About ABB

ABB is a pioneering technology leader in electrification products, robotics and motion, industrial automation and power grids serving customers in utilities, industry and transport & infrastructure globally. Continuing more than a 125-year history of innovation, ABB today is at the forefront of the industrial digitalization and driving the Energy and Fourth Industrial Revolutions. ABB operates in more than 100 countries with about 135,000 employees.

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).

Organizational structure

Our business is international in scope and we generate revenues in numerous currencies. We are headquartered in Zurich, Switzerland.

We manage our business based on a divisional structure, comprised of four divisions: Electrification Products, Robotics and Motion, Industrial Automation and Power Grids. For a breakdown of our consolidated revenues (i) by operating division and (ii) derived from each geographic region in which we operate, see "Analysis of Results of Operations–Revenues".

We operate in approximately 100 countries across three regions: Europe, the Americas, and Asia, Middle East and Africa (AMEA). A breakdown of our employees by geographic region is as follows:

	December 31,		
	2017	**2016**	**2015**
Europe	63,000	61,400	61,600
The Americas	28,800	29,000	30,900
Asia, Middle East and Africa	43,000	41,900	43,300
Total	**134,800**	**132,300**	**135,800**

The proportion of our employees that are represented by labor unions or are the subject of collective bargaining agreements varies based on the labor practices of each country in which we operate.

Divisions

Electrification Products Division

Overview
The Electrification Products division provides solutions across the full electrical value chain from the substation to the point of consumption. The innovations from this business enable a safer and more reliable electrical flow, with a full range of low- and medium-voltage products and solutions for intelligent protection and connection as well as pre-engineered packaged solutions and services tailored to customers' needs. The portfolio – within increasingly digital and connected solutions – includes modular substation packages, distribution automation products, switchgear, circuit breakers, measuring and sensing devices, control products, wiring accessories, and enclosures and cabling systems, including KNX systems (global standard for home and building control) designed to integrate and automate a building's lighting, heating and ventilation, and security and data communication networks.

The division delivers products to customers through a global network of channel partners and end-customers. Most of the division's revenue is derived from sales through distributors, wholesalers, original equipment manufacturers (OEMs), system integrators, utilities and panel builders, with some direct sales to end-users, utilities and other ABB divisions.

The Electrification Products division had approximately 42,200 employees as of December 31, 2017, and generated $10.1 billion of revenues in 2017.

Customers
The Electrification Products division serves a wide range of customers who are connecting, protecting and controlling electricity from a number of industry segments including buildings, data centers, rail, wind and solar, food and beverage, marine, and oil and gas.

Products and Services
The Protection and Connection business offers 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 ranges from miniature circuit breakers to high-capacity molded-case and air-circuit breakers and includes 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. In addition, the business offers terminal blocks, a range of contactors, starters, proximity sensors, safety products for industrial protection, limit switches and manual motor starters, along with electronic relays and overload relays.

The Building Products business provides smart home and intelligent building control systems, also known as KNX protocol, 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, and enclosures ideal for single family homes, multiple dwellings, commercial buildings, infrastructure and industrial applications.

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 Medium Voltage Products 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 link between high-voltage transmission systems and low-voltage users. Its comprehensive offering includes medium-voltage equipment (1 to 50 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.

The Electrification Solutions business offers systems solutions to customers across low- and medium-voltage applications, integrating the entire offering from the division into complete solutions

for customers, adding value through design, engineering, project management and service.

The Power and Electric Vehicle Infrastructure business supplies power generation products and solutions including electric vehicle charging and solar inverters for residential, commercial and utility applications, solar packages with integrated energy storage solutions and power protection solutions such as UPS (uninterruptible power supplies) solutions, status transfer switches, power distribution units, power converters, and fuel cell inverters. In electro mobility, ABB has been offering rapid charging solutions with more than 5,000 networked systems for passenger cars and commercial vehicles installed worldwide. ABB's portfolio of DC fast charging solutions ranges from 20kW wall boxes to ultra-fast charging solutions for cars and 600kW electric buses. In 2017, ABB introduced a leading technology for flash-charging and onboard traction equipment which recharges buses in 20-second bursts at stops, while passengers are embarking and disembarking. This technology is designed to deliver higher passenger capacity, lower noise and emission-free public transport.

In addition, the service offerings of the Electrification Products division span 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.

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

Competition
The Electrification Products division's principal competitors vary by product line, but they include Eaton Corporation, Legrand, Schneider, Siemens, Hubbell, Leviton, Rittal and Chint Electrical.

Capital Expenditures
The Electrification Products division's capital expenditures for property, plant and equipment totaled $218 million in 2017, compared to $215 million and $228 million in 2016 and 2015, respectively. Investments in 2017 were primarily related to footprint changes, equipment replacement and upgrades. Geographically, in 2017, Europe represented 56 percent of the capital expenditures, followed by the Americas (32 percent) and AMEA (12 percent).

Robotics and Motion Division

Overview
The Robotics and Motion division provides products, solutions and related services that increase industrial productivity and energy efficiency. Our key products such as motors, generators, drives and robotics provide power, motion and control for a wide range of automation applications. The leading position in wind generators and propulsion converters complement the industrial focus, leveraging joint technology, channels and operations platforms.

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

The Robotics and Motion division had approximately 27,100 employees as of December 31, 2017, and generated $8.4 billion of revenues in 2017.

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

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

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

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

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

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

Competition
The Robotics and Motion division’s principal competitors vary by product line but include Fanuc Robotics, Kuka Robot Group, Rockwell Automation, Schneider, Siemens, Yaskawa and WEG Industries.

Capital Expenditures
The Robotics and Motion division’s capital expenditures for property, plant and equipment totaled $118 million in 2017, compared to $112 million and $126 million in 2016 and 2015, respectively. Principal investments in 2017 were primarily related to equipment replacement, footprint adjustments and automation upgrades. Geographically, in 2017, Europe represented 46 percent of the capital expenditures, followed by the Americas (32 percent) and AMEA (22 percent).

Industrial Automation Division

Overview
The Industrial Automation division offers customers solutions that are designed to optimize the productivity, energy efficiency and safety of their industrial processes by combining the division’s integrated control products, systems and service offerings with deep domain and process expertise of each end market. Solutions include turnkey engineering, control systems, measurement products, lifecycle services, outsourced maintenance and industry-specific products such as electric propulsion for ships, Azipods, mine hoists, turbochargers and pulp and paper quality control equipment. The systems can link various processes and information flows which allows customers to manage their entire manufacturing and business process based on real-time access to plant information. Additionally, the systems allow customers to increase production efficiency, optimize their assets and reduce environmental waste. Some of the products from the Robotics and Motion, Power Grids and Electrification Products divisions are integrated into the process control and electrification solutions offered by the Industrial Automation division.

The Industrial Automation division offerings are available as separately sold products or as part of a total automation, electrification and/or instrumentation system. The division’s technologies are

sold primarily through direct sales forces as well as third-party channels.

The division had approximately 27,100 employees as of December 31, 2017, and generated revenues of $6.9 billion in 2017.

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

Products and Services
The Oil, Gas and Chemicals business provides solutions across 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 technologies connect people with data to optimize performance, improve reliability, enhance efficiency and minimize environmental impact from project start-up throughout the entire plant life cycle.

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

ABB serves the power generation market with leading automation solutions for all types of power generation such as coal, gas, combined-cycle, waste-to-energy as well as renewable sources such as hydro, solar, wind and biomass. With an offering that includes instrumentation, excitation and control systems, ABB technologies help optimize performance, improve reliability, enhance efficiency and minimize environmental impact throughout the plant life cycle. The business also serves the water industry, including applications such as pumping stations and desalination plants.

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

ABB offers an extensive portfolio of products and software from stand-alone basic control to integrated collaborative systems for complex or critical processes. One of the solutions, System 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 distributed control system for small to medium size applications. The 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 (Human Machine Interfaces) are available through our Compact Product Suite offering. The product portfolio is complemented by Automation Sentinel, a subscription-based life cycle management

program that provides services to maintain and continually advance and enhance ABB control systems (e.g. cyber security patches) and thus allows it to manage a customer's life cycle costs. The Advanced Services offering provides individual software-based services to continuously improve automation and processes. ABB also offers Manufacturing Execution Systems that create agility and transparency for production processes by synchronizing and orchestrating a flow across individual automation islands. An interactive software platform, Decathlon Software, combines plant operations data from control systems, enterprise resource planning (ERP) and other data sources into actionable information for decision-makers, creating additional customer value. ABB focuses strongly on the human factor and thus offers operator interfaces from panels to holistic control room solutions with ergonomic furniture and control centers to drive productivity, quality and safety to new levels.

The offerings of the Measurement and Analytics business are designed to measure product properties, such as weight, thickness, color, brightness, moisture content and additive content. 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 also offers a full line of instrumentation and analytical products to analyze, measure and record industrial and power processes.

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

In July 2017, ABB acquired B&R, the largest independent provider focused on product- and software-based, open-architecture solutions for machine and factory automation worldwide. This acquisition closes ABB's historic gap in machine and factory automation and is anticipated to create a comprehensive automation portfolio for customers globally. ABB combines state-of-the-art technology with advanced engineering to provide a wide range of customers with complete solutions for machine and factory automation, motion control, HMI and integrated safety technology. With Industrial Internet of Things communication standards like OPC Unified Architecture, POWERLINK and openSAFETY as well as the powerful Automation Studio software development environment, B&R strives to redefine the future of automation engineering. In addition, ABB offers a complete range of lifecycle services across all customer segments to help customers optimize their assets. Demand for process automation services is driven by customers seeking to increase productivity by improving the performance of existing equipment.

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

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

Capital Expenditures
The Industrial Automation division's capital expenditures for property, plant and equipment totaled $71 million in 2017, compared to $53 million and $57 million in 2016 and 2015, respectively. Principal investments in 2017 were in the Turbocharging and the Measurement and Analytics businesses. Geographically, in 2017, Europe represented 70 percent of the capital expenditures, followed by the Americas (17 percent) and AMEA (13 percent).

Power Grids Division

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

Approximately three quarters of the division's revenues come from utility customers and the remaining portion is generated from industry and transport & infrastructure customers. Power

Grids has a worldwide customer base, with a wide spread of revenues from a regional perspective across the Americas, Europe and AMEA. The division also has a globally diversified and well balanced manufacturing and engineering footprint. Direct sales account for a significant part of the division's total revenues and external channel partners such as wholesalers, distributors and OEMs account for the rest.

The division had approximately 36,400 employees as of December 31, 2017, and generated $10.4 billion of revenues in 2017.

Customers
The Power Grids division's principal customers include transmission and distribution operators and owners as well as utilities and industrial, transportation and infrastructure customers.

Products and Services
The Grid Automation business is at the forefront of grid automation and digitalization. It supplies substation automation products, systems and services. It also provides Supervisory Control and Data Acquisition (SCADA) systems for transmission and distribution networks as well as a range of wireless, fiber optic and power line carrier-based telecommunication technologies for mission critical applications. This business offers microgrid solutions that are being increasingly deployed for remote and partially grid-connected applications. Also included in this business is the enterprise software portfolio – a provider of an industry-leading suite of software solutions that help utilities and other asset-intensive industries (e.g. rail, mining) manage, maintain and optimize their assets.

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

The High Voltage products business 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 also 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 as well as instrument transformers and other substation components.

