share-based grants under the TSR performance factor of the 2018 launch ^{(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 December 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 30: EC shareholding overview at December 31, 2019

Name	Total number of shares held at December 31, 2019	Vested at December 31, 2019	Unvested at December 31, 2019					Replacement share grant for foregone benefits from former employer ⁽³⁾	Replacement share grant for foregone benefits from former employer ⁽⁴⁾
			Number of unvested options held under the MIP	Number of unvested options held under the MIP (vesting 2020/2021)	Reference number of shares deliverable under the 2017 performance components (P1 and P2) of the LTIP ⁽¹⁾	Reference number of shares deliverable under the 2018 performance factors (EPS and TSR) of the LTIP ⁽²⁾	Reference number of shares deliverable under the 2019 performance factors (EPS and TSR) of the LTIP ⁽²⁾		
Timo Ihamuotila	64,572	-	-	-	41,000	37,217	49,071	76,628	-
Sylvia Hill (EC member as of June 1, 2019)	2,265	743,750	584,375	-	-	-	36,158	-	-
Maria Varsellona (EC member as of November 1, 2019)	-	-	-	-	-	-	41,323	-	80,019
Frank Duggan	269,846	-	-	-	34,984	31,756	41,323	-	-
Chunyuan Gu	45,577	-	-	-	31,196	33,981	36,158	-	-
Sami Atiya	24,435	-	-	-	34,735	23,301	49,587	-	-
Tarak Mehta	212,869	-	-	-	34,494	34,790	44,422	-	-
Claudio Facchin	163,219	-	-	-	39,076	26,214	41,839	-	-
Peter Terwiesch	122,242	-	-	-	37,147	37,379	41,323	-	-
Morten Wierod (EC member as of April 1, 2019)	1,064	398,440	-	-	-	15,292	36,158	-	-
Total Executive Committee members at December 31, 2019 ⁽⁵⁾	906,089	1,142,190	584,375	252,632	239,930	417,362	417,362	76,628	80,019

(1) It is expected that upon vesting, the LTIP 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 and 2019 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 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.

(4) It is expected that the replacement share grants will be settled 65 percent in shares and 35 percent in cash. However, the participants have the possibility to elect to receive 100 percent of the vested award in shares.

(5) Departing Executive Committee members are not included in this table.

Compensation Exhibit 31: EC shareholding overview at December 31, 2018

Name	Total number of shares held at December 31, 2018	Unvested at December 31, 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)	Reference number of shares deliverable under the 2018 performance factors (EPS and TSR) of the LTIP ⁽²⁾ (vesting 2021)	Replacement share grant for foregone benefits from former employer ⁽³⁾ (vesting 2019 and 2020)
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 at December 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.

EMPLOYEES

A breakdown of our employees by geographic region is as follows:

	December 31,		
	2019	2018	2017
Europe	68,400	68,300	63,000
The Americas	35,200	35,600	28,800
Asia, Middle East and Africa	40,800	42,700	43,000
Total	144,400	146,600	134,800

The proportion of our employees that are represented by labor unions or are subject to 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, 2019, we had approximately 478,000 shareholders. Approximately 258,000 were U.S. holders, of which approximately 440 were record holders. Based on the share register, U.S. holders (including holders of ADSs) held approximately 13 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 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 our 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 our 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. Although we believe that there may be an unfavorable outcome in one or more of these compliance-related matters, at this time it is not possible for us to make an informed judgment about the possible financial impact.

General

In addition, we are 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, 2019 and 2018, we had aggregate liabilities of \$157 million and \$221 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, 2019.

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 depository. Each ADS represents one share.

There were no suspensions in the trading of our shares in 2019, 2018 or 2017.

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. Other than as disclosed below, the information called for by this Item is set forth in Exhibit 2.3 to this Annual Report and is incorporated by reference into this Annual Report.

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.

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”.

Shareholders’ Meetings

Under Swiss law, the annual general meeting of shareholders must be held within 6 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. For practical reasons, shareholders must be registered in the share register with the right to vote no later than 6 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.

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.

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 December 16, 2019, 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 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 was signed on October 2, 1996 (including any amendments thereto) 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 and – as from January 1, 2020 – also individual retirement saving plans 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 2019, 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, 2019 and does not expect to be classified as a PFIC for the taxable year ending December 31, 2020. 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 depository, 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 Corporate Treasury Operations function. Our Corporate 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 Corporate 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.

Corporate 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 Corporate 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 Corporate Treasury Operations, where legally possible, to hedge their exposures. Where local laws restrict our operating companies from entering into intercompany derivatives with Corporate 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 Corporate Treasury Operations, but create no additional market risks on a consolidated basis. Corporate 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. Corporate Treasury Operations also hedges currency risks arising from monetary intercompany balances, primarily loans receivable from other ABB companies.

At December 31, 2019 and 2018, the net fair value of financial instruments with exposure to foreign currency rate movements was an asset of \$2,382 million and \$2,150 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 \$428 million and \$405 million for December 31, 2019 and 2018, 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 Corporate 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 Corporate Treasury Operations. Corporate 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, 2019 and 2018, the net fair value of instruments subject to Interest Rate Risk was a liability of \$5,765 million and \$4,792 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 \$286 million and \$251 million, for December 31, 2019 and 2018, respectively.

Equity Risk

Certain of our entities have equity investments that expose us to equity price risk. At December 31, 2019 and 2018, the net fair value of equity risk sensitive instruments was an asset of \$26 million and \$7 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 \$10 million and \$2 million, for December 31, 2019 and 2018, respectively.

Commodity Risk

We enter into commodity derivatives to hedge certain of our raw material exposures. At December 31, 2019 and 2018, the net fair value of commodity derivatives was an asset of \$15 million and a liability of \$18 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 \$39 million and \$45 million for December 31, 2019 and 2018, 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.

Depository fees payable in connection with distributions of cash or securities to ADS holders and the depository services fee are charged by the depository bank to the holders of record of ADSs as of the applicable ADS record date. The depository 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 depository 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 depository 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 depository 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 depository banks.

In the event of refusal to pay the depository fees, the depository 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 depository fees from any distribution to be made to the ADS holder.

Depository fees are as follows:

Depository 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.

Depository Payments

In 2019, we received reimbursements from Citibank N.A., the Depository 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, Peter Voser, 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, 2019. Based on that evaluation, management, including the Chief Executive Officer and Chief Financial Officer, has concluded that, as of December 31, 2019, our disclosure controls and procedures were 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, 2019. 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).

As disclosed in our 2018 Annual Report on Form 20-F, we identified a material weakness in our information technology general controls (ITGCs) based on deficiencies in selection, development and monitoring of control activities in ITGCs. Specifically, 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.

During 2019, management implemented our previously disclosed remediation plan that included: (i) improving 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, (ii) formalizing information technology application review requirements to ensure proper identification of risks related to financial reporting and appropriately design controls, and (iii) enhancing training of our personnel and clearly communicating control responsibilities.

During 2019, we completed our testing of the operating effectiveness of the implemented controls and found them to be effective. As a result of management's assessment and the control tests performed, we have concluded the material weakness has been remediated as of December 31, 2019, and that internal control over financial reporting was effective as of December 31, 2019.

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, 2019, is included in “Item 18. Financial Statements”.

Changes in internal control over financial reporting

In 2019, except for the changes in connection with our implementation of the remediation plan described above, there have been no other changes in our internal control over financial reporting (as defined in Rules 13a-15(f) or 15d-15(f) of the Exchange Act) 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 of the Exchange Act 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 Web site at the address and location specified above.

Item 16C. Principal Accountant Fees and Services

The aggregate fees for services rendered by KPMG along with their respective affiliates for professional services were as follows:

(\$ in millions)	KPMG	
	2019	2018
Audit Fees	37.5	34.1
Audit-Related Fees	0.7	0.2
Tax Fees	0.5	0.4
Other Fees	0.0	0.0
Total	38.7	34.7

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.

Audit-Related Fees

These services consisting primarily of agreed-upon procedure reports, 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. 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 2019 and 2018 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

During 2019, no purchases of our own shares were made by us or on our behalf or by affiliated purchasers.

Item 16F. Change in Registrant's Certifying Accountant

Not applicable.

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-85, 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).
- 2.3 Description of Securities
- 4.1 \$2,000,000,000 Multicurrency Revolving Credit Agreement, dated December 16, 2019, entered into between ABB Ltd, certain subsidiaries of ABB Ltd as borrowers, 19 banks as mandated lead arrangers, Citibank Europe PLC, UK Branch, as facility agent and euro swingline agent and Citibank N.A. as dollar swingline agent.
- 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). Incorporated by reference to Exhibit 4.6 to the Form 20-F filed by ABB Ltd on March 28, 2019.
- 8.1 Subsidiaries of ABB Ltd as of December 31, 2019.
- 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.

101.SCH Inline XBRL Taxonomy Extension Schema Document
101.CAL Inline XBRL Taxonomy Extension Calculation Linkbase Document
101.DEF Inline XBRL Taxonomy Extension Definition Linkbase Document
101.LAB Inline XBRL Taxonomy Extension Label Linkbase Document
101.PRE Inline XBRL Taxonomy Extension Presentation Linkbase Document
104 Cover Page Interactive Data File (formatted as inline XBRL and contained in Exhibit 101)⁽¹⁾

* This document is being furnished in accordance with SEC Release Nos. 33-8212 and 34-74551.

(1) Filed at the SEC Herewith

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

Date: February 25, 2020

By: /s/ TIMO IHAMUOTILA

Name: Timo Ihamuotila

Title: *Executive Vice President and
Chief Financial Officer*

Date: February 25, 2020

By: /s/ RICHARD A. BROWN

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 based on the criteria established in Internal Control—Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework). Based on this assessment, management has concluded that ABB’s internal control over financial reporting was effective as of December 31, 2019.

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 opinion on the effectiveness of ABB’s internal control over financial reporting as of December 31, 2019, which is included on page F-5 of this Annual Report.

/s/ PETER VOSER

*Chairman of the Board of Directors and
Chief Executive Officer*

/s/ TIMO IHAMUOTILA

Chief Financial Officer

Zurich, February 25, 2020

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 sheets of ABB Ltd (the Company) as of December 31, 2019 and 2018, the related consolidated income statements, statements of comprehensive income, cash flows and changes in stockholders' equity for each of the years in the two-year period ended December 31, 2019, 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, 2019 and 2018, and the results of its operations and its cash flows for each of the years in the two-year period ended December 31, 2019, 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, 2019, 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 February 25, 2020 expressed an unqualified opinion on the effectiveness of the Company's internal control over financial reporting.

The consolidated financial statements of the Company for the year ended December 31, 2017 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 and except for Note 23 for which the date is February 25, 2020.

Change in Accounting Principle

As discussed in Note 2 to the consolidated financial statements, the Company has changed its method of accounting for leases as of January 1, 2019 due to the adoption of Accounting Standard Codification (ASC), 842 *Leases*.

Basis for Opinion

These consolidated financial statements are the responsibility of the Company's Board of Directors and management. Our responsibility is to express an opinion on these consolidated 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 consolidated 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 consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. We believe that our audits provide a reasonable basis for our opinion.

Critical Audit Matters

The critical audit matters communicated below are matters arising from the current period audit of the consolidated financial statements that were communicated or required to be communicated to the audit committee and that: (1) relate to accounts or disclosures that are material to the consolidated financial statements and (2) involved our especially challenging, subjective, or complex judgments. The communication of critical audit matters does not alter in any way our opinion on the consolidated financial statements, taken as a whole, and we are not, by communicating the critical audit matters below, providing separate opinions on the critical audit matters or on the accounts or disclosures to which they relate.

Evaluation of estimated costs to complete related to revenue recognition for long-term fixed price contracts

As discussed in Note 2 to the consolidated financial statements, revenues from the sale of customized products, including long-term fixed price contracts for integrated automation and electrification systems and solutions are generally recognized on an over time basis using the percentage of completion method of accounting.

We identified the evaluation of estimated costs to complete related to revenue recognition of long-term fixed price contracts using the percentage-of-completion method of accounting as a critical audit matter. In particular, a high degree of subjective auditor judgment was required to evaluate the Company's estimates regarding the amount of future direct materials, labor and subcontract costs, and indirect costs to complete the contracts.

The primary procedures we performed to address this critical audit matter included the following. We tested certain internal controls over the Company's long-term fixed price contract revenue recognition process, including controls over the development of estimates regarding the amount of future direct materials, labor and subcontract costs, and indirect costs. We assessed the Company's historical ability to accurately estimate costs to complete by comparing historical estimates to actual results for a sample of contracts. We evaluated the estimate of remaining costs to be incurred for a sample of contracts by assessing progress to date and the nature and complexity of work to be performed through interviewing project managers and inspecting correspondence, if any, between the Company and the customer and/or subcontractors.

Evaluation of unrecognized tax benefits related to transfer pricing

As discussed in Note 2 to the consolidated financial statements, the Company operates across multiple tax jurisdictions, is exposed to numerous tax laws and is regularly subject to tax audits by local tax authorities. Unrecognized tax benefits related to transfer pricing are recorded by the Company based on management's assessment of the technical merits of tax filings and considering applicable tax laws of the relevant jurisdictions. The unrecognized tax benefits related to transfer pricing represent a portion of the Company's total unrecognized tax benefits related to various matters.