The Transformers business supplies transformers that are an integral component found across the power value chain, enabling the efficient and safe conversion of electricity to different voltages. ABB is the world's largest maker of transformers. The product range is designed for reliability, durability and efficiency with a portfolio that includes power transformers, dry- and liquid-distribution transformers, traction transformers for rail applications, and special application transformers and related components such as insulation kits, bushings and other transformer accessories. In addition, ABB's power transformers are pushing the voltage barrier to unprecedented levels of 1100 kV DC and 1200 kV AC, facilitating more power to be transported longer distances with minimum losses. Other technology developments include grid-resilient transformers designed to withstand physical attack, eco-efficient transformers using biodegradable oil and innovative sensor-based as well as software-leveraging solutions for remote maintenance and asset optimization.

The division also has an extensive portfolio of service offerings. This is a growing focus area, leveraging the significant installed product base. The portfolio includes spare parts, condition monitoring and maintenance services, on- and off-site repairs as well as retrofits and upgrades. Advanced software-based monitoring and advisory services are being added to the portfolio to enable digitalization of grids. ABB Ability™, the company's unified, cross-industry digital capability supports the portfolio with devices, systems, solutions, services and a platform that enable customers to know more, do more and do better.

Competition
On a global basis, the Power Grids division faces worldwide competition across its portfolio mainly from Siemens and General Electric (GE Alstom). It also competes in specific geographies and in parts of the business with companies such as Hyundai, Hyosung, Crompton Greaves, TBEA

and NARI. The breadth of its portfolio, technology and innovation, a global footprint and a vast installed base, enable the division to maintain its leading position in the power sector.

Capital Expenditure
The Power Grids division's capital expenditures for property, plant and equipment totaled $171 million in 2017, compared to $172 million and $150 million in 2016 and 2015, respectively. Principal investments in 2017 were related to capacity expansion as well as the replacement of existing equipment, particularly in Sweden, the U.S. and Switzerland. Geographically, in 2017, Europe represented 60 percent of the capital expenditures, followed by the Americas (25 percent) and AMEA (15 percent).

Corporate and Other

Corporate and Other includes headquarters, central research and development, real estate activities, Group Treasury Operations, Global Business Services (GBS) and other minor business activities. In addition, we have classified the historical business activities of significant divested businesses in Corporate and Other.

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 the four business divisions. We have two global research laboratories, one focused on power technologies and the other focused on automation technologies, which both work on technologies relevant to the future of our four business divisions. Each laboratory works on new and emerging technologies and collaborates with universities and other external partners to support our divisions in advancing relevant technologies and in developing cross-divisional technology platforms. We have corporate research centers in seven countries (China, India, Germany, Poland, Sweden, Switzerland and the U.S.).

GBS operates in several hub locations and consists of shared services in the area of accounting, human resources, information systems and supply chain management. The costs for GBS are allocated to the operating divisions.

Corporate and Other had approximately 2,000 employees at December 31, 2017.

Capital expenditures

Total capital expenditures for property, plant and equipment and intangible assets (excluding intangibles acquired through business combinations) amounted to $949 million, $831 million, $876 million in 2017, 2016 and 2015, respectively. In 2017, 2016 and 2015, capital expenditures were 14 percent, 27 percent and 24 percent lower, respectively, than depreciation and amortization. Excluding acquisition-related amortization, capital expenditures were 13 percent higher, 3 percent lower and 3 percent higher, respectively, than depreciation and amortization.

Capital expenditures in 2017 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 2017 were driven primarily by upgrades and maintenance of existing production facilities, mainly in the U.S., Sweden, Switzerland, Italy and Germany. Capital expenditures in emerging markets were highest in China, Poland and India. Capital expenditures in emerging markets were made primarily to increase production capacity by investing in new or expanded facilities. The share of emerging markets capital expenditures as a percentage of total capital expenditures in 2017, 2016 and 2015 was 31 percent, 35 percent and 31 percent, respectively.

At December 31, 2017, construction in progress for property, plant and equipment was $700 million, mainly in China, the U.S., Sweden, Switzerland and Germany. At December 31, 2016, construction in progress for property, plant and equipment was $515 million, mainly in the U.S., China, Sweden, Switzerland and Germany while at December 31, 2015, construction in progress for property, plant and equipment was $559 million, mainly in Sweden, the U.S., China, Switzerland and Germany.

Our capital expenditures relate primarily to property, plant and equipment. For 2018, we estimate the expenditures for property, plant and equipment will be higher than our annual depreciation and amortization charge, excluding acquisition-related amortization.

Supplies and raw materials

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

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

- pool and leverage procurement of materials and services,
- provide transparency of ABB's global spending through a comprehensive performance and reporting system linked to our ERP systems,
- strengthen ABB's supply chain network by implementing an effective product category management structure and extensive competency-based training, and
- monitor and develop our supply base to ensure sustainability, both in terms of materials and processes used.

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

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

Overall, during 2017 supply chain management personnel in our businesses, and in the countries in which we operate, along with the global category teams, continued to focus on value chain optimization efforts in all areas, while maintaining and improving quality and delivery performance.

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

Application of critical accounting policies

General

We prepare our Consolidated Financial Statements in accordance with United States generally accepted accounting principles (U.S. GAAP) and present these in U.S. dollars unless otherwise stated.

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

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

judgments, often as a result of the need to make estimates regarding matters that are inherently uncertain. These policies should be considered when reading our Consolidated Financial Statements.

Revenue recognition

We generally recognize revenues for the sale of goods when persuasive evidence of an arrangement exists, delivery has occurred, the price is fixed or determinable, and collectability is reasonably assured. With regard to the sale of products, delivery 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) such as Ex Works (EXW), Free Carrier (FCA) and Delivered Duty Paid (DDP). Subsequent to delivery of the products, we generally have no further contractual performance obligations that would preclude revenue recognition.

Revenues under long-term construction-type contracts are generally recognized using the percentage-of-completion method of accounting. We use the cost-to-cost method to measure progress towards completion on contracts. Under this method, progress of contracts is measured by actual costs incurred in relation to management's best estimate of total estimated costs, which are reviewed and updated routinely for contracts in progress. The cumulative effect of any change in estimate is recorded in the period in which the change in estimate is determined.

The percentage-of-completion method of accounting involves the use of assumptions and projections, principally relating to future material, labor and project-related overhead costs. As a consequence, there is a risk that total contract costs will exceed those we originally estimated and the margin will decrease or the long-term construction-type 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 long-term 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.

Short-term construction-type contracts, or long-term construction-type contracts for which reasonably dependable estimates cannot be made or for which inherent hazards make estimates difficult, are accounted for under the completed-contract method. Revenues under the completed-contract method are recognized upon substantial completion—that is: acceptance by the customer, compliance with performance specifications demonstrated in a factory acceptance test or similar event.

For non construction-type contracts that contain customer acceptance provisions, revenue is deferred until customer acceptance occurs or we have demonstrated the customer-specified objective criteria have been met or the contractual acceptance period has lapsed.

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, and installation and commissioning of products as a stand-alone service or as part of a service contract.

Revenues for software license fees are recognized when persuasive evidence of a non-cancelable license agreement exists, delivery has occurred, the license fee is fixed or determinable, and collection is probable. In software arrangements that include rights to multiple software products and/or services, the total arrangement fee is allocated using the residual method, under which revenue is allocated to the undelivered elements based on vendor-specific objective evidence (VSOE) of fair value of such undelivered elements and the residual amounts of revenue are allocated to the delivered elements. Elements included in multiple element arrangements may consist of software licenses, maintenance (which includes customer support services and unspecified upgrades), hosting, and consulting services. VSOE is based on the price generally charged when an element is sold separately or, in the case of an element not yet sold separately, the price established by authorized management, if it is probable that the price, once established, will not change once the element is sold separately. If VSOE does not exist for an undelivered element, the total arrangement fee will be recognized as revenue over the life of the contract or upon delivery of the undelivered element.

We offer multiple element arrangements to meet our 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. Deliverables of such multiple element arrangements are evaluated to determine the unit of accounting and if certain criteria are met, we allocate revenues to each unit of accounting based on its relative selling price. A hierarchy of selling prices is used to determine the selling price of each specific deliverable that includes VSOE (if available), third-party evidence (if VSOE is not available), or estimated selling price if neither of the first two is available. The estimated selling price reflects our best estimate of what the selling prices of elements would be if the elements were sold on a stand-alone basis. Revenue is allocated between the elements of an arrangement consideration at the inception of the arrangement. Such arrangements generally include industry-specific performance and termination provisions, such as in the event of substantial delays or non-delivery.

Revenues are reported net of customer rebates and similar incentives. 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.

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

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

Contingencies

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

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

We provide for anticipated costs for warranties when we recognize revenues on the related products or contracts. Warranty costs include calculated costs arising from imperfections in design,

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

Pension and other postretirement benefits

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

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

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

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

Holding all other assumptions constant, a 0.25-percentage point decrease in the discount rate would have increased the PBO related to our defined benefit pension plans by $427 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 $401 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 2017 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, 2017, our defined benefit pension plans were $1,413 million underfunded compared to an underfunding of $1,403 million at December 31, 2016. Our other postretirement plans were underfunded by $132 million and $147 million at December 31, 2017 and 2016, 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 7.1 percent per annum for 2018, 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 (loss) from discontinued operations, net of tax". Unforeseen changes in tax rates and tax laws, as well as differences in the projected taxable income as compared to the actual taxable income, may affect these estimates.

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

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

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

Business combinations

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

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

In addition, uncertain tax positions and tax-related valuation allowances assumed in connection with a business combination are initially estimated at the acquisition date. We reevaluate these items quarterly, based upon facts and circumstances that existed at the acquisition date with any adjustments to our preliminary estimates being recorded to goodwill provided that we are within the twelve-month measurement period. Subsequent to the measurement period or our final determination of the tax allowance's or contingency's estimated value, whichever comes first, changes to these uncertain tax positions and tax-related valuation allowances will affect our provision for income taxes in our Consolidated Income Statements and could have a material impact on our results of operations and financial position. The fair values assigned to the intangible assets acquired are described in "Note 3 Acquisitions and business divestments" as well as "Note 11 Goodwill and other intangible assets", to our Consolidated Financial Statements.

Goodwill and other intangible assets

We review goodwill for impairment annually as of October 1, or more frequently if events or circumstances indicate the carrying value may not be recoverable. As of January 1, 2017, we early adopted an accounting standard update eliminating the requirement to calculate the implied fair value of goodwill when calculating an impairment loss.

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

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

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

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

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

In 2016, prior to the adoption of the new accounting standard update, we performed the two-step quantitative impairment test for all of our reporting units to reflect new assumptions and forecasts resulting from our newly developed strategic plan for the period 2017 to 2020. The two-step test required us to first calculate the fair value of the reporting unit and then compare it to the reporting unit's carrying value (as described above). However, if the carrying value of the net assets assigned to the reporting unit was equal to or exceeded the reporting unit's fair value, we would have performed a second step whereby we would have determined the implied fair value of the reporting unit's goodwill and would have compared it to the carrying value of the reporting unit's goodwill. If the carrying value of a reporting unit's goodwill had exceeded its implied fair value, then we would have recorded an impairment loss equal to the difference.

The quantitative test performed in 2016, concluded that the estimated fair values for each of our reporting units exceeded their respective carrying values by more than 100 percent and as no reporting unit had a zero or negative carrying value, we concluded that none of the reporting units were "at risk" of failing the goodwill impairment test. Consequently, the second step of the impairment test was not performed.

The projected future cash flows used in the 2016 fair value calculation were based on approved business plans for the reporting units which covered a period of four years plus a calculated terminal value. 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. 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. We based our fair value estimates on assumptions we believed to be reasonable, but which were inherently uncertain. Consequently, actual future results may differ from those estimates.

We assessed the reasonableness of the fair value calculations of our reporting units by reconciling the sum of the fair values for all our reporting units to our total market capitalization. The assumptions used in the fair value calculation were challenged each year (through the use of sensitivity analysis) to determine the impact on the fair value of the reporting units. Our sensitivity analysis in 2016 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 12.9 percent, while a 1-percentage point decrease in the terminal value growth rate would have reduced the calculated fair value by approximately 9.7 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 (loss) from discontinued operations, net of tax".

New accounting pronouncements

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

Research and development

Each year, we invest significantly in research and development. Our research and development focuses on developing and commercializing the technologies of our businesses that are of strategic importance to our future growth. In 2017, 2016 and 2015, we invested $1,365 million, $1,300 million and $1,406 million, respectively, or approximately 4.0 percent, 3.8 percent and 4.0 percent, respectively, of our annual consolidated revenues on research and development activities. We also had expenditures of $131 million, $155 million and $271 million, respectively, or approximately 0.4 percent, 0.5 percent and 0.8 percent, respectively, of our annual consolidated revenues in 2017, 2016 and 2015, on order-related development activities. These are customer- and project-specific development efforts that we undertake to develop or adapt equipment and systems to the unique needs of our customers in connection with specific orders or projects. Order-related development amounts are initially recorded in inventories as part of the work in process of a contract and then are reflected in cost of sales at the time revenue is recognized in accordance with our accounting policies.

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

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

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

Acquisitions and divestments

Acquisitions

During 2017, 2016 and 2015, ABB paid $2,111 million, $13 million and $37 million to purchase five, one and three businesses, respectively. The amounts exclude increases in investments made in cost- and equity-accounted companies.

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

None of the acquisitions in 2016 or 2015 were significant.

Planned acquisition of GE Industrial Solutions
On September 25, 2017, the Company announced that it had reached an agreement to acquire GE IS, GE's global electrification solutions business, for $2.6 billion. The acquisition is expected to strengthen the Company's global position in electrification and expand its access to the North American market through strong customer relationships, a large installed base and extensive distribution networks. GE IS is headquartered in the United States and has approximately 13,500 employees. The Company expects to complete the acquisition in the first half of 2018, following the receipt of customary regulatory approvals.

Divestments and Assets held for sale

In September 2016, ABB announced an agreement to divest its high-voltage cable system business. The assets and liabilities of this business are shown as assets and liabilities held for sale in our Consolidated Balance Sheet at December 31, 2016. The divestment was completed on March 1, 2017. Total cash proceeds from all business divestments during 2017 amounted to $605 million, net of transaction costs and cash disposed.

There were no significant divestments in 2016 and 2015.

For more information on our acquisitions and divestments, see "Note 3 Acquisitions and business divestments" to our Consolidated Financial Statements.

Exchange rates

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

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

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

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

The exchange rates between the USD and the EUR and the USD and the CHF at December 31, 2017, 2016 and 2015, were as follows:

Exchange rates into $	2017	2016	2015
EUR 1.00	1.20	1.05	1.09
CHF 1.00	1.02	0.98	1.01

The average exchange rates between the USD and the EUR and the USD and the CHF for the years ended December 31, 2017, 2016 and 2015, were as follows:

Exchange rates into $	2017	2016	2015
EUR 1.00	1.13	1.10	1.11
CHF 1.00	1.02	1.01	1.04

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 2017, approximately 80 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 20 percent,
- Chinese renminbi, approximately 13 percent, and
- Swedish krona, approximately 6 percent.

In 2017, approximately 79 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 20 percent,
- Chinese renminbi, approximately 12 percent, and
- Swedish krona, approximately 5 percent.

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

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

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

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

Transactions with 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.

Orders

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

The undiscounted value of revenues we expect to generate from our orders at any point in time is represented by our order backlog. Approximately 8.5 percent of the value of total orders we recorded in 2017 were "large orders", which we define as orders from third parties involving a value of at least $15 million for products or services. Approximately 61 percent of the total value of large orders in 2017 were recorded in our Power Grids division and approximately 22 percent in our Industrial Automation division. The other divisions accounted for the remainder of the total large orders recorded during 2017. The remaining portion of total orders recorded in 2017 was "base orders", which we define as orders from third parties with a value of less than $15 million for products or services.

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

Performance measures

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

Operational EBITA represents income from operations excluding:

- amortization expense on intangibles arising upon acquisitions (acquisition-related amortization),
- restructuring and restructuring-related expenses,
- non-operational pension cost comprising: (a) interest cost, (b) expected return on plan assets, (c) amortization of prior service cost (credit), (d) amortization of net actuarial loss, and (e) curtailments, settlements and special termination benefits,
- changes in the amount recorded for retained obligations of divested businesses occurring after the divestment date (changes in retained obligations of divested businesses),
- changes in estimates relating to opening balance sheets of acquired businesses (changes in pre-acquisition estimates),
- gains and losses from sale of businesses,
- acquisition-related expenses and certain 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).

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

Analysis of results of operations

Our consolidated results from operations were as follows:

($ in millions, except per share data in $)	2017	2016	2015
Orders	33,387	33,379	36,429
Order backlog at December 31,	22,414	22,981	24,121
Revenues	34,312	33,828	35,481
Cost of sales	(24,046)	(24,081)	(25,347)
Gross profit	**10,266**	**9,747**	**10,134**
Selling, general and administrative expenses	(5,607)	(5,349)	(5,574)
Non-order related research and development expenses	(1,365)	(1,300)	(1,406)
Other income (expense), net	140	(111)	(105)
Income from operations	**3,434**	**2,987**	**3,049**
Net interest and other finance expense	(203)	(188)	(209)
Provision for taxes	(860)	(781)	(788)
Income from continuing operations, net of tax	**2,371**	**2,018**	**2,052**
Income (loss) from discontinued operations, net of tax	(6)	16	3
Net income	**2,365**	**2,034**	**2,055**
Net income attributable to noncontrolling interests	(152)	(135)	(122)
Net income attributable to ABB	**2,213**	**1,899**	**1,933**
Amounts attributable to ABB shareholders:			
Income from continuing operations, net of tax	2,219	1,883	1,930
Net income	2,213	1,899	1,933
Basic earnings per share attributable to ABB shareholders:			
Income from continuing operations, net of tax	1.04	0.88	0.87
Net income	1.04	0.88	0.87
Diluted earnings per share attributable to ABB shareholders:			
Income from continuing operations, net of tax	1.03	0.87	0.87
Net income	1.03	0.88	0.87

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

Orders

				% Change	
($ in millions)	2017	2016	2015	2017	2016
Electrification Products	10,143	9,780	10,610	4%	(8)%
Robotics and Motion	8,468	7,858	8,272	8%	(5)%
Industrial Automation	6,554	5,991	7,398	9%	(19)%
Power Grids	9,600	10,844	11,425	(11)%	(5)%
Operating divisions	**34,765**	**34,473**	**37,705**	**1%**	**(9)%**
Corporate and Other[1]	(1,378)	(1,094)	(1,276)	n.a.	n.a.
Total	**33,387**	**33,379**	**36,429**	**0%**	**(8)%**

(1) Includes interdivisional eliminations.

In 2017, total orders were flat (flat in local currencies). The increase in orders in the Industrial Automation division mainly reflects the B&R acquisition in July 2017 as well as the increase in demand for ABB Ability™ solutions. A recovery in the end-market demand contributed to the increase in orders for the Electrification Products division. In the Robotics and Motion division demand was supported by strong orders in the Robotics business. The decrease in orders in the Power Grids division mainly reflects lower large orders compared to 2016 which included significant orders from India and China for ultra-high voltage direct current (UHVDC) transmission projects.

In 2017, base orders increased 6 percent (6 percent in local currencies) with positive impacts across all divisions. The increase in base orders reflects improvements in the global economic conditions across our key markets. Large orders decreased 37 percent (36 percent in local currencies), partly reflecting ABB's business model shift but also reflecting the impact of the large UHVDC orders in 2016 from India and China referred to above. For additional information about divisional order performance in all periods, please refer to the relevant sections of "Divisional analysis" below.

In 2016, total orders declined 8 percent (5 percent in local currencies) with orders decreasing in all divisions. The decline reflects ongoing macro-economic and geopolitical uncertainties and challenges in many markets. The low demand from both the onshore and offshore oil segments

negatively impacted many businesses, particularly the Industrial Automation division. This also contributed to the negative order development in the Robotics and Motion division, despite the strong demand from various industries for robotics. Weak market conditions impacted the orders in the Electrification Products and in the Power Grids divisions.

In 2016, base orders declined 5 percent (2 percent in local currencies) with negative impacts across all divisions. The decline of base orders reflects the uncertain global economic conditions across our key markets. Large orders decreased 27 percent (25 percent in local currencies), impacted by considerable investment delays.

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:

				% Change	
($ in millions)	**2017**	**2016**	**2015**	**2017**	**2016**
Europe	11,737	11,213	12,568	5%	(11)%
The Americas	9,749	9,351	10,505	4%	(11)%
Asia, Middle East and Africa	11,901	12,815	13,356	(7)%	(4)%
Total	**33,387**	**33,379**	**36,429**	**0%**	**(8)%**

Orders in 2017 increased in Europe and the Americas but were lower in Asia, Middle East and Africa, mainly due to the booking in 2016 of the large UHVDC orders in India and China referred to above. Both the Electrification Products and Robotics and Motion divisions saw growth in all regions while the Power Grids division saw declines in Asia, Middle East and Africa. Orders in Europe increased 5 percent (4 percent in local currencies) due primarily to an increase in base orders compared to 2016. Orders in Europe for the Electrification Products, Industrial Automation and Power Grids divisions grew in local currencies while remained flat for the Robotics and Motion division. In local currencies, orders were lower in Germany, Italy, Norway and Switzerland while orders increased in the United Kingdom, France and Spain. In the Americas orders increased 4 percent (3 percent in local currencies). In local currencies, orders increased in the U.S. and Canada. In Asia, Middle East and Africa, orders decreased 7 percent (6 percent in local currencies) as higher base orders were offset by lower large orders. Orders in China, India and Saudi Arabia decreased while orders increased in South Korea and the United Arab Emirates in local currencies.

Orders in 2016 declined in all regions, although we achieved growth within some divisions in Europe and Asia, Middle East and Africa. Orders in Europe decreased 11 percent (9 percent in local currencies) due primarily to lower large orders compared to 2015. Orders in Europe for the Electrification Products and the Robotics and Motion divisions grew in local currencies but were offset by decreases in the other divisions. In local currencies, orders were lower in Germany, the United Kingdom, Norway, Switzerland, Russia, France, Finland, Turkey and the Netherlands while orders increased in Italy, Sweden and Spain. In the Americas orders declined 11 percent (9 percent in local currencies) on lower base and large orders. In local currencies, orders decreased in the U.S. (mainly due to lower large orders), Canada, Brazil, Chile and Argentina while orders increased in Mexico. In Asia, Middle East and Africa, orders decreased 4 percent (flat in local currencies) as lower base orders were offset by strong demand for our power offering and higher large orders. Orders in China and India increased mainly due to investment activities in the HVDC power transmission technology while orders declined in Saudi Arabia, South Korea, the United Arab Emirates, Australia, Japan, South Africa and Qatar.