We identified the evaluation of unrecognized tax benefits related to transfer pricing as a critical audit matter as a high degree of subjective auditor judgment and specialized skills was required in assessing the Company's interpretation of international tax practice and developments in relation to intragroup charges and intragroup sales of goods and services and the Company's ability to estimate the ultimate resolution of the tax positions.

The primary procedures we performed to address this critical audit matter included the following. We tested certain internal controls over the Company's unrecognized tax benefits process, including controls related to the Company's interpretation of international tax practice and developments in relation to intragroup charges and intragroup sale of goods and services and the estimate of the related unrecognized tax benefits. We tested the identified costs that have a higher likelihood of being challenged by tax authorities associated with intragroup arrangements and potential price adjustments for intragroup sales of goods and services. We involved our tax professionals with specialized skills and knowledge, who assisted in evaluating (i) the Company's historical ability to accurately estimate the unrecognized tax benefits related to transfer pricing by comparing historical tax positions to subsequent settlements (ii) transfer pricing documentation and methodology for compliance with applicable laws and regulations by reviewing the documentation and relevant agreements, (iii) the impact of new information or changes in international tax practice and developments on historical tax positions, and (iv) performing an independent assessment of unrecognized tax benefits relating to the Company's intragroup sales of goods and services and comparing the results to the Company's assessment.

/s/ KPMG AG

We have served as the Company's auditor since 2018.

Zurich, Switzerland
February 25, 2020

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, 2019, based on criteria established in Internal Control – Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). In our opinion the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2019, 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 sheets of the Company as of December 31, 2019 and 2018, the related consolidated income statements, statements of comprehensive income, cash flows and changes in stockholders' equity for each of the years in the two-year period ended December 31, 2019, and the related notes (collectively, the consolidated financial statements), and our report dated February 25, 2020 expressed an unqualified opinion on those consolidated financial statements.

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
February 25, 2020

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 statements of income, comprehensive income, cash flows and changes in stockholders' equity for the year 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 results of operations and cash flows for the year 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 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 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 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 audit 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 audit 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 period, as to which the date is March 27, 2019, and

Except for Note 23 for the aforementioned period, as to which the date is February 25, 2020.

ABB Ltd
Consolidated Income Statements
Year ended December 31 (\$ in millions, except per share data in \$)

	<u>2019</u>	<u>2018</u>	<u>2017</u>
Sales of products	22,554	22,366	20,438
Sales of services and other	5,424	5,296	4,758
Total revenues	27,978	27,662	25,196
Cost of sales of products	(15,811)	(15,961)	(14,485)
Cost of services and other	(3,261)	(3,157)	(2,865)
Total cost of sales	(19,072)	(19,118)	(17,350)
Gross profit	8,906	8,544	7,846
Selling, general and administrative expenses	(5,447)	(5,295)	(4,765)
Non-order related research and development expenses	(1,198)	(1,147)	(1,013)
Other income (expense), net	(323)	124	162
Income from operations	1,938	2,226	2,230
Interest and dividend income	67	72	73
Interest and other finance expense	(215)	(262)	(234)
Non-operational pension (cost) credit	72	83	33
Income from continuing operations before taxes	1,862	2,119	2,102
Provision for taxes	(772)	(544)	(583)
Income from continuing operations, net of tax	1,090	1,575	1,519
Income from discontinued operations, net of tax	438	723	846
Net income	1,528	2,298	2,365
Net income attributable to noncontrolling interests	(89)	(125)	(152)
Net income attributable to ABB	1,439	2,173	2,213
<i>Amounts attributable to ABB shareholders:</i>			
Income from continuing operations, net of tax	1,043	1,514	1,441
Income from discontinued operations, net of tax	396	659	772
Net income	1,439	2,173	2,213
<i>Basic earnings per share attributable to ABB shareholders:</i>			
Income from continuing operations, net of tax	0.49	0.71	0.67
Income from discontinued operations, net of tax	0.19	0.31	0.36
Net income	0.67	1.02	1.04
<i>Diluted earnings per share attributable to ABB shareholders:</i>			
Income from continuing operations, net of tax	0.49	0.71	0.67
Income from discontinued operations, net of tax	0.19	0.31	0.36
Net income	0.67	1.02	1.03
<i>Weighted-average number of shares outstanding (in millions) used to compute:</i>			
Basic earnings per share attributable to ABB shareholders	2,133	2,132	2,138
Diluted earnings per share attributable to ABB shareholders	2,135	2,139	2,148

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)

	<u>2019</u>	<u>2018</u>	<u>2017</u>
Net income	1,528	2,298	2,365
Other comprehensive income (loss), net of tax:			
<i>Foreign currency translation adjustments:</i>			
Foreign currency translation adjustments	(130)	(627)	912
Gain on liquidation of foreign subsidiary	—	(31)	—
Changes attributable to divestments	(2)	12	12
Foreign currency translation adjustments	(132)	(646)	924
<i>Available-for-sale securities:</i>			
Net unrealized gains (losses) arising during the year	14	(4)	1
Reclassification adjustments for net losses included in net income	—	1	—
Unrealized gains (losses) on available-for-sale securities	14	(3)	1
<i>Pension and other postretirement plans:</i>			
Prior service (costs) credits arising during the year	6	(7)	(16)
Net actuarial losses arising during the year	(220)	(352)	(139)
Amortization of prior service cost (credit) included in net income	(28)	(24)	6
Amortization of net actuarial loss included in net income	68	69	63
Net (gains) losses from pension settlements included in net income	32	19	9
Changes attributable to divestments	—	—	6
Pension and other postretirement plan adjustments	(142)	(295)	(71)
<i>Cash flow hedge derivatives:</i>			
Net unrealized gains (losses) arising during the year	20	(49)	38
Reclassification adjustments for net (gains) losses included in net income	(9)	21	(22)
Changes attributable to divestments	—	—	(3)
Unrealized gains (losses) of cash flow hedge derivatives	11	(28)	13
Total other comprehensive income (loss), net of tax	(249)	(972)	867
Total comprehensive income, net of tax	1,279	1,326	3,232
Comprehensive income attributable to noncontrolling interests, net of tax	(83)	(110)	(177)
Total comprehensive income, net of tax, attributable to ABB	1,196	1,216	3,055

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)

	<u>2019</u>	<u>2018</u>
Cash and equivalents	3,544	3,445
Marketable securities and short-term investments	566	712
Receivables, net	6,434	6,386
Contract assets	1,025	1,082
Inventories, net	4,184	4,284
Prepaid expenses	191	176
Other current assets	674	616
Current assets held for sale and in discontinued operations	9,840	5,164
Total current assets	26,458	21,865
Property, plant and equipment, net	3,972	4,133
Operating lease right-of-use assets	994	—
Goodwill	10,825	10,764
Other intangible assets, net	2,252	2,607
Prepaid pension and other employee benefits	133	83
Investments in equity-accounted companies	33	87
Deferred taxes	910	1,006
Other non-current assets	531	469
Non-current assets held for sale and in discontinued operations	—	3,427
Total assets	46,108	44,441
Accounts payable, trade	4,353	4,424
Contract liabilities	1,719	1,707
Short-term debt and current maturities of long-term debt	2,287	2,031
Current operating leases	305	—
Provisions for warranties	816	948
Other provisions	1,375	1,372
Other current liabilities	3,761	3,780
Current liabilities held for sale and in discontinued operations	5,650	4,185
Total current liabilities	20,266	18,447
Long-term debt	6,772	6,587
Non-current operating leases	717	—
Pension and other employee benefits	1,793	1,828
Deferred taxes	911	927
Other non-current liabilities	1,669	1,689
Non-current liabilities held for sale and in discontinued operations	—	429
Total liabilities	32,128	29,907
<i>Commitments and contingencies</i>		
Stockholders' equity:		
Common stock, CHF 0.12 par value		
(2,168,148,264 issued shares at December 31, 2019 and 2018)	188	188
Additional paid-in capital	73	56
Retained earnings	19,640	19,839
Accumulated other comprehensive loss	(5,590)	(5,311)
Treasury stock, at cost		
(34,647,153 and 36,185,858 shares at December 31, 2019 and 2018, respectively)	(785)	(820)
Total ABB stockholders' equity	13,526	13,952
Noncontrolling interests	454	582
Total stockholders' equity	13,980	14,534
Total liabilities and stockholders' equity	46,108	44,441

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)

	2019	2018	2017
Operating activities:			
Net income	1,528	2,298	2,365
Less: Income from discontinued operations, net of tax	(438)	(723)	(846)
<i>Adjustments to reconcile net income to net cash provided by operating activities:</i>			
Depreciation and amortization	961	916	836
Deferred taxes	(83)	(142)	(199)
Net loss from derivatives and foreign exchange	1	93	29
Net gain from sale of property, plant and equipment	(51)	(57)	(37)
Net gain from sale of businesses	(55)	(57)	(252)
Fair value adjustment on assets and liabilities held for sale	421	—	—
Share-based payment arrangements	46	50	49
Other	(59)	(76)	4
<i>Changes in operating assets and liabilities:</i>			
Trade receivables, net	(202)	(144)	(178)
Contract assets and liabilities	128	(18)	6
Inventories, net	(182)	(336)	(66)
Accounts payable, trade	130	454	474
Accrued liabilities	(76)	252	99
Provisions, net	(36)	87	(4)
Income taxes payable and receivable	(3)	(102)	202
Other assets and liabilities, net	(131)	(143)	106
<i>Net cash provided by operating activities — continuing operations</i>	1,899	2,352	2,588
<i>Net cash provided by operating activities — discontinued operations</i>	426	572	1,211
Net cash provided by operating activities	2,325	2,924	3,799
Investing activities:			
Purchases of investments	(748)	(322)	(666)
Purchases of property, plant and equipment and intangible assets	(762)	(772)	(752)
Acquisition of businesses (net of cash acquired) and increases in cost- and equity-accounted companies	(22)	(2,664)	(2,011)
Proceeds from sales of investments	749	567	1,443
Proceeds from maturity of investments	80	160	100
Proceeds from sales of property, plant and equipment	82	72	61
Proceeds from sales of businesses (net of transaction costs and cash disposed) and cost- and equity-accounted companies	69	113	607
Net cash from settlement of foreign currency derivatives	(76)	(30)	63
Other investing activities	(23)	(32)	37
<i>Net cash used in investing activities — continuing operations</i>	(651)	(2,908)	(1,118)
<i>Net cash used in investing activities — discontinued operations</i>	(164)	(177)	(332)
Net cash used in investing activities	(815)	(3,085)	(1,450)
Financing activities:			
Net changes in debt with maturities of 90 days or less	164	221	204
Increase in debt	2,406	1,914	920
Repayment of debt	(2,156)	(830)	(1,000)
Delivery of shares	10	42	163
Purchase of treasury stock	—	(250)	(251)
Dividends paid	(1,675)	(1,717)	(1,635)
Dividends paid to noncontrolling shareholders	(90)	(86)	(83)
Other financing activities	13	(35)	(6)
<i>Net cash used in financing activities — continuing operations</i>	(1,328)	(741)	(1,688)
<i>Net cash used in financing activities — discontinued operations</i>	(55)	(48)	(47)
Net cash used in financing activities	(1,383)	(789)	(1,735)
Effects of exchange rate changes on cash and equivalents	(28)	(131)	268
Net change in cash and equivalents	99	(1,081)	882
Cash and equivalents, beginning of period	3,445	4,526	3,644
Cash and equivalents, end of period	3,544	3,445	4,526
Supplementary disclosure of cash flow information:			
Interest paid	284	243	205
Income taxes paid	1,005	1,026	894

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, 2019, 2018 and 2017 (\$ 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, 2017	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 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 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
Adoption of accounting standard update			36	(36)				
Comprehensive income:								
Net income			1,439			1,439	89	1,528
Foreign currency translation adjustments, net of tax				(126)		(126)	(6)	(132)
Effect of change in fair value of available-for-sale securities, net of tax				14		14		14
Unrecognized expense related to pensions and other postretirement plans, net of tax				(142)		(142)		(142)
Change in derivatives qualifying as cash flow hedges, net of tax				11		11		11
Total comprehensive income						1,196	83	1,279
Changes in noncontrolling interests		(17)				(17)	12	(5)
Fair value adjustment to noncontrolling interests recognized in business combination							(44)	(44)
Changes in noncontrolling interests in connection with divestments							(55)	(55)
Dividends to noncontrolling shareholders							(122)	(122)
Dividends paid to shareholders			(1,675)			(1,675)		(1,675)
Share-based payment arrangements		55				55		55
Delivery of shares		(24)			34	10		10
Call options		4				4		4
Balance at December 31, 2019	188	73	19,640	(5,590)	(785)	13,526	454	13,980

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 technology leader that is driving the digital transformation of industries with its four customer-focused, globally leading businesses.

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.

The 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 expense 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. These 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,
- 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,
- estimates used to record expected costs for employee severance in connection with restructuring programs,
- 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,
- assumptions used in determining inventory obsolescence and net realizable value,
- assessment of the allowance for doubtful accounts, and
- 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.

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 customer's 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 instruments 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 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 2019, the reporting units were the same as the operating segments for Electrification, Motion and Robotics & Discrete Automation, 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 using an income approach based on the present value of future cash flows, applying a discount rate that represents the Company's weighted-average cost of capital, 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

When developing 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 Consolidated Balance Sheets 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.

In January 2019, the Company adopted a new lease accounting standard. Prior to the adoption of the new accounting standard, lease transactions where substantially all risks and rewards incident to ownership were transferred from the lessor to the lessee were accounted for as capital leases. All other leases were accounted for as operating leases. The periodic rent expense for operating leases was recorded on a straight-line basis over the life of the lease term. Amounts due under capital leases were recorded as a liability. The value of the assets under capital leases were recorded as property, plant and equipment. Depreciation and amortization of assets recorded under capital leases was included in depreciation and amortization expense.

Under the new lease accounting standard, the Company evaluates if a contract contains a lease at inception of the contract. A contract is or contains a lease if it conveys the right to control the use of identified property, plant, or equipment (an identified asset) for a period of time in exchange for consideration. To determine this, the Company assesses whether, throughout the period of use, it has both the right to obtain substantially all of the economic benefits from use of the identified asset and the right to direct the use of the identified asset. Leases are classified as either finance or operating, with the classification determining the pattern of expense recognition in the Consolidated Income Statements. Lease expense for operating leases continues to be recorded on a straight-line basis over the lease term. Lease expense for finance leases is separated between amortization of right-of-use assets and lease interest expense.

In many cases, the Company's leases include one or more options to renew, with renewal terms that can extend up to 5 years. The exercise of lease renewal options is at the Company's discretion. Renewal periods are included in the expected lease term if they are reasonably certain of being exercised by the Company. Certain leases also include options to purchase the leased property. None of the Company's lease agreements contain material residual value guarantees or material restrictions or covenants.

Long-term leases (leases with terms greater than 12 months) are recorded in the Consolidated Balance Sheets at the commencement date of the lease based on the present value of the minimum lease payments. The present value of the lease payments is determined by using the interest rate implicit in the lease if available. As most of the Company's leases do not provide an implicit rate, the Company's incremental borrowing rate is used for most leases and is determined for portfolios of leases based on the remaining lease term, currency of the lease, and the internal credit rating of the subsidiary which entered into the lease.

Short-term leases (leases with an initial lease term of 12 months or less and where it is reasonably certain that the property will not be leased for a term greater than 12 months) are not recorded in the Consolidated Balance Sheets and are expensed on a straight-line basis over the lease term. The majority of short-term leases relate to real estate and machinery.

Assets under operating lease are included in "Operating lease right-of-use assets". Operating lease liabilities are reported both as current and non-current operating lease liabilities. Right-of-use assets represent the Company's right to use an underlying asset for the lease term and lease liabilities represent its obligation to make lease payments arising from the lease.

Assets under finance lease are included in "Property, plant and equipment, net" while finance lease liabilities are included in "Long-term debt" (including "Current maturities of long-term debt" as applicable).

Lease and non-lease components for leases other than real estate are not accounted for separately.

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". Current income tax relating to certain items is recognized directly in "Accumulated other comprehensive loss" and not in earnings. In general, the Company applies the individual items approach when releasing income tax effects from "Accumulated other comprehensive loss".

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 comprise 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 debt and equity 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

Leases

In January 2019, the Company adopted a new accounting standard that requires lessees to recognize lease assets and corresponding lease liabilities on the balance sheet for all leases with terms of more than 12 months with several practical expedients. The new accounting standard continues 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 12 months and to not separate lease and non-lease components for leases other than real estate.

The Company has adopted the standard on a modified retrospective basis and has therefore recorded a cumulative-effect adjustment to the opening balance of retained earnings on January 1, 2019. It has elected to apply the package of practical expedients which permits the Company to not reassess under the new standard prior conclusions about lease identification, lease classification and initial direct costs. While the adoption of this standard only had an insignificant impact on the Company's results of operations and cash flows, total assets and total liabilities increased by \$1,344 million and \$1,360 million, respectively, of which \$148 million and \$153 million, respectively, relate to assets and liabilities held for sale. Comparable information has not been restated to reflect the adoption of this new standard and continues to be measured and reported under the accounting standard in effect for those periods presented.

Derivatives and Hedging—Targeted improvements to accounting for hedging activities

In January 2019, the Company adopted an accounting standard update 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 was applied on a modified retrospective basis for cash flow and net investment hedges and prospectively for the amended presentation and disclosure guidance but did not have a significant impact on the consolidated financial statements.

Reclassification of certain tax effects from accumulated other comprehensive income

In January 2019, the Company adopted an accounting standard update 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. The updated guidance was applied in the period of adoption and resulted in a reclassification of \$36 million from Accumulated other comprehensive loss to retained earnings.

Applicable for future periods

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. Additional related updates with targeted improvements and clarifications were issued subsequently. 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. Measurement of expected credit losses will be based on historical experience, current conditions, and reasonable and supportable forecasts. The update also requires additional disclosures related to estimates and judgments used to measure credit losses. 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. For financial assets carried at amortized cost a cumulative-effect adjustment for the changes in the allowances for credit losses will be recognized in retained earnings on the consolidated balance sheet as of January 1, 2020. The Company does not expect the update to have a significant impact 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. 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 will adopt this update as of January 1, 2020, and does not believe that this update will have a significant impact on its consolidated financial statements.

Simplifying the accounting for income taxes

In December 2019, an accounting standard update was issued which simplifies the accounting for income taxes by removing certain exceptions to the general principles in this topic. The amendments also improve consistent application of existing guidance by clarifying certain aspects. This update is effective for the Company for annual and interim periods beginning January 1, 2021, with early adoption in any interim period permitted. Depending on the amendment, adoption may be applied on a retrospective, modified retrospective or prospective basis. The Company is currently evaluating the impact of this update on its consolidated financial statements.

Note 3—Basis of presentation and assets held for sale

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 at the end of the second quarter 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.

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. 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)	2019	2018	2017
Total revenues	9,037	9,698	10,028
Total cost of sales	(6,983)	(7,378)	(7,501)
Gross profit	2,054	2,320	2,527
Expenses	(1,394)	(1,326)	(1,376)
Income from operations	660	994	1,152
Net interest and other finance expense	(61)	(55)	(42)
Non-operational pension (cost) credit	5	12	9
Income from discontinued operations before taxes	605	951	1,119
Provision for taxes	(167)	(228)	(273)
Income from discontinued operations, net of tax	438	723	846

Of the total Income from discontinued operations before taxes in the table above, \$566 million, \$874 million and \$1,034 million in 2019, 2018 and 2017, 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, \$225 million, \$297 million and \$286 million, for 2019, 2018 and 2017, 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 the table above, Net interest and other finance expense in 2019, 2018 and 2017 includes \$44 million, \$43 million and \$33 million, respectively, of interest expense which has been recorded on an allocated basis in accordance with the Company's accounting policy election. In addition, as required by U.S. GAAP, subsequent to December 17, 2018, the Company has not recorded depreciation or amortization on the property, plant and equipment and intangible assets reported as discontinued operations. In 2018 and 2017, respectively, a total of \$258 million and \$265 million of depreciation and amortization expense was recorded for such assets. In 2019 and 2018, Income from discontinued operations before taxes includes \$28 million and \$18 million, respectively, for costs incurred to execute the transaction.

Included in the reported Total revenues of the Company for 2019, 2018 and 2017 are revenues for sales from the Company's operating segments to the Power Grids business of \$213 million, \$243 million and \$263 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 the assets and liabilities which are classified as held for sale and in discontinued operations in the Company's Consolidated Balance Sheets are summarized as follows:

(\$ in millions)	December 31,	
	2019	2018
Receivables, net	2,541	2,377
Contract assets	1,243	1,236
Inventories, net	1,667	1,457
Property, plant and equipment, net	1,754	—
Goodwill	1,631	—
Other current assets	1,004	94
Current assets held for sale and in discontinued operations	9,840	5,164
Property, plant and equipment, net	—	1,477
Goodwill	—	1,620
Other non-current assets	—	330
Non-current assets held for sale and in discontinued operations	—	3,427
Accounts payable, trade	1,722	1,732
Contract liabilities	1,121	998
Pension and other employee benefits	419	—
Other current liabilities	1,984	1,455
Current liabilities held for sale and in discontinued operations	5,246	4,185
Pension and other employee benefits	—	268
Other non-current liabilities	—	161
Non-current liabilities held for sale and in discontinued operations	—	429

Planned business divestments classified as held for sale

The Company classifies its long-lived assets or disposal groups to be sold as held for sale in the period in which all of the held for sale criteria are met. The Company initially measures a long-lived asset or disposal group that is classified as held for sale at the lower of its carrying value or fair value less any costs to sell. Any resulting loss is recognized in the period in which the held for sale criteria are met, while gains are not recognized on the sale of a long-lived asset or disposal group until the date of sale. The Company assesses the fair value of a long-lived asset or disposal group less any costs to sell at each reporting period and until the asset or disposal group is no longer classified as held for sale.

During 2019, the Company reached an agreement to sell its solar inverters business to FIMER S.p.A. for no consideration. Under the agreement the Company is obligated to transfer cash on the closing date and make additional cash payments to the purchaser through 2025. At December 31, 2019, a total of EUR 266 million (\$299 million) is estimated to be due to the buyer. As a result, in 2019, the Company recorded a loss, of \$421 million in "Other income (expense), net", representing the excess of the carrying value over the estimated fair value of this business. The carrying value at December 31, 2019, includes a loss arising from the cumulative translation adjustment of \$99 million.

The fair value is based on the estimated current market values using Level 3 inputs, considering the agreed-upon sale terms with the buyer. The solar inverters business, which includes the solar inverter business acquired as part of the Power-One acquisition in 2013, is part of the Company's Electrification operating segment.

The estimated loss is based on current exchange rates and net assets of the business. Any changes to these factors through to the closing date of the transaction will result in adjustments to the loss recognized on the planned sale.

The divestment is expected to be completed in the first quarter of 2020.

As this planned divestment does not qualify as a discontinued operation, the results of operations for this business are included in the Company's continuing operations for all periods presented. The assets and liabilities of this business are shown as assets and liabilities held for sale in the Company's Consolidated Balance Sheet at December 31, 2019. The carrying amounts of the major classes of assets and liabilities held for sale relating to this planned divestment are as follows:

(\$ in millions)	December 31, 2019
Assets	
Receivables, net	70
Inventories, net	127
Property, plant and equipment, net	69
Other intangible assets, net	27
Other assets	26
Valuation allowance on assets held for sale	(319)
Current assets held for sale	—
Liabilities	
Accounts payable, trade	86
Contract liabilities	59
Provisions for warranties	108
Other liabilities	49
Fair value adjustment on disposal group	102
Current liabilities held for sale	404

Including the above loss of \$421 million in 2019, Income from continuing operations before taxes includes net losses of \$490 million, from the solar inverters business. In 2018, net losses of \$94 million from this business were included in Income from continuing operations before taxes.

Reclassifications and other changes

Changes in presentation and disclosure relating to the adoption of new accounting pronouncements

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 net periodic benefit cost in the income statement. As a result, 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 were previously included as a component of income from operations.

Note 4—Acquisitions and business divestments

Acquisitions

Acquisitions were as follows:

(\$ in millions, except number of acquired businesses)	<u>2019</u>	<u>2018</u>	<u>2017</u>
Purchase price for acquisitions (net of cash acquired) ⁽¹⁾	—	2,638	1,992
Aggregate excess of purchase price over fair value of net assets acquired ⁽²⁾	92	1,472	1,267
Number of acquired businesses	—	3	4

(1) Excluding changes in cost- and equity-accounted companies.

(2) Recorded as goodwill (see Note 11). Includes adjustments of \$92 million in 2019 arising during the measurement period of acquisitions, primarily reflecting changes in the valuation of net working capital, deferred tax liabilities and intangible assets acquired.

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).

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. The purchase price allocation relating to the GEIS acquisition was finalized during the second quarter of 2019 and resulted in \$92 million of net measurement period adjustments, increasing goodwill, primarily related to changes in the valuation of net working capital, deferred tax liabilities and intangible assets acquired.

In addition, in November 2019, the Company recognized a gain of \$92 million relating to the receipt of cash from General Electric for a favorable resolution of an uncertainty with respect to the price paid to acquire GEIS. This occurred after the end of the measurement period and as a result, the Company recorded a gain in “Other income (expense), net”.

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 final allocation of purchase consideration for GEIS and the aggregate allocation of the purchase consideration for business acquisitions in 2017, was as follows:

(\$ in millions)	GEIS		2017	
	Allocated amounts	Weighted-average useful life	Allocated amounts ⁽¹⁾	Weighted-average useful life
Technology	92	7 years	412	7 years
Customer relationships	178	12 years	264	20 years
Trade names	135	13 years	61	10 years
Supply agreement	32	13 years	—	
Intangible assets	437		737	
Property, plant and equipment	373		131	
Debt acquired	—		(50)	
Deferred tax liabilities	(45)		(249)	
Inventories	405		176	
Other assets and liabilities, net ⁽²⁾	(19)		(20)	
Goodwill ⁽³⁾	1,534		1,267	
Noncontrolling interest	(63)		—	
Total consideration (net of cash acquired)⁽⁴⁾	2,622		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 amount of goodwill which is tax deductible is \$769 million.

(4) Primarily relates to the acquisition of 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)	<u>2018</u>	<u>2017</u>
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	<u><u>31</u></u>	<u><u>(75)</u></u>

Business divestments

In 2019, the Company recorded net gains (including transactions costs) of \$55 million, primarily due to the divestment of two businesses in China.