Order backlog

	December 31,			% Change	
($ in millions)	**2017**	**2016**	**2015**	**2017**	**2016**
Electrification Products	3,098	2,839	3,136	9%	(9)%
Robotics and Motion	3,961	3,660	3,785	8%	(3)%
Industrial Automation	5,376	5,409	6,199	(1)%	(13)%
Power Grids	11,330	11,638	11,707	(3)%	(1)%
Operating divisions	**23,765**	**23,546**	**24,827**	**1%**	**(5)%**
Corporate and Other[1]	(1,351)	(565)	(706)	n.a.	n.a.
Total	**22,414**	**22,981**	**24,121**	**(2)%**	**(5)%**

(1) Includes interdivisional eliminations.

As at December 31, 2017, the consolidated order backlog declined 2 percent (8 percent in local currencies). Order backlog declined in the Industrial Automation and Power Grids divisions while increased in the Electrification Products as well as in Robotics and Motion divisions. The decrease in the order backlog was mainly due to high levels of execution from the order backlog while orders received during the year remained flat compared to 2016. The net impact on order backlog from divestments and acquisitions was a decrease of 4 percent.

As at December 31, 2016, the consolidated order backlog declined 5 percent (2 percent in local currencies) and was lower in all divisions. The decline in the Electrification Products division was driven by the Medium Voltage Products and Building Products businesses. In the Robotics and Motion division, the backlog was flat in local currencies as the increase in the Robotics was offset by declines in the other businesses. In the Industrial Automation division, order backlog declined and was lower across all businesses, except for in the Measurement and Analytics business. In the Power Grids division, local currency order backlog increased, driven by the Transformers business.

Revenues

				% Change	
($ in millions)	**2017**	**2016**	**2015**	**2017**	**2016**
Electrification Products	10,094	9,920	10,275	2%	(3)%
Robotics and Motion	8,401	7,906	8,188	6%	(3)%
Industrial Automation	6,880	6,654	7,219	3%	(8)%
Power Grids	10,394	10,660	11,245	(2)%	(5)%
Operating divisions	**35,769**	**35,140**	**36,927**	**2%**	**(5)%**
Corporate and Other[1]	(1,457)	(1,312)	(1,446)	n.a.	n.a.
Total	**34,312**	**33,828**	**35,481**	**1%**	**(5)%**

(1) Includes interdivisional eliminations.

Revenues in 2017 increased 1 percent (1 percent in local currencies) as growth in 2017 was generally hindered by a lower opening order backlog compared to 2016. Revenues in the Robotics and Motion division were positively impacted by growth in the Robotics business with strong demand from the automotive and general industry sectors. The increase in revenues in the Industrial Automation division was mainly attributable to the acquisition of B&R in July 2017, partially offset by lower revenues in the division's other businesses. Revenues in the Electrification Products division increased from both the distributors as well as certain end-customer channels. Revenues in the Power Grids division were impacted by weaker large order intake as well as a lower opening order backlog. For additional information about the divisional revenues performance in all periods, please refer to "Divisional analysis" below.

Revenues in 2016, decreased 5 percent (2 percent in local currencies) and declined in all divisions. Revenues were lower due to declining orders during the year and a lower opening order backlog compared to the beginning of 2015. In the Industrial Automation division, a continued low level of orders from the oil and gas industry, as well as from mining and metals, negatively impacted revenues. Revenues in the Power Grids division were impacted by weaker order intake, the exit from certain businesses as well as lower pull-through revenues from other divisions. Revenues were positively impacted by growth in the Robotics business, despite market challenges while revenues in the Electrification Products division slightly increased in local currencies.

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:

				% Change	
($ in millions)	**2017**	**2016**	**2015**	**2017**	**2016**
Europe	11,840	11,315	11,602	5%	(2)%
The Americas	9,713	9,741	10,554	0%	(8)%
Asia, Middle East and Africa	12,759	12,772	13,325	0%	(4)%
Total	**34,312**	**33,828**	**35,481**	**1%**	**(5)%**

In 2017, revenues increased in Europe but were flat in the Americas and in Asia, Middle East and Africa. In Europe, revenues increased 5 percent (4 percent in local currencies) reflecting growth in the Electrification Products and Power Grids divisions, as well as in the Industrial Automation division, which benefited from the acquisition of B&R. In local currencies, revenues declined in Germany and the United Kingdom, while revenues increased in France, Italy, Norway and Sweden. Revenues in the Americas were flat (decreased 1 percent in local currencies). In local currencies, revenues decreased in Brazil, Canada, Chile and Peru while revenues were higher in the U.S. In Asia, Middle East and Africa, revenues were flat (flat in local currencies). In local currencies, revenues declined in Australia, Japan, Saudi Arabia, South Korea and Singapore while revenues increased in China and India.

In 2016, revenues decreased across all regions, although we achieved regional growth within some divisions. In Europe, revenues declined 2 percent (flat in local currencies) due to growth in the Electrification Products division and steady revenues in the Industrial Automation division. In local currencies, revenues declined in Sweden, Norway, Switzerland, Germany and France, while revenues increased in Russia, the United Kingdom, Italy and Spain. Revenues from the Americas decreased 8 percent (5 percent in local currencies). In local currencies, revenues decreased in the U.S. and Brazil while revenues

were higher in Canada, Mexico, Argentina and Chile. In Asia, Middle East and Africa, revenues decreased 4 percent (1 percent in local currencies), supported by strong demand for our power offering. In local currencies, revenues declined in South Africa, Australia, Japan, Saudi Arabia and Singapore while revenues increased in China, India and Egypt.

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 2017, cost of sales was flat (flat in local currencies) at $24,046 million. The Robotics and Motion division recorded the highest increase in cost of sales, which was due to revenue growth but also due to additional charges recorded in the turnkey full train retrofit business. As a percentage of revenues, cost of sales decreased from 71.2 percent in 2016 to 70.1 percent in 2017. The decrease in the cost of sales as a percentage of revenues occurred in all divisions except Robotics and Motion, and was impacted by the reversal in 2017 of previously recorded restructuring costs. Total restructuring costs in cost of sales, net of reversals, was $88 million in 2017 compared to $182 million in 2016. In addition, cost of sales continued to reflect improvements generated from supply chain programs aimed at reducing costs.

In 2016, cost of sales decreased 5 percent (2 percent in local currencies) to $24,081 million. As a percentage of revenues, cost of sales decreased from 71.4 percent in 2015 to 71.2 percent in 2016. In particular, the Industrial Automation and Power Grids divisions had a reduction in cost of sales as a percentage of revenues, resulting from improvement in project margins and savings from supply chain and operational excellence cost take-out programs. In 2016, cost of sales was negatively impacted by approximately 0.5 percent due to the charges recorded for a change in previously estimated warranty liabilities for certain solar inverters sold by Power-One in the Electrification Products division.

Selling, general and administrative expenses

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

($ in millions, unless otherwise stated)	2017	2016	2015
Selling expenses	3,585	3,480	3,729
Selling expenses as a percentage of orders received	10.7%	10.4%	10.2%
General and administrative expenses	2,022	1,869	1,845
General and administrative expenses as a percentage of revenues	5.9%	5.5%	5.2%
Total selling, general and administrative expenses	**5,607**	**5,349**	**5,574**
Total selling, general and administrative expenses as a percentage of revenues	16.3%	15.8%	15.7%
Total selling, general and administrative expenses as a percentage of the average of orders received and revenues	16.6%	15.9%	15.5%

In 2017, general and administrative expenses increased 8 percent compared to 2016 (8 percent in local currencies). As a percentage of revenues, general and administrative expenses increased from 5.5 percent to 5.9 percent. Although we recorded a reduction of $55 million in restructuring and restructuring-related expenses for the White Collar Productivity program compared to last year, general and administrative expenses increased driven by a series of strategic investments including the Power Up program and additional general and administrative expenses from the acquired B&R.

In 2016, general and administrative expenses increased 1 percent compared to 2015 (4 percent in local currencies). As a percentage of revenues, general and administrative expenses increased from 5.2 percent to 5.5 percent. General and administrative expenses were impacted by approximately $183 million of restructuring and restructuring-related expenses for the White Collar Productivity program. Restructuring-related expenses include the additional costs of running parallel operations during the relocation and transition phase, advisory costs for external consultants, expenses associated with our internal restructuring program implementation teams and costs for hiring and training personnel at new locations.

In 2017, selling expenses increased 3 percent compared to 2016 (2 percent in local currencies) primarily driven by extended sales activities in selective business units like Robotics, Grid Integration, Building Products and Grid Automation and additional selling expenses from the acquired B&R, despite a reduction of $32 million in expenses for the White Collar Productivity program. Selling expenses as a percentage of orders received increased from 10.4 percent to 10.7 percent on higher expenses.

In 2016, selling expenses decreased 7 percent compared to 2015 (4 percent in local currencies) primarily driven by lower restructuring expenses related to the White Collar Productivity program. Selling expenses as a percentage of orders received increased from 10.2 percent to 10.4 percent on lower orders. Selling expenses were impacted by approximately $34 million from costs for the White Collar Productivity program.

In 2017, selling, general and administrative expenses increased 5 percent compared to 2016 (4 percent in local currencies) and as a percentage of the average of orders and revenues, selling, general and administrative expenses increased from 15.9 percent to 16.6 percent mainly from the impact of the higher expenses described above.

In 2016, selling, general and administrative expenses decreased 4 percent compared to 2015 (2 percent in local currencies) and as a percentage of the average of orders and revenues, selling, general and administrative expenses increased from 15.5 percent to 15.9 percent mainly impacted by lower orders and revenues.

Non-order related research and development expenses

In 2017, non-order related research and development expenses increased 5 percent (5 percent in local currencies) compared to 2016 reflecting a focused increase in investment to build up competencies in certain new technologies. In 2016, non-order related research and development expenses decreased 8 percent (6 percent in local currencies) compared to 2015 and reflects the savings realized by reducing the number of employees.

Non-order related research and development expenses as a percentage of revenues increased in 2017 to 4.0 percent, after decreasing to 3.8 percent in 2016 from 4.0 percent in 2015.

Other income (expense), net

($ in millions)	2017	2016	2015
Restructuring and restructuring-related expenses[1]	(49)	(49)	(67)
Net gain from sale of property, plant and equipment	36	38	26
Asset impairments	(29)	(61)	(33)
Net gain (loss) from sale of businesses	252	(10)	(20)
Misappropriation loss, net	(9)	(73)	—
Income from equity-accounted companies and other income (expense), net	(61)	44	(11)
Total	**140**	**(111)**	**(105)**

(1) Excluding asset impairments.

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

In 2017, "Other income (expense), net" was an income of $140 million compared to an expense of $111 million in 2016. The change was mainly due to $252 million net gains recorded in 2017 from sales of businesses, primarily relating to the Cables business. In 2017, we also recorded higher charges in connection with certain legal claims (recorded within other expense) and lower asset impairments. The change compared to 2016 also reflects that in 2016 we recorded the large misappropriation loss described below.