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, 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, 2019					
(\$ 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	2,111			2,111	2,111	
Time deposits	1,433			1,433	1,433	
Equity securities	294	10		304		304
	3,838	10	—	3,848	3,544	304
Changes in fair value recorded in other comprehensive income						
<i>Debt securities available-for-sale:</i>						
—U.S. government obligations	191	7	(1)	197		197
—Corporate	61	4		65		65
	252	11	(1)	262	—	262
Total	4,090	21	(1)	4,110	3,544	566

	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	206		(3)	203		203
	3,858	—	(3)	3,855	3,445	410
Changes in fair value recorded in other comprehensive income						
<i>Debt securities available-for-sale:</i>						
—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

Included in Other short-term investments at December 31, 2018, are receivables of \$206 million, representing reverse repurchase agreements.

Contractual maturities

Contractual maturities of debt securities consisted of the following:

(\$ in millions)	December 31, 2019	
	Available-for-sale	
	Cost basis	Fair value
One to five years	125	126
Six to ten years	74	77
Due after ten years	53	59
Total	252	262

At December 31, 2019 and 2018, the Company pledged \$66 million and \$68 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 (Management Incentive Plan) (see Note 18). 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 (\$ in millions)	Total notional amounts at December 31,		
	2019	2018	2017
Foreign exchange contracts	15,015	13,612	16,261
Embedded foreign exchange derivatives	924	733	899
Interest rate contracts	5,188	3,300	5,706

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 derivatives (whether designated as hedges or not), on a net basis, to reflect the Company's requirements for these commodities:

Type of derivative	Unit	Total notional amounts at December 31,		
		2019	2018	2017
Copper swaps	metric tonnes	42,494	46,143	28,976
Silver swaps	ounces	2,508,770	2,861,294	1,966,729
Aluminum swaps	metric tonnes	8,388	9,491	1,869

Equity derivatives

At December 31, 2019, 2018 and 2017, the Company held 40 million, 41 million and 37 million cash-settled call options indexed to ABB Ltd shares (conversion ratio 5:1) with a total fair value of \$26 million, \$6 million and \$42 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, 2019, 2018 and 2017, “Accumulated other comprehensive loss” included net unrealized losses of \$5 million, \$16 million and net unrealized gains of \$12 million, respectively, net of tax, on derivatives designated as cash flow hedges. Of the amount at December 31, 2019, net losses of \$2 million are expected to be reclassified to earnings in 2020. At December 31, 2019, the longest maturity of a derivative classified as a cash flow hedge was 49 months.

In 2019, 2018 and 2017, 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 in 2019, 2018 and 2017, were not significant.

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 2019, 2018 and 2017, 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)	<u>2019</u>	<u>2018</u>	<u>2017</u>
Gains (losses) recognized in Interest and other finance expense:			
- on derivatives designated as fair value hedges	38	(4)	(23)
- on hedged item	<u>(38)</u>	<u>5</u>	<u>27</u>

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) Type of derivative not designated as a hedge	Gains (losses) recognized in income			
	Location	2019	2018	2017
Foreign exchange contracts	Total revenues	(7)	(121)	92
	Total cost of sales	(64)	46	(41)
	SG&A expenses ⁽¹⁾	2	10	(18)
	Non-order related research and development	1	(1)	—
	Interest and other finance expense	(122)	40	22
Embedded foreign exchange contracts	Total revenues	17	58	7
	Total cost of sales	(6)	(4)	(2)
	SG&A expenses ⁽¹⁾	—	2	5
Commodity contracts	Total cost of sales	12	(33)	31
Other	Interest and other finance expense	—	3	(2)
Total		(167)	—	94

(1) SG&A expenses represent “Selling, general and administrative expenses”.

The fair values of derivatives included in the Consolidated Balance Sheets were as follows:

(\$ in millions)	December 31, 2019			
	Derivative assets		Derivative liabilities	
	Current in “Other current assets”	Non-current in “Other non-current assets”	Current in “Other current liabilities”	Non-current in “Other non-current liabilities”
<i>Derivatives designated as hedging instruments:</i>				
Foreign exchange contracts	—	—	2	6
Interest rate contracts	—	72	—	—
Cash-settled call options	11	14	—	—
Total	11	86	2	6
<i>Derivatives not designated as hedging instruments:</i>				
Foreign exchange contracts	85	14	127	14
Commodity contracts	17	—	2	—
Embedded foreign exchange derivatives	7	3	12	3
Total	109	18	141	17
Total fair value	120	104	143	23

	December 31, 2018			
	Derivative assets		Derivative liabilities	
	Current in “Other current assets”	Non-current in “Other non-current assets”	Current in “Other current liabilities”	Non-current in “Other non-current liabilities”
(\$ in millions)				
<i>Derivatives designated as hedging instruments:</i>				
Foreign exchange contracts	—	—	1	4
Commodity contracts	—	—	2	—
Interest rate contracts	—	35	—	1
Cash-settled call options	3	3	—	—
Total	3	38	3	5
<i>Derivatives not designated as hedging instruments:</i>				
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

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, 2019 and 2018, 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, 2019 and 2018, information related to these offsetting arrangements was as follows:

(\$ in millions)	December 31, 2019				
	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
Type of agreement or similar arrangement					
Derivatives	214	(102)	—	—	112
Total	214	(102)	—	—	112

(\$ in millions)	December 31, 2019				
	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
Type of agreement or similar arrangement					
Derivatives	151	(102)	—	—	49
Total	151	(102)	—	—	49

(\$ in millions)	December 31, 2018				
	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
Type of agreement or similar arrangement					
Derivatives	181	(121)	—	—	60
Reverse repurchase agreements	206	—	—	(206)	—
Total	387	(121)	—	(206)	60

(\$ in millions)	December 31, 2018				
	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
Type of agreement or similar arrangement					
Derivatives	220	(121)	—	—	99
Total	220	(121)	—	—	99

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:

(\$ in millions)	December 31, 2019			Total fair value
	Level 1	Level 2	Level 3	
Assets				
Securities in “Marketable securities and short-term investments”:				
Equity securities	—	304	—	304
Debt securities—U.S. government obligations	197	—	—	197
Debt securities—Corporate	—	65	—	65
Derivative assets—current in “Other current assets”	—	120	—	120
Derivative assets—non-current in “Other non-current assets”	—	104	—	104
Total	197	593	—	790
Liabilities				
Derivative liabilities—current in “Other current liabilities”	—	143	—	143
Derivative liabilities—non-current in “Other non-current liabilities”	—	23	—	23
Total	—	166	—	166

(\$ in millions)	December 31, 2018			Total fair value
	Level 1	Level 2	Level 3	
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

During 2019, 2018 and 2017 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”*: 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.
- *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

In June 2019, the Company adjusted the carrying value of the solar inverters business which is classified as held for sale (see Note 3). The fair value is based on the estimated current market values using Level 3 inputs, considering the agreed-upon sale terms with the buyer. There were no other significant non-recurring fair value measurements during 2019 and 2018.

Disclosure about financial instruments carried on a cost basis

The fair values of financial instruments carried on a cost basis were as follows:

(\$ in millions)	December 31, 2019				Total fair value
	Carrying value	Level 1	Level 2	Level 3	
Assets					
Cash and equivalents (excluding securities with original maturities up to 3 months):					
Cash	2,111	2,111	—	—	2,111
Time deposits	1,433	—	1,433	—	1,433
Other non-current assets:					
Loans granted	30	—	31	—	31
Restricted cash and cash deposits	37	37	—	—	37
Liabilities					
Short-term debt and current maturities of long-term debt (excluding finance lease obligations)					
	2,270	1,534	736	—	2,270
Long-term debt (excluding finance lease obligations)					
	6,618	6,267	692	—	6,959
December 31, 2018					
(\$ in millions)	December 31, 2018				Total fair value
	Carrying value	Level 1	Level 2	Level 3	
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 finance lease obligations)					
	2,008	1,480	528	—	2,008
Long-term debt (excluding finance lease obligations)					
	6,457	5,839	707	—	6,546

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 finance 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 finance lease obligations, approximate their fair values.
- *Long-term debt (excluding finance 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:

(\$ in millions)	December 31,	
	2019	2018
Trade receivables	5,967	5,970
Other receivables	695	635
Allowance	(228)	(219)
Total	6,434	6,386

“Trade receivables” in the table above includes contractual retention amounts billed to customers of \$151 million and \$176 million at December 31, 2019 and 2018, 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, 2019, 76 percent and 17 percent are expected to be collected in 2020 and 2021, 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)	2019	2018	2017
Balance at January 1,	219	202	202
Additions	93	126	61
Deductions	(81)	(93)	(74)
Exchange rate differences	(3)	(16)	13
Balance at December 31,	228	219	202

The following table provides information about Contract assets and Contract liabilities:

(\$ in millions)	2019	2018	2017
Contract assets	1,025	1,082	1,141
Contract liabilities	1,719	1,707	1,792

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:

(\$ in millions)	2019		2018	
	Contract assets	Contract liabilities	Contract assets	Contract liabilities
Revenue recognized, which was included in the Contract liabilities balance at Jan 1, 2019/2018		(1,158)		(879)
Additions to Contract liabilities - excluding amounts recognized as revenue during the period		1,255		518
Receivables recognized that were included in the Contract assets balance at Jan 1, 2019/2018	(786)		(633)	

The Company considers its order backlog to represent its unsatisfied performance obligations. At December 31, 2019, the Company had unsatisfied performance obligations totaling \$13,324, million and, of this amount, the Company expects to fulfill approximately 75 percent of the obligations in 2020, approximately 14 percent of the obligations in 2021 and the balance thereafter.

Note 9—Inventories, net

“Inventories, net” consisted of the following:

(\$ in millions)	December 31,	
	2019	2018
Raw materials	1,760	1,823
Work in process	819	837
Finished goods	1,499	1,525
Advances to suppliers	106	99
Total	4,184	4,284

Note 10—Property, plant and equipment, net

“Property, plant and equipment, net” consisted of the following:

(\$ in millions)	December 31,	
	2019	2018
Land and buildings	3,568	3,573
Machinery and equipment	5,620	5,624
Construction in progress	500	464
	9,688	9,661
Accumulated depreciation	(5,716)	(5,528)
Total	3,972	4,133

Assets under finance leases included in “Property, plant and equipment, net” were as follows:

(\$ in millions)	December 31,	
	2019	2018
Land and buildings	142	171
Machinery and equipment	62	69
	204	240
Accumulated depreciation	(99)	(122)
Total	105	118

In 2019, 2018 and 2017 depreciation, including depreciation of assets under finance leases, was \$616 million, \$578 million and \$549 million, respectively. In 2019, 2018 and 2017 there were no significant impairments of property, plant or equipment.

Note 11—Goodwill and other intangibles assets

The changes in “Goodwill” below have been recast to reflect the reorganization in 2019 of the Company’s operating segments as outlined in Note 23:

(\$ in millions)	Robotics &					Total
	Electrification	Industrial Automation	Motion	Discrete Automation	Corporate and Other	
Cost at January 1, 2018	2,969	1,631	2,470	2,445	39	9,554
Accumulated impairment charges	—	—	—	—	(18)	(18)
Balance at January 1, 2018	2,969	1,631	2,470	2,445	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)	(15)	(29)	(65)	—	(213)
Balance at December 31, 2018	4,276	1,616	2,441	2,410	21	10,764
Goodwill acquired during the year ⁽¹⁾	92	—	—	—	—	92
Goodwill allocated to disposals	(18)	—	—	—	—	(18)
Exchange rate differences and other	22	(1)	(5)	(29)	—	(13)
Balance at December 31, 2019	4,372	1,615	2,436	2,381	21	10,825

(1) Amount consists of adjustments arising during the twelve-month measurement period subsequent to the respective acquisition date (see Note 4).

In 2018, goodwill acquired primarily relates to GEIS, acquired in June 2018, which has been allocated to the Electrification Business.

Intangible assets other than goodwill consisted of the following:

(\$ in millions)	December 31,					
	2019			2018		
	Gross carrying amount	Accumulated amortization	Net carrying amount	Gross carrying amount	Accumulated amortization	Net carrying amount
Capitalized software for internal use	790	(628)	162	779	(586)	193
Capitalized software for sale	29	(29)	—	30	(30)	—
<i>Intangibles other than software:</i>						
Customer-related	2,513	(1,005)	1,508	2,609	(909)	1,700
Technology-related	1,056	(722)	334	1,131	(701)	430
Marketing-related	501	(286)	215	483	(240)	243
Other	59	(26)	33	67	(26)	41
Total	4,948	(2,696)	2,252	5,099	(2,492)	2,607

Additions to intangible assets other than goodwill consisted of the following:

(\$ in millions)	2019	2018
Capitalized software for internal use	42	139
<i>Intangibles other than software:</i>		
Customer-related	—	214
Technology-related	—	87
Marketing-related	—	122
Other	—	34
Total	42	596

The additions of \$42 million in 2019 were not related to business combinations. Included in the additions of \$596 million in 2018 were the following intangible assets other than goodwill related to business combinations:

(\$ in millions)	2018	
	Amount acquired	Weighted-average useful life
Capitalized software for internal use	65	2 years
<i>Intangibles other than software:</i>		
Customer-related	214	14 years
Technology-related	87	7 years
Marketing-related	122	13 years
Other	34	13 years
Total	522	

Amortization expense of intangible assets other than goodwill consisted of the following:

(\$ in millions)	2019	2018	2017
Capitalized software for internal use	74	59	50
Intangibles other than software	271	279	237
Total	345	338	287

In 2019, 2018 and 2017, impairment charges on intangible assets other than goodwill were not significant.

At December 31, 2019, future amortization expense of intangible assets other than goodwill is estimated to be:

	(\$ in millions)
2020	337
2021	301
2022	253
2023	233
2024	211
Thereafter	917
Total	2,252

Note 12—Debt

The Company's total debt at December 31, 2019 and 2018, amounted to \$9,059 million and \$8,618 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:

(\$ in millions)	December 31,	
	2019	2018
Short-term debt (weighted-average interest rate of 2.8% and 2.3%, respectively)	838	561
Current maturities of long-term debt (weighted-average nominal interest rate of 0.7% and 2.7%, respectively)	1,449	1,470
Total	2,287	2,031

Short-term debt primarily represents short-term loans from various banks and issued commercial paper.

At December 31, 2019, 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, \$172 million was outstanding under the \$2 billion Euro-commercial paper program. No amount was outstanding under this program at December 31, 2019. At December 31, 2019 and 2018, \$706 million and \$292 million, respectively, was outstanding under the \$2 billion program in the United States.

In addition, in December 2019, the Company replaced its \$2 billion multicurrency revolving credit facility, maturing in 2021, with a new \$2 billion 5-year multicurrency credit facility maturing in 2024. The new credit facility provides an option in 2020 and 2021 to extend the maturity to 2025 and 2026, respectively. The facility is 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 0.175 percent, while commitment fees (payable on the unused portion of the facility) amount to 35 percent of the margin, which represents commitment fees of 0.06125 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. 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. No amount was drawn at December 31, 2019 and 2018, under either the new or the old facility. The old facility was terminated in December 2019.

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:

(\$ in millions, except % data)	December 31,					
	2019			2018		
	Balance	Nominal rate	Effective rate	Balance	Nominal rate	Effective rate
Floating rate	2,221	1.5%	1.1%	3,106	1.7%	1.1%
Fixed rate	6,000	2.8%	2.4%	4,951	3.6%	3.6%
	8,221			8,057		
Current portion of long-term debt	(1,449)	0.7%	0.6%	(1,470)	2.7%	2.7%
Total	6,772			6,587		

At December 31, 2019, the principal amounts of long-term debt repayable (excluding finance lease obligations) at maturity were as follows:

	(\$ in millions)
2020	1,433
2021	1,273
2022	1,259
2023	1,237
2024	1,136
Thereafter	1,681
Total	8,019

Details of the Company's outstanding bonds were as follows:

	December 31,				
	2019		2018		
	Nominal outstanding	Carrying value ⁽¹⁾	Nominal outstanding	Carrying value ⁽¹⁾	
	(in millions)		(in millions)		
<i>Bonds:</i>					
2.625% EUR Instruments, due 2019			EUR	1,250	\$ 1,431
2.8% USD Notes, due 2020	USD	300	\$	300	USD 300
Floating EUR Notes, due 2020	EUR	1,000	\$	1,122	
4.0% USD Notes, due 2021	USD	650	\$	648	USD 650
2.25% CHF Bonds, due 2021	CHF	350	\$	373	CHF 350
5.625% USD Notes, due 2021	USD	250	\$	260	USD 250
2.875% USD Notes, due 2022	USD	1,250	\$	1,267	USD 1,250
3.375% USD Notes, due 2023	USD	450	\$	448	USD 450
0.625% EUR Instruments, due 2023	EUR	700	\$	799	EUR 700
0.75% EUR Instruments, due 2024	EUR	750	\$	859	EUR 750
0.3% CHF Notes, due 2024	CHF	280	\$	288	
3.8% USD Notes, due 2028	USD	750	\$	746	USD 750
1.0% CHF Notes, due 2029	CHF	170	\$	175	
4.375% USD Notes, due 2042	USD	750	\$	724	USD 750
Total			\$	8,009	\$ 7,842

(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 2019, the Company repaid at maturity its 2.625% EUR Instruments. The 2.625% EUR Instruments paid fixed rate interest annually in arrears.

The 2.8% USD Notes, due 2020, pay interest semi-annually in arrears at a fixed rate of 2.8 percent per annum.

In April 2019, the Company issued 18-month floating rate notes with an aggregate principal of EUR 1,000 million, due in October 2020. These notes pay interest quarterly in arrears at a variable interest rate of 35 basis points above the 3-month EURIBOR, with a floor rate of zero. The aggregate net proceeds amounted to EUR 1,002 million (equivalent to approximately \$1,129 million on date of issuance).

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. 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.

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 interests 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).

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, 2019 and 2018, are finance lease obligations, bank borrowings of subsidiaries and other long-term debt, none of which is individually significant.

Note 13—Other provisions, other current liabilities and other non-current liabilities

“Other provisions” consisted of the following:

(\$ in millions)	December 31,	
	2019	2018
Contract-related provisions	607	590
Restructuring and restructuring-related provisions	234	277
Provisions for contractual penalties and compliance and litigation matters	209	209
Provision for insurance-related reserves	168	166
Other	157	130
Total	1,375	1,372

“Other current liabilities” consisted of the following:

(\$ in millions)	December 31,	
	2019	2018
Employee-related liabilities	1,396	1,506
Accrued expenses	592	546
Non-trade payables	442	477
Income taxes payable	355	260
Accrued customer rebates	287	299
Other tax liabilities	282	277
Derivative liabilities (see Note 6)	143	192
Accrued interest	44	73
Pension and other employee benefits	36	34
Deferred income	25	36
Other	159	80
Total	3,761	3,780

“Other non-current liabilities” consisted of the following:

(\$ in millions)	December 31,	
	2019	2018
Income tax related liabilities	1,218	1,111
Provisions for contractual penalties and compliance and litigation matters	112	132
Employee-related liabilities	72	74
Environmental provisions	48	56
Derivative liabilities (see Note 6)	23	37
Deferred income	7	12
Other	189	267
Total	1,669	1,689

Note 14—Leases

The Company’s lease obligations primarily relate to real estate, machinery and equipment. Prior to the adoption of the new lease standard in 2019, rent expense was \$364 million and \$385 million in 2018 and 2017, respectively. Sublease income received by the Company on leased assets was \$7 million and \$11 million in 2018 and 2017, respectively.

Under the new accounting standard, adopted in January 2019, the components of lease expense were as follows:

(\$ in millions)	2019		
	Land and buildings	Machinery and equipment	Total
Operating lease cost	268	101	369
Finance lease cost:			
Amortization of right-of-use assets	13	20	33
Interest on lease liabilities	1	2	3
Variable lease cost ⁽¹⁾	—	5	5
Short-term lease cost	19	29	48
Sub-lease income	(2)	—	(2)
Total lease expense	299	157	456

(1) Primarily relates to variable payments that are tied to the consumer price index and are therefore included in the measurement of the right-of-use asset or lease liability.

The following table presents supplemental cash flow information related to leases:

(\$ in millions)	2019		
	Land and buildings	Machinery and equipment	Total
Cash paid for amounts included in the measurement of lease liabilities:			
Operating cash flows from operating leases	252	96	348
Operating cash flows from finance leases	1	2	3
Financing cash flows from finance leases	8	12	20
Right-of-use assets obtained in exchange for new liabilities:			
Under operating leases	153	52	205
Under finance leases	23	18	41

At December 31, 2019, the future net minimum lease payments for operating and finance leases and the related present value of the net minimum lease payments consisted of the following:

(\$ in millions)	Operating Leases		Finance Leases	
	Land and buildings	Machinery and equipment	Land and buildings	Machinery and equipment
2020	222	86	23	14
2021	178	41	24	11
2022	137	21	23	8
2023	105	10	20	4
2024	86	8	21	1
Thereafter	226	5	84	—
Total minimum lease payments	954	171	195	38
Less amount representing estimated executory costs included in total minimum lease payments	—	—	(1)	—
Net minimum lease payments	954	171	194	38
Difference between undiscounted cash flows and discounted cash flows	(98)	(5)	(59)	(2)
Present value of minimum lease payments	856	166	135	36

The following table presents certain information related to lease terms and discount rates for leases as of December 31, 2019:

(\$ in millions)	Operating Leases		Finance Leases	
	Land and buildings	Machinery and equipment	Land and buildings	Machinery and equipment
Weighted-average remaining term (months)	78	29	110	33
Weighted-average discount rate	3.0%	2.2%	8.2%	2.8%

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 finance lease payments included in “Short-term debt and current maturities of long-term debt” and “Long-term debt” in the Consolidated Balance Sheets at December 31, 2019, amounts to \$17 million and \$154 million, respectively.

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. Although the Company believes that there may be an unfavorable outcome in one or more of these compliance-related matters, at this time it is not possible for the Company to make an informed judgment about the possible financial impact.

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, 2019 and 2018, the Company had aggregate liabilities of \$157 million and \$221 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,	
	2019	2018
	Maximum potential payments⁽¹⁾	
(\$ in millions)		
Performance guarantees	1,860	1,584
Financial guarantees	10	10
Indemnification guarantees	64	64
Total	1,934	1,658

(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, 2019 and 2018, 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, 2019 and 2018, the maximum potential payable under these guarantees amounts to \$898 million and \$771 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, 2019 and 2018, the total outstanding performance bonds aggregated to \$6.8 billion and \$7.4 billion, respectively, of which \$3.7 billion and \$4.3 billion, respectively, relate to discontinued operations. There have been no significant amounts reimbursed to financial institutions under these types of arrangements in 2019, 2018 and 2017.

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)	<u>2019</u>	<u>2018</u>	<u>2017</u>
Balance at January 1,	948	909	815
Net change in warranties due to acquisitions, divestments and liabilities held for sale ⁽¹⁾	(88)	41	30
Claims paid in cash or in kind	(310)	(307)	(243)
Net increase in provision for changes in estimates, warranties issued and warranties expired	276	341	234
Exchange rate differences	(10)	(36)	73
Balance at December 31,	<u>816</u>	<u>948</u>	<u>909</u>

(1) Includes adjustments to the initial purchase price allocation recorded during the measurement period.

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.

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)	<u>2019</u>	<u>2018</u>	<u>2017</u>
Current taxes	855	686	782
Deferred taxes	(83)	(142)	(199)
Tax expense from continuing operations	<u>772</u>	<u>544</u>	<u>583</u>
Tax expense from discontinued operations	<u>167</u>	<u>228</u>	<u>273</u>

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 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)	<u>2019</u>	<u>2018</u>	<u>2017</u>
Income from continuing operations before taxes	1,862	2,119	2,102
Weighted-average global tax rate	18.3%	22.2%	23.6%
Income taxes at weighted-average tax rate	341	470	497
Items taxed at rates other than the weighted-average tax rate	(7)	(43)	(114)
Changes in valuation allowance, net	198	41	763
Effects of changes in tax laws and (enacted) tax rates	63	1	(747)
Non-deductible expenses	44	86	58
Other, net	133	(11)	126
Tax expense from continuing operations	772	544	583
Effective tax rate for the year	41.5%	25.7%	27.7%

The allocation of consolidated income from continued operations, which is predominantly earned outside of Switzerland, impacts the “weighted-average global tax rate”. In 2019, based on the enacted tax rates in the applicable jurisdictions, the loss recorded for the planned sale of the solar inverters business reduced the weighted-average global tax rate by approximately 2 percent.

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 2019, the amount was not significant.

In 2019, “Changes in valuation allowance, net” includes adjustments to the valuation allowance in certain jurisdictions where the Company updated its assessment that it was more likely than not that such deferred tax assets would be realized. In 2019, the Company recorded an increase of \$158 million to the valuation allowance in certain operations in North America including an amount to provide for certain deferred tax assets arising in 2019.

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 2019, “Effects of changes in tax laws and (enacted) tax rates” primarily reflects a change in tax law applicable to a country in Europe. The benefit was mostly offset by a related change in the valuation allowance, resulting in a net benefit of \$17 million. 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. This benefit was also offset by a related change in the 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.

In 2019, 2018 and 2017, “Non-deductible expenses” includes \$44 million, \$86 million and \$58 million, respectively, 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 2019 and 2017, “Other, net” in the table above included net charges of \$91 million and \$148 million, respectively, related to the interpretation for tax law and double tax treaty agreements by competent tax authorities while in 2018, “Other, net” included a net benefit of \$22 million.

Deferred income tax assets and liabilities (excluding amounts held for sale and in discontinued operations) consisted of the following:

(\$ in millions)	December 31,	
	2019	2018
<i>Deferred tax assets:</i>		
Unused tax losses and credits	507	600
Provisions and other accrued liabilities	650	769
Pension	592	476
Inventories	463	253
Intangibles and other non-current assets	972	1,031
Other	300	122
Total gross deferred tax asset	3,484	3,251
Valuation allowance	(1,632)	(1,535)
Total gross deferred tax asset, net of valuation allowance	1,852	1,716
<i>Deferred tax liabilities:</i>		
Property, plant and equipment	(244)	(202)
Intangibles and other assets	(679)	(770)
Pension and other liabilities	(538)	(153)
Inventories	(39)	(67)
Unremitted earnings	(353)	(445)
Total gross deferred tax liability	(1,853)	(1,637)
Net deferred tax asset (liability)	(1)	79
<i>Included in:</i>		
“Deferred taxes”—non-current assets	910	1,006
“Deferred taxes”—non-current liabilities	(911)	(927)
Net deferred tax asset (liability)	(1)	79

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 \$1,632 million and \$1,535 million, at December 31, 2019 and 2018, respectively. “Unused tax losses and credits” at December 31, 2019 and 2018, in the table above, included \$126 million and \$145 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, 2019, 2018 and 2017 was \$1,632 million, \$1,535 million and \$1,303 million, respectively.