In 2016, "Other income (expense), net" was an expense of $111 million compared to an expense of $105 million in 2015. In 2016, we recorded lower restructuring costs, higher gains on sale of property, plant and equipment, and lower losses from sale of businesses. In addition, higher asset impairments negatively impacted Other income (expense), net in 2016. We also recorded a loss of $73 million, net of expected insurance recoveries, for the misappropriation of cash by the treasurer of our subsidiary in South Korea, which was uncovered in February 2017. In addition, in 2016, other income included gains on certain foreign currency derivatives entered into in connection with the planned sale of the Cables business.

Income from operations

				% Change[1]	
($ in millions)	**2017**	**2016**	**2015**	**2017**	**2016**
Electrification Products	1,349	1,091	1,247	24%	(13)%
Robotics and Motion	1,035	1,034	1,058	0%	(2)%
Industrial Automation	782	769	793	2%	(3)%
Power Grids	797	830	554	(4)%	50%
Operating divisions	**3,963**	**3,724**	**3,652**	**6%**	**2%**
Corporate and Other	(535)	(741)	(617)	n.a.	n.a.
Intersegment elimination	6	4	14	n.a.	n.a.
Total	**3,434**	**2,987**	**3,049**	**15%**	**(2)%**

(1) Certain percentages are stated as n.a. as the computed change would not be meaningful.

In 2017 and 2016, 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.

($ in millions)	**2017**	**2016**	**2015**
Interest and dividend income	74	73	77
Interest and other finance expense	(277)	(261)	(286)
Net interest and other finance expense	**(203)**	**(188)**	**(209)**

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

In 2016, "Interest and other finance expense" decreased compared to 2015. Interest expense on bonds and other debt was lower and interest charges for uncertain tax positions were lower in 2016 compared to 2015. This was partially offset by higher foreign exchange losses.

Provision for taxes

($ in millions)	**2017**	**2016**	**2015**
Income from continuing operations before taxes	3,231	2,799	2,840
Provision for taxes	(860)	(781)	(788)
Effective tax rate for the year	26.6%	27.9%	27.7%

In 2017, the effective tax rate decreased from 27.9 percent to 26.6 percent. The distribution of income within the group resulted in a higher weighted-average global tax rate. In addition, the impact from changes to the interpretation of law and double tax treaty agreements by competent tax authorities increased the effective tax rate. However, these were more than offset primarily by the positive impact from non-taxable amounts for the net gain from sale of businesses and the net benefit from a change in tax rate.

In 2016, the effective tax rate increased to 27.9 percent from 27.7 percent. The distribution of income within the group resulted in a lower weighted-average global tax rate. Changes in the valuation allowance in 2016 compared to 2015 lowered the effective tax rate, as did the impact of the interpretation of tax law and double tax treaty agreements by competent tax authorities. However, these were offset by the negative impacts of changes in enacted tax rates and lower benefits arising from research and development activities.

In 2015, the effective tax rate of 27.7 percent included a net increase in valuation allowance of deferred taxes of $57 million, as we determined it was not more likely than not that such deferred tax assets would be realized. In addition, we recorded a benefit of $50 million relating to tax credits arising from research and development activities and a charge of $74 million relating to the interpretation of tax law and double tax treaty agreements by competent tax authorities.

Income from continuing operations, net of tax

As a result of the factors discussed above, income from continuing operations, net of tax, increased by $353 million to $2,371 million in 2017 compared to 2016, and decreased $34 million to $2,018 million in 2016 compared to 2015.

Income (loss) from discontinued operations, net of tax

Income (loss) from discontinued operations, net of tax, for 2017, 2016 and 2015, was not significant.

Net income attributable to ABB

As a result of the factors discussed above, net income attributable to ABB increased by $314 million to $2,213 million in 2017 compared to 2016, and decreased by $34 million to $1,899 million in 2016 compared to 2015.

Earnings per share attributable to ABB shareholders

(in $)	2017	2016	2015
Income from continuing operations, net of tax:			
Basic	1.04	0.88	0.87
Diluted	1.03	0.87	0.87
Net income attributable to ABB:			
Basic	1.04	0.88	0.87
Diluted	1.03	0.88	0.87

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

Divisional analysis

Electrification Products

Effective January 1, 2017, the Group reorganized its four business divisions to bring together all businesses relating to electrification of the consumption points. In connection with this change, the scope of the Electrification Products division has been expanded to include the electric vehicle charging, solar and power quality businesses from the former Discrete Automation and Motion division. The financial information for 2016 and 2015 has been recast to reflect these organizational changes.

The financial results of our Electrification Products division were as follows:

				% Change	
($ in millions)	2017	2016	2015	2017	2016
Orders	10,143	9,780	10,610	4%	(8)%
Third-party base orders	9,559	9,242	9,758	3%	(5)%
Order backlog at December 31,	3,098	2,839	3,136	9%	(9)%
Revenues	10,094	9,920	10,275	2%	(3)%
Income from operations	1,349	1,091	1,247	24%	(13)%
Operational EBITA	1,510	1,459	1,520	3%	(4)%

Orders
The majority of the division's orders are small 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 or larger solutions requiring engineering and installation. Substantially all of the division's orders are comprised of base orders. In addition, approximately half of the division's orders are received via third-party distributors; as a consequence, end-customer market data is based partially on management estimates.

In 2017, orders increased 4 percent (5 percent in local currencies) with stronger order growth in the second half of the year. Orders for products increased throughout the division as end market demand improved in utilities and construction, specifically non-residential construction. Increased demand for low-voltage and medium-voltage solutions was primarily driven by continued investments in light industries such as data centers as well as food and beverage. Orders in the Power and EV Infrastructure business increased driven by large order intake for electric vehicle products and systems, however the growth was partially offset by decreases in demand for solar products and systems.

In 2016, orders decreased by 8 percent (5 percent in local currencies). Orders were impacted by weak market conditions in the process industries and in particular in the oil and gas sector, as many EPC projects were delayed or cancelled. This negatively affected the Medium Voltage Products and Electrification Solutions businesses. Driven by construction and light industries, demand for our short-cycle products was stable. Product demand was weaker in the Installation Products business, with lower orders from both distributors and end-customer channels. Orders in the Protection and Connection business were lower as growth in OEM orders was offset by weakened orders from end-customer and distributor channels. Orders were higher in the Building Products business, as lower order levels from direct end-customers were more than offset by increased orders through distributors. Finally, orders in the Power and EV Infrastructure business declined, driven by a decrease in orders of customers in the solar industry.

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

(in %)	2017	2016	2015
Europe	37	37	34
The Americas	27	27	28
Asia, Middle East and Africa	36	36	38
Total	**100**	**100**	**100**

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

In 2016, the share of orders in Europe increased, driven by growth in several countries, especially Germany. In the Americas, the share of orders decreased slightly due to order declines in the region, particularly in the United States and Canada. Asia, Middle East and Africa was relatively weak primarily due to lower orders in China and Saudi Arabia compared to 2015.

Order backlog
In 2017, the order backlog increased 9 percent (5 percent in local currencies), with strong growth in the Power and EV Infrastructure business, where there was significant order intake for electric vehicle fast-charging solutions.

In 2016, the order backlog decreased 9 percent (6 percent in local currencies), primarily because of a decreased backlog in the Medium Voltage Products business, reflecting higher execution levels of orders for Modular Systems and Primary Switchgear. The backlog also decreased due to lower orders received in the Power and EV Infrastructure business.

Revenues
In 2017, revenues increased 2 percent (2 percent in local currencies) compared to 2016. Revenues for the Protection and Connection, Building Products and Installation Products businesses increased, driven by end-market demand in utilities and construction, specifically non-residential construction. Across the division, revenue levels improved both from distributors as well as some end-customer channels. Revenues were lower in the Medium Voltage Products and Power and EV Infrastructure business as the opening order backlog was lower coming into 2017, mainly related to the solar industry.

In 2016, revenues decreased 3 percent (1 percent in local currencies) compared to 2015 and were mixed across the division. In local currencies, revenues increased in the Medium Voltage Products business as sales from Modular Systems more than offset lower volume coming from Primary Switchgear. The Building Products business also increased revenues driven by distribution and panel builder channels, which partially mitigated the lower revenues from direct end-customers. Revenues were lower in all other business units on lower demand from the distribution and OEM channels.

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

(in %)	2017	2016	2015
Europe	37	36	34
The Americas	27	27	27
Asia, Middle East and Africa	36	37	39
Total	**100**	**100**	**100**

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

In 2016, the share of revenues from Europe increased. Growth stemmed from several countries, especially Germany. The Americas maintained a stable share of revenues, although in absolute terms revenues decreased slightly. The lowered share of revenues from Asia, Middle East and Africa was driven by a reduced revenue volume from China and the Middle East.

Income from operations

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

In 2016, income from operations decreased 13 percent primarily due to the impact of the significant warranty costs referred to above incurred in 2016. These warranty costs amounted to $151 million and were recorded as a charge to cost of sales, recognizing a change in the estimated warranty liability for these products. The majority of the products were delivered to customers by Power-One prior to the acquisition date in 2013. Of this charge, $131 million related to the products sold by Power-One prior to the acquisition and has been included as an adjustment, in the table below, to determine the segment profit for the division. In addition, lower gross margins were mostly offset by reductions in selling, general and administrative expenses resulting from ongoing restructuring and cost savings programs, as well as lower restructuring and restructuring-related expenses. Furthermore, 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.

Operational EBITA

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

($ in millions)	2017	2016	2015
Income from operations	**1,349**	**1,091**	**1,247**
Acquisition-related amortization	98	121	133
Restructuring and restructuring-related expenses[1]	28	93	133
Non-operational pension cost	3	3	(3)
Changes in pre-acquisition estimates	8	131	21
Acquisition-related expenses and certain non-operational items	44	8	4
FX/commodity timing differences in income from operations	(20)	12	(15)
Operational EBITA	**1,510**	**1,459**	**1,520**

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

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

In 2016, Operational EBITA decreased 4 percent (2 percent excluding the impacts from changes in foreign currencies) compared to 2015, primarily due to the reasons described under "Income from operations", excluding the explanations related to the reconciling items in the table above.

Robotics and Motion

Effective January 1, 2017, the former Discrete Automation and Motion division was renamed as the Robotics and Motion division. In connection with this change, certain businesses were transferred to the Electrification Products division including EV charging, solar and power quality businesses. The financial information for 2016 and 2015 has been recast to reflect these organizational changes.

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

				% Change	
($ in millions)	**2017**	**2016**	**2015**	**2017**	**2016**
Orders	8,468	7,858	8,272	8%	(5)%
Third-party base orders	7,654	7,029	7,234	9%	(3)%
Order backlog at December 31,	3,961	3,660	3,785	8%	(3)%
Revenues	8,401	7,906	8,188	6%	(3)%
Income from operations	1,035	1,034	1,058	0%	(2)%
Operational EBITA	1,178	1,223	1,288	(4)%	(5)%

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

Orders in 2016 were 5 percent lower (3 percent lower in local currencies) compared to 2015. Third-party base orders were 3 percent lower (flat in local currencies). Third-party base orders were driven by increased demand for traction solutions for transport customers but was offset by the decline in orders from process industries, in particular from oil and gas customers. The division benefited from strong large order intake in the Robotics business and a particularly strong order intake for traction solutions from the rail industry.