At December 31, 2019 and 2018, deferred tax liabilities totaling \$353 million and \$445 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 2019 and 2018, certain taxes arose in certain foreign jurisdictions for which the technical merits do not allow utilization of benefits. At December 31, 2019 and 2018, foreign subsidiary retained earnings subject to withholding taxes upon distribution of approximately \$100 million and \$100 million, respectively, were considered as indefinitely 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, 2019, net operating loss carry-forwards of \$1,999 million and tax credits of \$78 million were available to reduce future taxes of certain subsidiaries. Of these amounts, \$1,203 million of loss carry-forwards and \$52 million of tax credits will expire in varying amounts through 2039, 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, 2017	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
Net change due to acquisitions and divestments	11	7	18
Increase relating to prior year tax positions	202	85	287
Decrease relating to prior year tax positions	(82)	(63)	(145)
Increase relating to current year tax positions	163	6	169
Decrease due to settlements with tax authorities	(57)	(8)	(65)
Decrease as a result of the applicable statute of limitations	(83)	(28)	(111)
Exchange rate differences	(9)	(5)	(14)
Balance at December 31, 2019, which would, if recognized, affect the effective tax rate	1,106	233	1,339

In 2019, 2018 and 2017, the "Increase relating to current year tax positions" included a total of \$163 million, \$111 million and \$193 million, respectively, in taxes related to the interpretation of tax law and double tax treaty agreements by competent tax authorities.

In 2019, the "Increase relating to prior year tax positions" is predominantly related to the interpretation of tax law and double tax treaty agreements by competent tax authorities.

At December 31, 2019, the Company expected the resolution, within the next twelve months, of unrecognized tax benefits related to pending court cases amounting to \$76 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, 2019, the earliest significant open tax years that remained subject to examination were the following:

Region	Year
Europe	2011
The Americas	2016
Asia, Middle East and Africa	2010

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:

(\$ in millions)	Defined pension benefits				Other postretirement benefits	
	Switzerland		International		International	
	2019	2018	2019	2018	2019	2018
Benefit obligations at January 1,	3,993	4,055	7,429	7,892	120	132
Service cost	76	92	113	122	1	1
Interest cost	15	30	174	198	4	4
Contributions by plan participants	75	69	19	16	—	—
Benefit payments	(244)	(239)	(404)	(318)	(10)	(11)
Benefit obligations of businesses acquired (divested)	—	10	(21)	60	—	8
Actuarial (gain) loss	323	6	617	(92)	(1)	(12)
Plan amendments and other	—	(4)	9	(119)	(5)	—
Exchange rate differences	70	(26)	(58)	(330)	1	(2)
Benefit obligation at December 31,	4,308	3,993	7,878	7,429	110	120
Fair value of plan assets at January 1,	3,879	4,020	5,866	6,514	—	—
Actual return on plan assets	320	(41)	689	(184)	—	—
Contributions by employer	91	89	115	152	10	11
Contributions by plan participants	75	69	19	16	—	—
Benefit payments	(244)	(239)	(404)	(318)	(10)	(11)
Plan assets of businesses acquired (divested)	—	7	(12)	39	—	—
Plan amendments and other	—	—	—	(94)	—	—
Exchange rate differences	68	(26)	(27)	(259)	—	—
Fair value of plan assets at December 31,	4,189	3,879	6,246	5,866	—	—
Funded status — underfunded	(119)	(114)	(1,632)	(1,563)	(110)	(120)

The amounts recognized in "Accumulated other comprehensive loss" and "Noncontrolling interests" were:

(\$ in millions)	December 31,					
	2019	2018	2017	2019	2018	2017
	Defined pension benefits			Other postretirement benefits		
Net actuarial (loss) gain	(2,777)	(2,628)	(2,321)	28	30	20
Prior service credit	62	74	99	13	23	27
Amount recognized in OCI⁽¹⁾ and NCI⁽²⁾	(2,715)	(2,554)	(2,222)	41	53	47
Taxes associated with amount recognized in OCI and NCI	571	535	503	—	—	—
Amount recognized in OCI and NCI, net of tax⁽³⁾	(2,144)	(2,019)	(1,719)	41	53	47

(1) OCI represents "Accumulated other comprehensive loss".

(2) NCI represents "Noncontrolling interests".

(3) NCI, net of tax, amounted to \$0 million, \$(1) million, and \$0 million at December 31, 2019, 2018 and 2017.

In addition, the following amounts were recognized in the Company's Consolidated Balance Sheets:

	December 31,					
	2019		2018		2018	
	2019		2018		2018	
	Defined pension benefits				Other postretirement benefits	
	Switzerland		International		International	
(\$ in millions)						
Overfunded plans	62	24	71	59	—	—
Underfunded plans — current	(78)	—	(295)	(19)	(14)	(11)
Underfunded plans — non-current	(103)	(138)	(1,408)	(1,603)	(96)	(109)
Funded status - underfunded	(119)	(114)	(1,632)	(1,563)	(110)	(120)
<i>Amounts reported as assets and liabilities held for sale</i>	(78)	(93)	(277)	(120)	(5)	—

	December 31,	
	2019	2018
(\$ in millions)		
Non-current assets		
Overfunded pension plans	132	83
Other employee-related benefits	1	1
Pension and other employee benefits	133	84

	December 31,	
	2019	2018
(\$ in millions)		
Current liabilities		
Underfunded pension plans	(374)	(19)
Underfunded other postretirement benefit plans	(14)	(11)
Other employee-related benefits	(72)	(10)
Pension and other employee benefits	(460)	(40)
<i>Amounts reported as Current liabilities held for sale</i>	(424)	(4)

	December 31,	
	2019	2018
(\$ in millions)		
Non-current liabilities		
Underfunded pension plans	(1,510)	(1,741)
Underfunded other postretirement benefit plans	(96)	(109)
Other employee-related benefits	(186)	(246)
Pension and other employee benefits	(1,792)	(2,096)
<i>Amounts reported as Non-current liabilities held for sale</i>	—	(266)

The accumulated benefit obligation (ABO) for all defined benefit pension plans was \$11,981 million and \$11,249 million at December 31, 2019 and 2018, 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:

(\$ in millions)	PBO exceeds fair value of plan assets				ABO exceeds fair value of plan assets			
	Switzerland		International		Switzerland		International	
	2019	2018	2019	2018	2019	2018	2019	2018
December 31,								
PBO	3,769	3,482	7,346	6,897	3,769	3,482	7,228	6,872
ABO	3,769	3,482	7,156	6,743	3,769	3,482	7,054	6,724
Fair value of plan assets	3,588	3,344	5,643	5,275	3,588	3,344	5,537	5,254

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:

(\$ in millions)	Defined pension benefits						Other postretirement benefits		
	Switzerland			International			International		
	2019	2018	2017	2019	2018	2017	2019	2018	2017
Operational pension cost:									
Service cost	76	92	106	113	122	122	1	1	1
Operational pension cost	76	92	106	113	122	122	1	1	1
Non-operational pension cost (credit):									
Interest cost	15	30	41	174	198	208	4	4	5
Expected return on plan assets	(112)	(117)	(112)	(276)	(305)	(295)	—	—	—
Amortization of prior service cost (credit)	(14)	(15)	10	2	1	1	(5)	(5)	(5)
Amortization of net actuarial loss	—	—	—	108	92	91	(3)	(1)	(1)
Curtailments, settlements and special termination benefits	11	—	—	27	23	16	(10)	—	(1)
Non-operational pension cost (credit)	(100)	(102)	(61)	35	9	21	(14)	(2)	(2)
Net periodic benefit cost	(24)	(10)	45	148	131	143	(13)	(1)	(1)

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 \$47 million, \$45 million and \$55 million in 2019, 2018 and 2017, respectively, related to discontinued operations.

Assumptions

The following weighted-average assumptions were used to determine benefit obligations:

(in %)	December 31,					
	2019		2018		2018	
	Defined pension benefits			Other postretirement benefits		
	Switzerland		International		International	
Discount rate	0.2	0.8	2.0	2.8	2.8	3.9
Rate of compensation increase	—	—	2.2	2.4	0.2	0.2
Rate of pension increase	—	—	1.3	1.4	—	—
Cash balance interest credit rate	1.0	1.0	1.6	1.6	—	—

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 resulted in a net decrease in the service and interest components for benefit cost in 2019. Previously, the Company calculated 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. 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 following weighted-average assumptions were used to determine the “Net periodic benefit cost”:

(in %)	Defined pension benefits						Other postretirement benefits		
	Switzerland			International			International		
	2019	2018	2017	2019	2018	2017	2019	2018	2017
Discount rate	0.8	0.8	1.1	2.8	2.6	2.9	3.9	3.2	3.3
Expected long-term rate of return on plan assets	3.0	3.0	3.0	4.9	4.9	5.0	—	—	—
Rate of compensation increase	—	—	—	2.4	2.5	2.5	0.2	—	—
Cash balance interest credit rate	1.0	1.0	1.0	1.6	1.7	1.7	—	—	—

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,	
	2019	2018
Health care cost trend rate assumed for next year	6.3%	6.7%
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:

(in %)	Target	
	Switzerland	International
Asset class		
Equity	19	19
Fixed income	54	64
Real estate	22	7
Other	5	10
Total	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, 2019, is 3.8 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, 2019 and 2018, plan assets include ABB Ltd’s shares (as well as an insignificant amount of the Company’s debt instruments) with a total value of \$10 million and \$8 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.

(\$ in millions)	December 31, 2019			Total fair value
	Level 1	Level 2	Not subject to leveling ⁽¹⁾	
Asset class				
Equity				
Equity securities	224	7	—	231
Mutual funds/commingled funds	—	1,687	23	1,710
Emerging market mutual funds/commingled funds	—	339	—	339
Fixed income				
Government and corporate securities	521	1,013	—	1,534
Government and corporate—mutual funds/commingled funds	—	3,738	31	3,769
Emerging market bonds—mutual funds/commingled funds	—	805	—	805
Real estate	—	—	1,433	1,433
Insurance contracts	—	123	—	123
Cash and short-term investments	101	152	—	253
Private equity	—	—	211	211
Hedge funds	—	—	1	1
Commodities	—	26	—	26
Total	846	7,890	1,699	10,435

(\$ in millions) Asset class	December 31, 2018			
	Level 1	Level 2	Not subject to leveling ⁽¹⁾	Total fair value
	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

(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:

(\$ in millions)	Defined pension benefits				Other postretirement benefits	
	Switzerland		International		International	
	2019	2018	2019	2018	2019	2018
Total contributions to defined benefit pension and other postretirement benefit plans	91	89	115	152	10	11
Of which, discretionary contributions to defined benefit pension plans	2	—	8	25	—	—

In 2019, 2018 and 2017, total contributions included non-cash contributions totaling \$13 million, \$31 million and \$31 million, respectively, of available-for-sale debt securities to certain of the Company's pension plans.

The Company expects to contribute approximately \$356 million, including \$167 million in discretionary contributions, to its defined benefit pension plans in 2020. Of these discretionary contributions \$156 million are expected to be non-cash contributions. The Company expects to contribute approximately \$10 million to its other postretirement benefit plans in 2020.

The Company also contributes to a number of defined contribution plans. The aggregate expense for these plans was \$245 million, \$245 million and \$233 million in 2019, 2018 and 2017, respectively. Contributions to multi-employer plans were not significant in 2019, 2018 and 2017. Defined contribution expense includes \$55 million, \$59 million and \$61 million in 2019, 2018 and 2017, 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, 2019, are as follows:

(\$ in millions)	Defined pension		Other postretirement
	benefits		benefits
	Switzerland	International	International
2020	335	341	10
2021	254	347	9
2022	239	346	9
2023	226	343	9
2024	215	344	8
Years 2025 - 2029	961	1,727	34

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 \$46 million, \$50 million and \$49 million in 2019, 2018 and 2017, 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 2019, 2018 and 2017 was not significant.

At December 31, 2019, 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, 35 million shares held by the Company as treasury stock at December 31, 2019, 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.

	2019	2018	2017
Expected volatility	19%	17%	19%
Dividend yield	4.7%	3.1%	4.7%
Expected term	6 years	6 years	6 years
Risk-free interest rate	-0.9%	-0.1%	-0.1%

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, 2019	444.9	89.0	21.54		
Granted	63.5	12.7	19.00		
Forfeited	(9.9)	(2.0)	22.87		
Expired	(81.0)	(16.2)	21.50		
Outstanding at December 31, 2019	417.6	83.5	21.13	3.0	189
Vested and expected to vest at December 31, 2019	413.6	82.7	21.15	3.0	185
Exercisable at December 31, 2019	239.6	47.9	20.78	1.8	124

(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) Computed using the closing price, in Swiss francs, of ABB Ltd shares on the SIX Swiss Exchange and the exercise price of each option in Swiss francs.

At December 31, 2019, there was \$39 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 2.0 years. The weighted-average grant-date fair value (per option) of options granted during 2019, 2018 and 2017 was 0.34 Swiss francs, 0.46 Swiss francs and 0.47 Swiss francs, respectively. In 2018 and 2017, the aggregate intrinsic value (on the date of exercise) of options exercised was \$13 million and \$38 million, respectively, while the amount in 2019 was not significant.

Presented below is a summary, by launch, related to options outstanding at December 31, 2019:

	Number of options (in millions)	Number of shares (in millions) ⁽²⁾	Weighted- average remaining contractual term (in years)
Exercise price (in Swiss francs) ⁽¹⁾			
21.00	72.3	14.5	0.7
19.50	78.1	15.6	1.6
21.50	72.7	14.5	2.7
22.50	66.1	13.2	3.6
23.50	65.0	13.0	4.7
19.00	63.4	12.7	5.7
Total number of options and shares	417.6	83.5	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 income of \$14 million in 2018 and an expense of \$19 million in 2017, as a result of changes in both the fair value and vested portion of the outstanding WARs. The amount in 2019 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 “Selling, general and administrative expenses”, the Company recorded an expense of \$18 million in 2018 and income of \$15 million in 2017, related to the cash-settled call options. The amount in 2019 was not significant.

The aggregate fair value of outstanding WARs was \$26 million and \$6 million at December 31, 2019 and 2018, 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, 2019	41.2
Granted	10.9
Exercised	(8.9)
Forfeited	(0.3)
Expired	(3.0)
Outstanding at December 31, 2019	39.9
Exercisable at December 31, 2019	11.5

The aggregate fair value at date of grant of WARs granted in 2019, 2018 and 2017 was not significant. In 2018 and 2017, share-based liabilities of \$6 million and \$10 million, respectively, were paid upon exercise of WARs by participants. The amount in 2019 is not significant.

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.

	2019	2018	2017
Expected volatility	18%	19%	17%
Dividend yield	4.1%	4.1%	3.1%
Expected term	1 year	1 year	1 year
Risk-free interest rate	-0.7%	-0.6%	-0.6%

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, 2019	3.6	20.38		
Granted	2.3	20.78		
Forfeited	(0.3)	20.38		
Exercised ⁽⁴⁾	(0.5)	20.38		
Not exercised (savings returned plus interest)	(2.8)	20.38		
Outstanding at December 31, 2019	2.3	20.78	0.8	6.0
Vested and expected to vest at December 31, 2019	2.2	20.78	0.8	5.7
Exercisable at December 31, 2019	—	—	—	—

(1) Includes shares represented by ADS.

(2) Information presented for ADS is based on equivalent Swiss franc denominated awards.

(3) Computed using the closing price, in Swiss francs, of ABB Ltd shares on the SIX Swiss Exchange and the exercise price of each option in Swiss francs.

(4) The cash received upon exercise was approximately \$10 million. The shares were delivered out of treasury stock.

The exercise prices per ABB Ltd share and per ADS of 20.78 Swiss francs and \$21.17, respectively, for the 2019 grant, 20.38 Swiss francs and \$20.37, respectively, for the 2018 grant, and 26.26 Swiss francs and \$26.24, respectively, for the 2017 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, 2019, 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 2019, 2018 and 2017 was 1.05 Swiss francs, 1.10 Swiss francs and 1.37 Swiss francs, respectively. The total intrinsic value (on the date of exercise) of options exercised in 2017 was \$17 million, while in 2019 and 2018 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 2019 and 2018 LTIP launches are 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.

For the relative total shareholder return component of the 2019 and 2018 LTIP launches, 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 the earnings per share performance component of the 2019 and 2018 LTIP launches, 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 LTIP launch, 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 2019 and 2018 LTIP launches, 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 LTIP launch, 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, 2019	1.3	21.61
Granted	1.1	15.94
Vested	(1.1)	18.49
Forfeited	(0.3)	19.68
Nonvested at December 31, 2019	1.0	19.26

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, 2019, total unrecognized compensation cost related to equity-settled awards under the LTIP was not significant. The compensation cost recorded in 2019, 2018 and 2017 for cash-settled awards was not significant.

The aggregate fair value, at the dates of grant, of shares granted in 2019, 2018 and 2017 was \$18 million, \$19 million and \$22 million, respectively. The total grant-date fair value of shares that vested during 2019, 2018 and 2017 was \$21 million, \$17 million and \$22 million, respectively. The weighted-average grant-date fair value (per share) of shares granted during 2019, 2018 and 2017 was 15.94 Swiss francs, 21.97 Swiss francs and 22.13 Swiss francs, respectively.

For the relative total shareholder return component of the 2019 and 2018 LTIP launches, 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, 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 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, 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 2019, 2018 and 2017 was not significant.

Note 19—Stockholders' equity

At both December 31, 2019 and 2018, 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 May 2019, shareholders approved the proposal of the Board of Directors to distribute a total of 0.80 Swiss francs per share. The approved dividend distribution amounted to \$1,675 million and was paid in May 2019. At the 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.

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 a \$4 billion share buyback program (executed between September 2014 and September 2016). 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.

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, 2019, such call options representing 11.8 million shares and with strike prices ranging from 19.00 to 23.50 Swiss francs (weighted-average strike price of 21.11 Swiss francs) were held by the bank. The call options expire in periods ranging from August 2020 to August 2025. However, only 3.9 million of these instruments, with strike prices ranging from 19.50 to 23.50 Swiss francs (weighted-average strike price of 20.69 Swiss francs), could be exercised at December 31, 2019, under the terms of the agreement with the bank.

In addition to the above, at December 31, 2019, the Company had further outstanding obligations to deliver:

- 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 14.5 million shares relating to the options granted under the 2016 launch of the MIP, with a strike price of 21.50 Swiss francs, vested in August 2019 and expiring in August 2022,
- up to 13.2 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 13.0 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 12.7 million shares relating to the options granted under the 2019 launch of the MIP, with a strike price of 19.00 Swiss francs, vesting in August 2022 and expiring in August 2025,
- up to 2.3 million shares relating to the ESAP, vesting and expiring in October 2020,
- up to 4.7 million shares to Eligible Participants under the 2019, 2018 and 2017 launches of the LTIP, vesting and expiring in May 2022, April 2021 and June 2020, respectively, and

- approximately 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 and 2017, the Company delivered 2.4 million and 6.3 million shares, respectively, out of treasury stock, for options exercised in relation to the MIP, while in 2019 the amount was not significant. In addition, in 2019 and 2017 the Company delivered 0.5 million and 2.8 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, 2019, the total unconsolidated stockholders' equity of ABB Ltd was 8,420 million Swiss francs (\$8,696 million), including 260 million Swiss francs (\$269 million) representing share capital, 8,920 million Swiss francs (\$9,212 million) representing reserves and 760 million Swiss francs (\$785 million) representing a reduction of equity for own shares (treasury stock). Of the reserves, 760 million Swiss francs (\$785 million) relating to own shares and 52 million Swiss francs (\$54 million) representing 20 percent of share capital, are restricted and not available for distribution.

In February 2020, the Company announced that a proposal will be put to the 2020 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 2019, 2018 and 2017, outstanding securities representing a maximum of 81 million, 88 million and 31 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 \$)

	<u>2019</u>	<u>2018</u>	<u>2017</u>
<i>Amounts attributable to ABB shareholders:</i>			
Income from continuing operations, net of tax	1,043	1,514	1,441
Income from discontinued operations, net of tax	396	659	772
Net income	<u>1,439</u>	<u>2,173</u>	<u>2,213</u>
Weighted-average number of shares outstanding (in millions)	2,133	2,132	2,138
<i>Basic earnings per share attributable to ABB shareholders:</i>			
Income from continuing operations, net of tax	0.49	0.71	0.67
Income from discontinued operations, net of tax	0.19	0.31	0.36
Net income	<u>0.67</u>	<u>1.02</u>	<u>1.04</u>

Diluted earnings per share:

(\$ in millions, except per share data in \$)

	<u>2019</u>	<u>2018</u>	<u>2017</u>
<i>Amounts attributable to ABB shareholders:</i>			
Income from continuing operations, net of tax	1,043	1,514	1,441
Income from discontinued operations, net of tax	<u>396</u>	<u>659</u>	<u>772</u>
Net income	<u>1,439</u>	<u>2,173</u>	<u>2,213</u>
Weighted-average number of shares outstanding (in millions)	2,133	2,132	2,138
<i>Effect of dilutive securities:</i>			
Call options and shares	<u>2</u>	<u>7</u>	<u>10</u>
Adjusted weighted-average number of shares outstanding (in millions)	<u>2,135</u>	<u>2,139</u>	<u>2,148</u>
<i>Diluted earnings per share attributable to ABB shareholders:</i>			
Income from continuing operations, net of tax	0.49	0.71	0.67
Income from discontinued operations, net of tax	<u>0.19</u>	<u>0.31</u>	<u>0.36</u>
Net income	<u>0.67</u>	<u>1.02</u>	<u>1.03</u>

Note 21—Other Comprehensive Income

The following table includes amounts recorded within “Total other comprehensive income (loss)” including the related income tax effects:

(\$ in millions)	2019			2018			2017		
	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	(130)	—	(130)	(641)	14	(627)	911	1	912
Gain on liquidation of foreign subsidiary	—	—	—	(31)	—	(31)	—	—	—
Changes attributable to divestments ⁽¹⁾	(2)	—	(2)	12	—	12	12	—	12
Net change during the year	(132)	—	(132)	(660)	14	(646)	923	1	924
Available-for-sale securities:									
Net unrealized gains (losses) arising during the year	16	(2)	14	(5)	1	(4)	1	—	1
Reclassification adjustments for net (gains) losses included in net income	1	(1)	—	1	—	1	—	—	—
Net change during the year	17	(3)	14	(4)	1	(3)	1	—	1
Pension and other postretirement plans:									
Prior service (costs) credits arising during the year	3	3	6	(11)	4	(7)	(20)	4	(16)
Net actuarial gains (losses) arising during the year	(293)	73	(220)	(411)	59	(352)	(184)	45	(139)
Amortization of prior service cost (credit) included in net income	(25)	(3)	(28)	(19)	(5)	(24)	6	—	6
Amortization of net actuarial loss included in net income	99	(31)	68	91	(22)	69	90	(27)	63
Net losses from pension settlements included in net income	38	(6)	32	23	(4)	19	13	(4)	9
Changes attributable to divestments ⁽¹⁾	—	—	—	—	—	—	8	(2)	6
Net change during the year	(178)	36	(142)	(327)	32	(295)	(87)	16	(71)
Cash flow hedge derivatives:									
Net gains (losses) arising during the year	20	—	20	(51)	2	(49)	45	(7)	38
Reclassification adjustments for net (gains) losses included in net income	(9)	—	(9)	20	1	21	(26)	4	(22)
Changes attributable to divestments ⁽¹⁾	—	—	—	—	—	—	(4)	1	(3)
Net change during the year	11	—	11	(31)	3	(28)	15	(2)	13
Total other comprehensive income (loss)	(282)	33	(249)	(1,022)	50	(972)	852	15	867

(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, 2017	(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
<i>Less:</i>					
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)
<i>Less:</i>					
Amounts attributable to noncontrolling interests	(15)	—	—	—	(15)
Balance at December 31, 2018	(3,324)	(4)	(1,967)	(16)	(5,311)
Adoption of an accounting standard update ⁽²⁾	—	—	(36)	—	(36)
Other comprehensive (loss) income before reclassifications	(130)	14	(214)	20	(310)
Amounts reclassified from OCI	—	—	72	(9)	63
Changes attributable to divestments	(2)	—	—	—	(2)
Total other comprehensive (loss) income	(132)	14	(142)	11	(249)
<i>Less:</i>					
Amounts attributable to noncontrolling interests	(6)	—	—	—	(6)
Balance at December 31, 2019	(3,450)	10	(2,145)	(5)	(5,590)

(1) Amounts relate to the adoption of two accounting standard updates in 2018 regarding the Recognition and measurement of financial assets and financial liabilities and Revenue from contracts with customers.

(2) Amounts relate to the adoption of an accounting standard update in 2019 regarding the Tax Cuts and Jobs Act of 2017. See “Applicable for current periods” 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)	Location of (gains) losses reclassified from OCI	2019	2018	2017
Details about OCI components				
<i>Foreign currency translation adjustments:</i>				
Gain on liquidation of foreign subsidiary	Other income (expense), net	—	(31)	—
<i>Pension and other postretirement plan adjustments:</i>				
Amortization of prior service cost (credit)	Non-operational pension (cost) credit ⁽¹⁾	(25)	(19)	6
Amortization of net actuarial loss	Non-operational pension (cost) credit ⁽¹⁾	99	91	90
Net losses from pension settlements	Non-operational pension (cost) credit ⁽¹⁾	38	23	13
Total before tax		112	95	109
Tax	Provision for taxes	(40)	(31)	(31)
Amounts reclassified from OCI		72	64	78

(1) Amounts include a total of \$6 million, \$12 million and \$9 million in 2019, 2018 and 2017, respectively, reclassified from OCI to Income from discontinued operations.

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 2019, 2018 and 2017.

Note 22—Restructuring and related expenses

OS program

In December 2018, the Company announced a two-year restructuring program with the objective of simplifying 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 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, core technologies and the ABB Ability™ platform. The program is expected to be performed over two years and incur restructuring expenses of \$350 million, primarily relating to employee severance costs.