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

(in %)	**2017**	**2016**	**2015**
Europe	35	37	35
The Americas	32	33	34
Asia, Middle East and Africa	33	30	31
Total	**100**	**100**	**100**

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

In 2016, strengthened demand from Germany for Robotics helped the share of orders from Europe to rise. The share of orders from the Americas fell mainly due to decreased demand from process customers, in particular oil and gas.

Order backlog
The order backlog in 2017 increased 8 percent (1 percent in local currencies) compared to 2016. In local currencies, the backlog improved in the Motors and Generators business, while the backlog in the Drives and Robotics businesses remained stable.

The order backlog in 2016 declined 3 percent. In local currencies, the order backlog was flat. An improved backlog in the Robotics business was offset by a weakened backlog in the Drives and Motors and Generators businesses.

Revenues
In 2017, revenues were 6 percent higher compared to 2016 (6 percent in local currencies). Revenues were positively impacted by growth in deliveries of robotics solutions for the automotive and general industry sectors with stronger growth in the second half of 2017, due to execution of the strong order levels received in the first half of the year.

Service revenues were higher as the division serviced more of the installed base and as customers demanded remote monitoring solutions such as ABB Ability™.

In 2016, revenues decreased 3 percent (1 percent in local currencies). Revenues were positively impacted by demand for Robotics solutions for the automotive and general industry sectors. This positive development was more than offset by lower demand for Intelligent Motion™ solutions, particularly in the process industries.

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

(in %)	2017	2016	2015
Europe	35	37	36
The Americas	33	33	34
Asia, Middle East and Africa	32	30	30
Total	**100**	**100**	**100**

In 2017, revenues grew in all regions. The relative share of revenues from Europe declined despite modest growth in the region, supported by Finland, Switzerland and Italy. The share of revenues from the Americas remained steady, supported by growth in the United States and Canada but offset partially by lower revenues in Brazil. The share of revenues from Asia, Middle East and Africa increased supported by double-digit revenue growth in China, especially in the Robotics business. This reflects ongoing strong orders from China.

In 2016, the geographical distribution of revenues was similar to 2015. The share of revenues in Europe slightly increased due to the execution of a strong order backlog, while the share of revenues in the Americas decreased due to a decline in the Motors and Generators business. The share of revenues from Asia, Middle East and Africa remained flat as higher revenues in the Robotics business offset the decline in the Drives and the Motors and Generators businesses.

Income from operations

In 2017, income from operations was stable. Income from operations benefited from positive impacts of cost reduction efforts in all businesses, including cost savings from the White Collar Productivity program. In addition, increased volumes, especially in the Robotics business, contributed positively. Income from operations also reflected the positive impact of lower amortization of intangible assets as certain acquired intangible assets were fully amortized. These positive effects were offset by negative impacts including increased commodity prices and the impact of low capacity utilization in the Motors and Generators business. The division also was impacted by project losses recorded in the turnkey full train retrofit business. Changes in foreign currencies, including the impacts from FX/commodity timing differences summarized in the table below, negatively impacted income from operations by 1 percent.

Lower revenues and capacity underutilization reduced income from operations in the division by 2 percent in 2016 compared to 2015. A strong performance from the Robotics business plus decreased restructuring and restructuring-related expenses relative to 2015 proved insufficient to outweigh decreased activity levels in the other business units. 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.

Operational EBITA

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

($ in millions)	2017	2016	2015
Income from operations	**1,035**	**1,034**	**1,058**
Acquisition-related amortization	66	94	96
Restructuring and restructuring-related expenses[1]	64	69	111
Non-operational pension cost	2	2	3
Acquisition-related expenses and certain non-operational items	2	18	26
FX/commodity timing differences in income from operations	9	6	(6)
Operational EBITA	**1,178**	**1,223**	**1,288**

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

In 2017, Operational EBITA decreased 4 percent (4 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 2016, Operational EBITA decreased 5 percent (3 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.

Industrial Automation

Effective January 1, 2017, the former Process Automation division was renamed as the Industrial Automation division. The results of B&R, acquired in

July 2017, have been included in the Industrial Automation division since the acquisition date.

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

				% Change	
($ in millions)	**2017**	**2016**	**2015**	**2017**	**2016**
Orders	6,554	5,991	7,398	9%	(19)%
Third-party base orders	5,776	5,200	5,576	11%	(7)%
Order backlog at December 31,	5,376	5,409	6,199	(1)%	(13)%
Revenues	6,880	6,654	7,219	3%	(8)%
Income from operations	782	769	793	2%	(3)%
Operational EBITA	953	897	977	6%	(8)%

Orders

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

Orders in 2016 declined 19 percent (16 percent in local currencies) compared with 2015. Orders were lower in most Industrial Automation businesses, primarily driven by lower expenditures in the process end-markets, oil and gas, mining and metals, as well as in parts of the marine business. Customers continued to defer capital expenditures for both onshore and offshore oil investments while low commodity prices affected mining companies. Large orders as a percent of divisional revenues were 9 percent compared to 23 percent in 2015. In 2016, third-party base orders declined 7 percent (4 percent in local currencies) as customers deferred service activities and reduced their spare parts inventories.

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

(in %)	**2017**	**2016**	**2015**
Europe	42	42	39
The Americas	23	21	22
Asia, Middle East and Africa	35	37	39
Total	**100**	**100**	**100**

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

In 2016, orders declined in all regions. Orders in Europe declined less than other regions, thus increasing the geographic share of orders from Europe. The volume in Europe was supported by orders from marine industries, specifically for specialty vessels like cruise ships and ice-going vessels. The share of orders from the Americas fell slightly with order declines in Canada, the U.S. and Chile, where the Process Industries business was affected by low capital expenditure in mining due to low demand from China for raw materials. In the Asia, Middle East and Africa region, orders were lower in the Marine and Ports business due to weak demand for oil and gas related vessels and the lack of infrastructure projects from the ports business. In addition, the Oil, Gas and Chemicals business and the Process Industries business suffered from the lack of large orders in this geographic area.

Order backlog

Order backlog at December 31, 2017 was 1 percent lower (8 percent in local currencies) than at December 31, 2016. Although the division saw some stabilization in demand, shown by a lower decline than in 2016, the market environment remained difficult and political uncertainty weakened confidence in key markets.

Order backlog at December 31, 2016 was 13 percent lower (11 percent in local currencies) than at December 31, 2015. The lower backlog was a result of the lower order intake during the year and the continued execution from the existing backlog.

Revenues

In 2017, revenues increased 3 percent (3 percent in local currencies) compared with 2016 due to the acquisition of B&R, which contributed 6 percent

to revenue growth. The majority of the division's other businesses recorded lower revenues as the project business units suffered from weaker opening order backlog and the market environment dampened the book-to-bill ratio. However, revenues were higher in the Measurement and Analytics and Turbocharging businesses. During the year, the division realized higher revenues from faster turning orders in short-cycle businesses which reduced the impact of the lower order backlog at the beginning of 2017.

In 2016, revenues declined 8 percent (5 percent in local currencies) compared with the previous year. The largest decline was in the Process Industries business due to the lower opening order backlog and the continued low level of order activity from the mining and metals sector. A continued lack of orders from the oil and gas industry negatively impacted revenues in the Oil, Gas and Chemicals business. The overall decrease in revenues was mitigated by some stabilization in the Marine and Ports business which was supported by a strong opening order backlog for ice-going and cruise vessels. Revenues were also steady in the Power Generation business due to solid execution from the order backlog. Of the product businesses, Control Technologies had revenue levels similar to the previous year, but the Measurement and Analytics and Turbocharging businesses were slightly lower due to lower order intake.

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

(in %)	2017	2016	2015
Europe	42	37	35
The Americas	20	22	24
Asia, Middle East and Africa	38	41	41
Total	**100**	**100**	**100**

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

In 2016, revenues declined in the Americas and in Asia, Middle East and Africa, while Europe was stable. This resulted in an increase in the share of revenues from Europe. Except for the Marine and Ports business, revenues in the Americas declined in all businesses, especially the Oil, Gas and Chemicals, Process Industries and Measurement and Analytics businesses. Revenues in Asia, Middle East and Africa were especially impacted by the weak demand from the Process Industries business, particularly mining.

Income from operations

In 2017, income from operations increased 2 percent compared to 2016. The inclusion of B&R reduced income from operations by 4 percent driven by the related charges for amortization of intangible assets and the higher charges in cost of sales resulting from recording the opening balance of inventory at fair value. Offsetting this was the impact from changes in foreign currencies, including the impacts from changes in FX/commodity timing differences summarized in the table below which, combined, positively impacted income from operations by 5 percent. Restructuring and restructuring-related expenses in 2017 of $87 million were $8 million higher than in 2016. Restructuring expenses recorded for the White Collar Productivity program were $58 million lower compared to 2016 because 2017 included a net reversal of $22 million of estimated amounts recorded in previous years. This benefit was more than offset by an increased amount of restructuring expenses for specific initiatives to align the cost structure and footprint of the operations to reflect changing market conditions. Excluding these impacts, higher income from operations reflects an improved mix, ongoing progress in the division's rationalization efforts and benefits secured from the implementation of the White Collar Productivity program.

In 2016, income from operations decreased 3 percent compared with 2015. Operating margins were maintained as the division reduced overhead costs, removing organizational costs at the local division level and downsizing operations in areas with low order backlog and low market demand. Key actions included closing warehouses and consolidating operations to fewer locations, but mainly included reducing the number of personnel. Restructuring programs were implemented in all businesses due to a continued weak market outlook. Overall, the number of employees in the Industrial Automation division was reduced by approximately 1,300 during 2016. However, as revenues declined by 8 percent, the aforementioned actions were not enough to maintain previous year level of income from operations. In addition, 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.

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

($ in millions)	2017	2016	2015
Income from operations	**782**	**769**	**793**
Acquisition-related amortization	47	11	12
Restructuring and restructuring-related expenses[1]	87	79	135
Non-operational pension cost	7	2	6
Gains and losses on sale of businesses	(2)	—	—
Acquisition-related expenses and certain non-operational items	52	9	14
FX/commodity timing differences in income from operations	(20)	27	17
Operational EBITA	**953**	**897**	**977**

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

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

In 2016, Operational EBITA decreased 8 percent (6 percent excluding the impacts from changes in foreign currencies) compared to 2015, primarily due to the reasons described under "Income from operations", excluding the explanations related to the reconciling items in the table above.

Power Grids

In 2017, we divested our high-voltage cable and cables accessories businesses which were previously part of the Power Grids division. The financial results relating to these divested businesses have been reclassified to Corporate and Other for all periods presented.