The following table outlines the costs incurred in 2019 and 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 ⁽¹⁾		Cumulative costs incurred up to	Total expected costs ⁽¹⁾
	2019	2018	December 31, 2019 ⁽¹⁾	
Electrification	18	32	50	80
Industrial Automation	3	21	24	40
Motion	6	1	7	50
Robotics & Discrete Automation	8	—	8	20
Corporate and Other	54	11	65	160
Total	89	65	154	350

(1) Amounts in the table above have been recast to reflect the reorganization of the Company's operating segments in 2019 as outlined in Note 23.

The Company recorded the following expenses, net of change in estimates, under this program:

(\$ in millions)	Costs incurred in		Cumulative costs
	2019	2018	incurred up to December 31, 2019
Employee severance costs	81	65	146
Estimated contract settlement, loss order and other costs	1	—	1
Inventory and long-lived asset impairments	7	—	7
Total	89	65	154

Restructuring expenses recorded for this program are included in the following line items in the Consolidated Income Statements:

(\$ in millions)	2019	2018
Total cost of sales	8	35
Selling, general and administrative expenses	46	23
Non-order related research and development expenses	1	3
Other income (expense), net	34	4
Total	89	65

Liabilities associated with the OS program are primarily included in “Other provisions”. The following table shows the activity from the beginning of the program to December 31, 2019:

(\$ in millions)	Employee severance costs	Contract settlement, loss order and other costs	Total
Liability at January 1, 2018	—	—	—
Expenses	65	—	65
Liability at December 31, 2018	65	—	65
Expenses	111	1	112
Cash payments	(44)	(1)	(45)
Change in estimates	(30)	—	(30)
Exchange rate differences	(3)	—	(3)
Liability at December 31, 2019	99	—	99

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.

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 following table outlines the net costs incurred in 2017 and the cumulative net costs incurred up to December 31, 2017:

(\$ in millions)	Net costs incurred in 2017 ⁽¹⁾	Cumulative costs incurred up to December 31, 2017 ⁽¹⁾
Electrification	(17)	72
Industrial Automation	(23)	106
Motion	(10)	42
Robotics & Discrete Automation	(4)	14
Corporate and Other	(32)	91
Total	(86)	325

(1) Amounts in the table above have been recast to reflect the reorganization of the Company’s operating segments in 2019 as outlined in Note 23.

The Company recorded the following expenses, net of changes in estimates, under this program:

(\$ in millions)	2017	Cumulative costs incurred up to December 31, 2017
Employee severance costs	(90)	307
Estimated contract settlement, loss order and other costs	3	8
Inventory and long-lived asset impairments	1	10
Total	(86)	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
Total cost of sales	(47)
Selling, general and administrative expenses	(35)
Non-order related research and development expenses	(5)
Other income (expense), net	1
Total	(86)

Other restructuring-related activities

In 2019, 2018 and 2017, the Company executed various other restructuring-related activities and incurred charges of \$114 million, \$116 million and \$181 million, respectively.

(\$ in millions)	2019	2018	2017
Employee severance costs	55	74	130
Estimated contract settlement, loss order and other costs	37	29	32
Inventory and long-lived asset impairments	22	13	19
Total	114	116	181

Expenses associated with these activities are recorded in the following line items in the Consolidated Income Statements:

(\$ in millions)	2019	2018	2017
Total cost of sales	46	24	119
Selling, general and administrative expenses	4	52	10
Non-order related research and development expenses	—	2	—
Other income (expense), net	64	38	52
Total	114	116	181

At December 31, 2019 and 2018, \$189 million and \$245 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 these operating segments consist of Electrification, Industrial Automation, Motion, and Robotics & Discrete Automation. The remaining operations of the Company are included in Corporate and Other.

Effective April 1, 2019, the Company announced a reorganization of its operating segments into four customer-focused, entrepreneurial businesses. The Electrification Products segment was renamed the Electrification segment. The Industrial Automation segment remains unchanged except that it now excludes the Machine and Factory Automation business line, which has been transferred, along with the Robotics business line from the former Robotics and Motion segment, to the new Robotics & Discrete Automation segment. The new Motion segment contains the remaining business lines of the former Robotics and Motion segment.

The segment information for 2018 and 2017, and at December 31, 2018 and 2017, has been recast to reflect these changes. In addition, the segment level information for restructuring and related expenses included in Note 22 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:* 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 large turbochargers. In addition, the business offers a comprehensive range of services ranging from repair to advanced services such as remote monitoring, preventive maintenance and cybersecurity services.
- *Motion:* manufactures and sells motors, generators, drives, wind converters, mechanical power transmissions, complete electrical powertrain systems and related services and digital solutions for a wide range of applications in industry, transportation, infrastructure, and utilities.
- *Robotics & Discrete Automation:* develops and sells robotics and machinery automation solutions, including robots, controllers, software, function packages, cells, programmable logic controllers (PLC), industrial PCs (IPC), servo motion, engineered manufacturing solutions, turn-key solutions and collaborative robot solutions for a wide range of applications. In addition, the business offers a comprehensive range of digital solutions as well as field and after sales service.
- *Corporate and Other:* includes headquarters, central research and development, the Company's real estate activities, Corporate 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 acquisitions (acquisition-related amortization),
- restructuring, related and implementation costs,
- 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 (including fair value adjustment on assets and liabilities held for sale),
- 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 disaggregated segment revenues from contracts with customers for 2019, 2018 and 2017.

(\$ in millions)	2019					Total
	Electrification	Industrial Automation	Motion	Robotics & Discrete Automation	Corporate and Other	
<i>Geographical markets</i>						
Europe	4,039	2,416	1,879	1,634	36	10,004
The Americas	4,568	1,582	2,315	453	1	8,919
Asia, Middle East and Africa	3,665	2,153	1,827	1,157	40	8,842
	<u>12,272</u>	<u>6,151</u>	<u>6,021</u>	<u>3,244</u>	<u>77</u>	<u>27,765</u>
<i>End Customer Markets</i>						
Utilities	2,355	1,057	696	—	18	4,126
Industry	4,798	3,606	3,890	3,165	35	15,494
Transport and infrastructure	5,119	1,488	1,435	79	24	8,145
	<u>12,272</u>	<u>6,151</u>	<u>6,021</u>	<u>3,244</u>	<u>77</u>	<u>27,765</u>
<i>Product type</i>						
Products	10,315	1,439	5,152	1,785	65	18,756
Systems	958	1,648	—	968	12	3,586
Services and software	999	3,064	869	491	—	5,423
	<u>12,272</u>	<u>6,151</u>	<u>6,021</u>	<u>3,244</u>	<u>77</u>	<u>27,765</u>
Third-party revenues	12,272	6,151	6,021	3,244	77	27,765
Intersegment revenues ⁽¹⁾	456	122	512	70	(947)	213
Total Revenues	<u>12,728</u>	<u>6,273</u>	<u>6,533</u>	<u>3,314</u>	<u>(870)</u>	<u>27,978</u>

2018						
(\$ in millions)	Electrification	Industrial Automation	Motion	Robotics & Discrete Automation	Corporate and Other	Total
Geographical markets						
Europe	3,881	2,475	1,862	1,737	58	10,013
The Americas	3,650	1,467	2,389	476	21	8,003
Asia, Middle East and Africa	3,680	2,449	1,699	1,339	236	9,403
	11,211	6,391	5,950	3,552	315	27,419
End Customer Markets						
Utilities	2,452	1,174	746	—	176	4,548
Industry	4,395	3,573	3,877	3,510	98	15,453
Transport and infrastructure	4,364	1,644	1,327	42	41	7,418
	11,211	6,391	5,950	3,552	315	27,419
Product type						
Products	9,679	1,528	5,111	2,019	118	18,455
Systems	617	1,853	—	1,001	197	3,668
Services and software	915	3,010	839	532	—	5,296
	11,211	6,391	5,950	3,552	315	27,419
Third-party revenues	11,211	6,391	5,950	3,552	315	27,419
Intersegment revenues ⁽¹⁾	475	109	513	59	(913)	243
Total Revenues	11,686	6,500	6,463	3,611	(598)	27,662
2017						
(\$ in millions)	Electrification	Industrial Automation	Motion	Robotics & Discrete Automation	Corporate and Other	Total
Geographical markets						
Europe	3,514	2,470	1,657	1,259	132	9,032
The Americas	2,613	1,349	2,219	534	116	6,831
Asia, Middle East and Africa	3,464	2,515	1,473	1,125	493	9,070
	9,591	6,334	5,349	2,918	741	24,933
End Customer Markets						
Utilities	2,597	1,273	628	—	575	5,073
Industry	4,022	3,398	3,488	2,891	155	13,954
Transport and infrastructure	2,972	1,663	1,233	27	11	5,906
	9,591	6,334	5,349	2,918	741	24,933
Product type						
Products	8,322	1,406	4,595	1,489	169	15,981
Systems	614	2,089	—	926	565	4,194
Services and software	655	2,839	754	503	7	4,758
	9,591	6,334	5,349	2,918	741	24,933
Third-party revenues	9,591	6,334	5,349	2,918	741	24,933
Intersegment revenues ⁽¹⁾	503	138	528	39	(945)	263
Total Revenues	10,094	6,472	5,877	2,957	(204)	25,196

(1) Intersegment revenues include sales to the Power Grids business which is presented as discontinued operations and are not eliminated from Total revenues (see Note 3).

Revenues by geography reflect the location of the customer. Approximately 24 percent, 22 percent and 20 percent of the Company's total revenues in 2019, 2018 and 2017, respectively, came from customers in the United States. In each of 2019, 2018 and 2017 approximately 15 percent of the Company's total revenues were generated from customers in China. In each of 2019, 2018 and 2017 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 2019, 2018 and 2017, as well as Total assets at December 31, 2019, 2018 and 2017.

(\$ in millions)	2019	2018	2017
<i>Operational EBITA:</i>			
Electrification	1,688	1,626	1,510
Industrial Automation	732	914	902
Motion	1,082	1,023	838
Robotics & Discrete Automation	393	528	473
Corporate and Other:			
— Non-core and divested businesses	(145)	(291)	(163)
— Stranded corporate costs	(225)	(297)	(286)
— Corporate costs and Other intersegment elimination	(418)	(498)	(457)
Total	3,107	3,005	2,817
Acquisition-related amortization	(265)	(273)	(229)
Restructuring, related and implementation costs ⁽¹⁾	(300)	(172)	(300)
Changes in obligations related to divested businesses	(36)	(106)	(94)
Changes in pre-acquisition estimates	(22)	(8)	(8)
Gains and losses from sale of businesses	55	57	252
Fair value adjustment on assets and liabilities held for sale	(421)	—	—
Acquisition- and divestment-related expenses and integration costs	(121)	(204)	(81)
Foreign exchange/commodity timing differences in income from operations:			
Unrealized gains and losses on derivatives (foreign exchange, commodities, embedded derivatives)	20	(1)	56
Realized gains and losses on derivatives where the underlying hedged transaction has not yet been realized	8	(23)	8
Unrealized foreign exchange movements on receivables/payables (and related assets/liabilities)	(7)	(9)	(30)
Certain other non-operational items:			
Costs for planned divestment of Power Grids	(141)	—	—
Regulatory, compliance and legal costs	(7)	(34)	(102)
Business transformation costs	(19)	(17)	—
Executive Committee transition costs	(14)	—	—
Favorable resolution of an uncertain purchase price adjustment	92	—	—
Gain on sale of investments	15	—	—
Gain on liquidation of a foreign subsidiary	—	31	—
Asset write downs/impairments	(4)	(25)	(40)
Other non-operational items	(2)	5	(19)
Income from operations	1,938	2,226	2,230
Interest and dividend income	67	72	73
Interest and other finance expense	(215)	(262)	(234)
Non-operational pension (cost) credit	72	83	33
Income from continuing operations before taxes	1,862	2,119	2,102

(1) Amounts in 2019 include \$97 million of implementation costs in relation to the OS Program.

(\$ in millions)	Depreciation and amortization			Capital expenditures ⁽¹⁾			Total assets ^{(1), (2)} at December 31,		
	2019	2018	2017	2019	2018	2017	2019	2018	2017
Electrification	414	355	315	279	244	218	11,671	12,052	8,881
Industrial Automation	55	57	61	64	58	54	4,559	4,287	4,478
Motion	169	184	193	110	93	89	6,149	6,016	6,051
Robotics & Discrete Automation	124	127	73	59	74	44	4,661	4,760	4,848
Corporate and Other	199	193	194	250	303	347	19,068	17,326	19,200
Consolidated	961	916	836	762	772	752	46,108	44,441	43,458

(1) Capital expenditures and Total assets are after intersegment eliminations and therefore reflect third-party activities only.

(2) At December 31, 2019, 2018 and 2017, Corporate and Other includes \$9,840 million, \$8,591 million and \$8,603 million, respectively, of assets in the Power Grids business which is reported as discontinued operations (see Note 3).

Other geographic information

Geographic information for long-lived assets was as follows:

(\$ in millions)	Long-lived assets at December 31,	
	2019	2018
Europe	2,565	2,110
The Americas	1,469	1,168
Asia, Middle East and Africa	932	855
Total	4,966	4,133

Long-lived assets represent “Property, plant and equipment, net” and, with effect from 2019 as a result of adopting the new leasing standard (see Note 2), “Operating lease right-of-use assets” and are shown by location of the assets. At December 31, 2019, approximately 23 percent, 10 percent and 10 percent of the Company’s long-lived assets were located in the U.S., China, and Switzerland, respectively. 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., China and Switzerland, respectively.