The financial results of our Power Grids division were as follows:

				% Change	
($ in millions)	2017	2016	2015	2017	2016
Orders	9,600	10,844	11,425	(11)%	(5)%
Third-party base orders	7,421	7,268	7,492	2%	(3)%
Order backlog at December 31,	11,330	11,638	11,707	(3)%	(1)%
Revenues	10,394	10,660	11,245	(2)%	(5)%
Income from operations	797	830	554	(4)%	50%
Operational EBITA	972	998	810	(3)%	23%

Orders
In 2017, orders decreased 11 percent (11 percent in local currencies) compared to 2016. The decrease mainly reflects fewer large orders from India and China as the demand for ultra-high voltage transmission projects in those markets was lower than in the previous year. Consequently, large orders as a percentage of total orders was 18 percent, 11 percentage points lower than in 2016. Significant large orders awarded in 2017 included an order for $290 million from National Grid and Réseau de Transport d'Electricité (RTE), the British and French grid operators, to provide HVDC technology that will help interconnect the electricity networks of France and the United Kingdom, a $137 million order relating to the Hinkley Point C nuclear power station in the United Kingdom and a $71 million traction substations order in connection with the Bangkok metro project. Third-party base orders increased 2 percent (2 percent in local currencies), driven by continued investment into renewables, ongoing electrification of society and the increasing complexity and digitization of the grid (the energy revolution) as well as growing demand from the industry sector. Geographically, the increase in third-party base orders was driven by the Americas and the Asia, Middle East and Africa regions which more than offset a slight decline in Europe. Through the Power Up transformation program, the Power Grids division is refocusing its business model on solutions and services to improve grid control and automation. Consequently, service orders grew 10 percent (9 percent in local currencies) with growth in all business units. In addition, demand continued to grow for digital solutions, specifically for ABB Ability™ digital substations, ABB Ability™ grid control systems, energy storage and service solutions.

In 2016, orders decreased 5 percent (2 percent in local currencies) compared to 2015, due to general macro-economic uncertainty which led to a reduction in spending by utilities and sluggishness in certain geographic markets such as Saudi Arabia

and the U.S. The lower pull-through of orders from other ABB divisions, primarily the Industrial Automation division, reduced orders by 3 percent. Large orders as a percentage of total orders were 29 percent, 2 percent above 2015 levels. Large orders in 2016 included a $640 million UHVDC transmission link in India and two UHVDC orders for China, each worth more than $300 million. In 2016, third-party base orders decreased 3 percent (steady in local currencies) with order growth in the Grid Automation, Grid Integration and High Voltage Products businesses offset by market-driven base order weakness in the Transformers business. Service orders decreased 2 percent (flat in local currencies) as increases in the Grid Automation service business were offset by the other businesses.

The geographic distribution of orders for our Power Grids division was as follows:

(in %)	2017	2016	2015
Europe	31	24	32
The Americas	30	28	29
Asia, Middle East and Africa	39	48	39
Total	**100**	**100**	**100**

In 2017, the share of orders in Europe increased from 24 percent to 31 percent, mainly due to the impact of large orders in the United Kingdom as described above. In 2016, ABB received several large HVDC orders from China and India, resulting in a high percentage of orders from the Asia, Middle East and Africa region in that year. The decrease in large orders in Asia, Middle East and Africa during 2017 was not offset by the increase in third-party base orders in the region. As a result, the proportion of orders from the Asia, Middle East and Africa region in 2017 reverted back to a similar level as 2015. Positive base order development in the Americas supported the increase in the share of orders from the region, with base orders in the U.S. and Brazil returning to growth.

In 2016, the share of orders from Asia, Middle East and Africa increased from 39 percent to 48 percent, supported by exceptional order intake in China and India. The share of orders from the Americas declined slightly as both the U.S. and Brazilian markets saw challenging market conditions as the presidential election in the U.S. and a political corruption crisis in Brazil affected order decisions of large utility customers. The share of orders from Europe decreased to 24 percent, compared with 32 percent in 2015, mainly due to the high amount of large orders received from Europe in 2015.

Order backlog

Order backlog at December 31, 2017, decreased by 3 percent (8 percent in local currencies). In 2017, the transmission market experienced decreased activity and the division realized fewer large order opportunities compared to the prior year. Additionally, the strategic repositioning of the business through the Power Up program and the exit from certain business activities also reduced order opportunities, particularly for large EPC projects. The growth in base orders did not offset the decline in large orders, resulting in a decreased order backlog.

Order backlog at December 31, 2016, decreased 1 percent (increased 3 percent in local currencies). The local currency increase in the order backlog was mainly driven by the Transformers business, resulting from a significantly higher share of large orders with long lead times.

Revenues

Revenues in 2017 decreased 2 percent (3 percent in local currencies) compared with 2016. Revenues were impacted by a low opening order backlog and the timing of execution of orders which were not offset by stronger short-cycle orders, specifically in the Grid Automation and Grid Integration businesses. Lower revenues in the Grid Integration business reflects the exit from certain business activities, as well as the de-risking and strategic repositioning of this business. Revenues in the Transformers business were flat, on steady execution of the order backlog. Service revenues grew by 3 percent (1 percent in local currencies) as a result of the continued focus on the service business.

Revenues in 2016 decreased 5 percent (3 percent in local currencies) compared with 2015. The revenue volume in 2016 mainly reflected the scheduled execution of the order backlog. The revenue decrease was mainly attributable to the Grid Integration business as revenues were negatively impacted by the exit from the EPC Solar business and the wind-down of the plant electrification business. In addition, the Grid Integration business revenues were lower due to a strong comparable in 2015 from the offshore wind projects which were either finalized or nearing completion. A lower level of revenues in the Transformers business primarily resulted from order weakness in the U.S. Service revenues increased 4 percent (6 percent in local currencies) compared with 2015.

The geographic distribution of revenues for our Power Grids division was as follows:

(in %)	2017	2016	2015
Europe	30	28	30
The Americas	29	30	31
Asia, Middle East and Africa	41	42	39
Total	**100**	**100**	**100**

In 2017, the large portion of revenues generated from Asia, Middle East and Africa was supported by the increase in the share of orders from Asia, Middle East and Africa in 2016. The share of revenues in Europe increased due to solid execution of the order backlog. As a result of these developments the relative share of revenues from the Americas decreased to 29 percent.

In 2016, the share of revenues from Asia, Middle East and Africa increased to 42 percent, supported by significantly higher revenues from the Transformer business in China. The share of revenues from Europe decreased to 28 percent, mainly due to a lower level of revenues from the Grid Integration business, related to lower revenues in the offshore wind projects described above. The share of revenues from the Americas was lower, mainly driven by lower volumes from the U.S. and Brazil.

Income from operations

In 2017, income from operations was $797 million, compared with $830 million in the prior year. In 2017, income from operations was impacted by charges recorded in the EPC business to account for project-related penalties and to reflect the decrease in realized profitability of certain long-term contracts. This was partially offset by the impact of higher gross margins despite lower revenue levels. Margin improvements were driven by continued productivity improvements, cost savings and improved project execution. In 2017, the division increased the amounts spent for sales and research and development under the Power Up transformation program, resulting in increased expenses compared to the prior year. This program commenced at the end of 2016 and aims to accelerate the transformation of the Power Grids division, driving higher margins and revenue growth. Restructuring and restructuring-related expenses in 2017 of $80 million were $21 million lower than in 2016, as we recorded a reversal of the previously recorded estimated restructuring expenses in connection with the White Collar Productivity program. This was partially offset by higher restructuring ongoing expenses which relate to footprint changes and capacity adjustments. Acquisition-related expenses and certain non-operational items increased to $79 million, primarily driven by the charges recorded for certain legal claims as well as a portion of the costs relating to the Power Up program. Income from operations also benefited from changes in foreign currencies, including changes in FX/commodity timing differences in income from operations, which, combined, increased the division's income from operations by 4 percent compared to the prior year.

In 2016, income from operations increased by $276 million to $830 million compared with $554 million in 2015. The impact from lower revenues was more than offset by a higher gross margin, driven by solid project execution, improved productivity and continued cost savings. For 2016, the division also had lower research and development expenses. Restructuring and restructuring-related expenses in 2016 of $101 million were $58 million lower than in 2015 and included additional charges for the White Collar Productivity program, as well as initiatives to align the cost structure and footprint of certain operations to reflect changing market conditions. Acquisition-related amortization in 2016 was lower compared to 2015. In addition, changes in foreign currencies, including the changes in FX/commodity timing differences in income from operations decreased the division's income from operations by 6 percent compared to 2015.

Operational EBITA

The reconciliation of income from operations to Operational EBITA for the Power Grids division was as follows:

($ in millions)	2017	2016	2015
Income from operations	**797**	**830**	**554**
Acquisition-related amortization	36	35	52
Restructuring and restructuring-related expenses[1]	80	101	159
Non-operational pension cost	3	(2)	3
Gains and losses on sale of businesses	—	—	24
Acquisition-related expenses and certain non-operational items	79	20	17
FX/commodity timing differences in income from operations	(23)	14	1
Operational EBITA	**972**	**998**	**810**

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

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

In 2016, Operational EBITA increased 23 percent (25 percent excluding the impacts from changes in foreign currencies) compared to 2015, primarily

due to the reasons described under "Income from operations", excluding the explanations related to the reconciling items in the table above.

Corporate and Other

Income (loss) from operations for Corporate and Other was as follows:

($ in millions)	2017	2016	2015
Corporate headquarters and stewardship	(374)	(380)	(355)
Corporate research and development	(128)	(133)	(144)
Corporate real estate	45	47	50
Net gain (loss) from sale of businesses	250	(10)	4
White Collar Productivity program costs	(107)	(199)	(130)
Misappropriation loss, net	(9)	(73)	—
Divested businesses	(129)	36	(10)
Other	(83)	(29)	(32)
Total Corporate and Other	**(535)**	**(741)**	**(617)**

In 2017, the net loss from operations within Corporate and Other was $535 million, a decrease of $206 million compared to 2016. The decrease was primarily due to the recognition of the gain for the sale of the cables businesses and lower restructuring and implementation costs related to While Collar Productivity program. In 2016, the net loss from operations was higher than in 2015 primarily due to higher costs related to the White Collar Productivity program and the misappropriation loss described below.

Corporate headquarter and stewardship costs were $374 million in 2017, slightly lower than the $380 million reported in 2016, primarily due to the costs in 2016 associated with the new ABB branding and cost related to the Next Level Strategy program. This also is the reason that corporate headquarters and stewardship costs increased in 2016 compared to 2015.

Corporate real estate primarily includes income from property rentals and gains from the sale of real estate properties. In 2017, 2016 and 2015, income from operations in Corporate real estate included gains from the sale of real estate properties of $28 million, $33 million and $26 million, respectively.

The net gain recorded from sale of businesses in 2017 related to the sales of the cables businesses and the Oil & Gas EPC business.

In 2017, ABB recorded a total of $107 million in Corporate and Other for both restructuring and related expenses as well as program implementation costs for the White Collar Productivity program. In 2016 and 2015, costs incurred in connection with this program amounted to $199 million and $130 million, respectively. These costs relate mainly to employee severance costs and both external and internal costs relating to the execution of the program. For further information on the White Collar Productivity program see "Restructuring and other cost savings initiatives" below.

In 2016, we recorded a loss of $73 million, net of expected insurance recoveries, for the misappropriation of cash by the treasurer of our subsidiary in South Korea. In 2017, additional losses of $9 million were recorded.

The historical results of operations for certain divested businesses are presented in Corporate and Other. In 2017, 2016 and 2015, this primarily includes the income and loss from operations of the cables businesses, which were disposed in March 2017 and the Oil & Gas EPC business, which was transferred to a new joint venture with Arkad in December 2017. The amount in 2017 also includes charges of $94 million for changes (after divestment) in the amount recorded for certain retained liabilities associated with the divested cables businesses.

"Other" consists of operational costs of our Global Treasury Operations, operating income or loss in other non-core businesses and certain other charges such as costs and penalties associated with legal cases, environmental expenses and impairment charges related to investments. "Other" costs were higher in 2017 as compared to 2016 as the costs a year earlier included the impact of a reduction in certain insurance-related provisions for self-insured risks offset by amounts recorded for certain pension curtailment costs. In 2015, "Other" also included a reduction of insurance-related provisions for self-insured risks.

Restructuring and other cost savings initiatives

White Collar Productivity program
In September 2015, we announced a two-year program aimed at making ABB leaner, faster and more customer-focused. Productivity improvements include the rapid expansion and use of regional shared service centers as well as the streamlining of global operations and head office functions, with business units moving closer to their respective key markets. In the course of this program, we implemented and executed various restructuring initiatives across all operating segments and regions. As of December 31, 2017,

ABB has incurred substantially all costs related to the White Collar Productivity program.

The program was originally expected to generate cost savings of approximately $1.0 billion and be realized from 2016 and increasing through the end of 2017. During 2016, we re-assessed the expected amount of cost savings and increased the expected total annual rate of cost savings from the program by 30 percent to approximately $1.3 billion. The program's final cost savings realized amount to approximately $1.4 billion. During 2017, cost savings of approximately $0.5 billion were realized. These savings are primarily being realized as reductions in cost of sales, selling, general and administrative expenses and non-order related research and development expenses.

The following table outlines the costs incurred in 2017, 2016 and 2015 and the cumulative amount of costs incurred under the program.

	Costs incurred in			Cumulative costs incurred up to December 31, 2017[1]
($ in millions)	2017	2016[1]	2015[1]	
Electrification Products	(17)	15	74	72
Robotics and Motion	(14)	26	44	56
Industrial Automation	(22)	36	96	110
Power Grids	(38)	33	70	65
Corporate and Other	(34)	30	86	82
Total	**(125)**	**140**	**370**	**385**

(1) Total costs have been recast to reflect the reorganization of the Company's operating segments as outlined in Note 23 to our Consolidated Financial Statements.

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

In 2017, net restructuring reversals of $125 million was recorded mainly due to higher than expected rates of attrition and internal redeployment.
In 2016, net restructuring costs of $140 million were recorded based on the anticipated number of personnel to be impacted by the program and a country-specific average severance cost per person. Various functions including marketing and sales, supply chain management, research and development, engineering, service, and certain other support functions were impacted in various phases commencing in 2015 and continuing in 2016 and in 2017.

In 2017 and 2016, we experienced a significantly higher than expected rate of attrition and redeployment and a lower than expected severance cost per employee for the employee groups affected by the restructuring programs initiated in 2015 and 2016. As a result, in 2017, we adjusted the amount of our estimated liability for restructuring which was recorded in 2016 and 2015. This change in estimate of $164 million during 2017 resulted in a reduction primarily in cost of sales of $90 million and in selling, general and administrative expenses of $63 million in the year. In 2016, we adjusted the amount of our estimated liability for restructuring which was recorded in 2015. This change in estimate of $103 million during 2016 resulted in a reduction primarily in cost of sales of $49 million and in selling, general and administrative expenses of $38 million for the year.

At December 31, 2017, we have substantially completed the White Collar Productivity program and incurred total restructuring charges of $385 million under this program.

The majority of the remaining cash outlays, primarily for employee severance benefits, are expected to occur in 2018. We expect that our cash flow from operating activities will be sufficient to cover any obligations under this restructuring program.

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 2017, 2016 and 2015, we also executed other restructuring-related and cost saving measures to sustainably reduce our costs and protect our profitability. Costs associated with these other measures amounted to $249 million, $171 million and $256 million in 2017, 2016 and 2015, 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 2017, 2016 and 2015, our financial position was strengthened by the positive cash flow from operating activities of $3,799 million, $3,843 million and $3,818 million, respectively.

Our net debt is shown in the table below:

	December 31,	
($ in millions)	**2017**	**2016**
Short-term debt and current maturities of long-term debt	738	1,003
Long-term debt	6,709	5,800
Cash and equivalents	(4,526)	(3,644)
Marketable securities and short-term investments	(1,102)	(1,953)
Net debt (defined as the sum of the above lines)	**1,819**	**1,206**

Net debt at December 31, 2017, increased $613 million compared to December 31, 2016, as cash flows from operating activities during 2017 of $3,799 million was more than offset by cash outflows for acquisitions of businesses (primarily B&R) ($2,130 million), the dividend payment to our shareholders ($1,635 million), net purchases of property, plant and equipment and intangible assets ($883 million) and amounts paid to purchase treasury stock ($251 million). Other significant transactions affecting our liquidity included the issuance of treasury shares for $163 million and payments of dividends to noncontrolling shareholders of $127 million. Movements in foreign exchange rates increased net debt by approximately $54 million. See “Financial position”, “Investing activities” and “Financing activities” for further details.

Our Group Treasury Operations is responsible for providing a range of treasury management services to our group companies, including investing cash in excess of current business requirements. At December 31, 2017 and 2016, the proportion of our aggregate “Cash and equivalents” and “Marketable securities and short-term investments” managed by our Group Treasury Operations amounted to approximately 49 percent and 57 percent, respectively.

Throughout 2017 and 2016, 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 2017 and 2016, we also continued to place limited funds in connection with reverse repurchase agreements. We actively monitor credit risk in our investment portfolio and hedging activities. Credit risk exposures are controlled in accordance with policies approved by our senior management to identify, measure, monitor and control credit risks. We closely monitor developments in the credit markets and make appropriate changes to our investment policy as deemed necessary. The rating criteria we require for our counterparts have remained unchanged during 2017 (compared to 2016) as follows: a minimum rating of A/A2 for our banking counterparts (with limited exceptions), while the minimum required rating for investments in short-term corporate commercial paper is A-1/P-1. In addition to rating criteria, we have specific investment parameters and 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 35 percent of our cash and cash equivalents held at December 31, 2017, was in U.S. dollars, while other significant amounts were held in Chinese renminbi (23 percent), euro (17 percent) and Indian rupee (5 percent).

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

Due to the nature of our operations, our cash flow from operations generally tends to be weaker in the first half of the year than in the second half of the year.

Debt and interest rates

Total outstanding debt was as follows:

	December 31,	
($ in millions)	**2017**	**2016**
Short-term debt and current maturities of long-term debt	738	1,003
Long-term debt:		
Bonds	6,487	5,660
Other long-term debt	222	140
Total debt	**7,447**	**6,803**

The decrease in short-term debt in 2017 was due to the repayment at maturity of both our USD 500 million 1.625% Notes and our AUD 400 million 4.25% Notes. This was partially offset by the reclassification of our CHF 350 million 1.5% Bonds due in 2018. In addition, we increased the amount of issued commercial paper ($259 million outstanding at December 31, 2017, compared to $57 million outstanding at December 31, 2016).

Our debt has been obtained in a range of currencies and maturities and on various interest rate terms. For certain of our debt obligations, we use derivatives to manage the fixed interest rate exposure. For example, we use interest rate swaps to effectively convert fixed rate debt into floating rate liabilities. After considering the effects of interest rate swaps, the effective average interest rate on our floating rate long-term debt (including current maturities) of $3,213 million and our fixed rate long-term debt (including current maturities) of $3,907 million was 0.6 percent and 3.5 percent, respectively. This compares with an effective rate of 1.3 percent for floating rate long-term debt of $1,745 million and 2.9 percent for fixed rate long-term debt of $4,923 million at December 31, 2016.

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

During 2016 we exercised our second and final option to extend the maturity of our $2 billion multicurrency revolving credit facility from 2020 to 2021.

No amount was drawn under the credit facility at December 31, 2017 and 2016. The facility is available for general corporate purposes. The facility contains cross-default clauses whereby an event of default would occur if we were to default on indebtedness, as defined in the facility, at or above a specified threshold.

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

Commercial paper

At December 31, 2017, 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, 2017, $259 million was outstanding under the $2 billion program in the United States, compared to $57 million outstanding at December 31, 2016.

No amount was outstanding under the $2 billion Euro-commercial paper program at December 31, 2017 and 2016.

European program for the issuance of debt

The European program for the issuance of debt allows the issuance of up to the equivalent of $8 billion in certain debt instruments. The terms of the program do not obligate any third party to extend credit to us and the terms and possibility of issuing any debt under the program are determined with respect to, and as of the date of issuance of, each debt instrument. During 2017, we issued EUR 750 million 0.75% Notes, due 2024, and during 2016, we issued EUR 700 million 0.625% Notes, due 2023, under the program. At December 31, 2017, three bonds (principal amount of EUR 1,250 million, due in 2019, principal amount of EUR 700 million, due in 2023 and principal amount of EUR 750 million, due in 2024) having a combined carrying amount of $3,216 million, were outstanding under the program. At December 31, 2016, two bonds (principal amount of EUR 1,250 million, due in 2019, and principal amount of EUR 700 million, due in 2023) having a combined carrying amount of $2,043 million, were outstanding under the program.

Australian program for the issuance of debt

During 2012, we set up a program for the issuance of up to AUD 1 billion (equivalent to $779 million, using December 31, 2017, exchange rates) of medium-term notes and other 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. No amount was outstanding under this program at December 31, 2017. At December 31, 2016, one bond, having a principal amount of AUD 400 million, which matured in 2017, was outstanding under the program. The carrying amount of the bond at December 31, 2016, was $291 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, 2017 and 2016, our long-term debt was rated A2 by Moody's and A by Standard & Poor's.

Limitations on transfers of funds

Currency and other local regulatory limitations related to the transfer of funds exist in a number of countries where we operate, including: China, Egypt, India, Indonesia, South Korea, Malaysia, Russian Federation, Taiwan, Thailand and Turkey. Funds, other than regular dividends, fees or loan repayments, cannot be readily transferred offshore from these countries and are therefore deposited and used for working capital needs in those countries. In addition, there are certain countries where, for tax reasons, it is not considered optimal to transfer the cash offshore. As a consequence, these funds are not available within our Group Treasury Operations to meet short-term cash obligations outside the relevant country. The above described funds are reported as cash in our Consolidated Balance Sheets, but we do not consider these funds immediately available for the repayment of debt outside the respective countries where the cash is situated, including those described above. At December 31, 2017 and 2016, 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 $2,222 million and $1,737 million, respectively.

During 2017 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, 2017	2016	% Change
Current assets			
Cash and equivalents	4,526	3,644	24%
Marketable securities and short-term investments	1,102	1,953	(44)%
Receivables, net	10,416	9,696	7%
Inventories, net	5,059	4,347	16%
Prepaid expenses	189	176	7%
Other current assets	647	688	(6)%
Assets held for sale	—	548	n.a.
Total current assets	**21,939**	**21,052**	**4%**

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 2017 as the amount of excess liquidity available for investments was reduced as funds were needed for acquisitions of businesses. The reduction resulted primarily in lower amounts deposited with banks with fixed deposit terms over three months and lower investments in money market funds (see “Cash flows-Investing activities”, below, and “Note 4 Cash and equivalents, marketable securities and short-term investments” to our Consolidated Financial Statements).

Receivables increased 7 percent (2 percent in local currencies). The increase was primarily due to the impact of the acquisition of B&R. For details on the components of Receivables, see “Note 7 Receivables, net” to our Consolidated Financial Statements.

Inventories increased 16 percent (6 percent in local currencies). The increase in inventory was primarily due to the impact of the B&R acquisition but also due to a planned increase of inventories to deliver against expected growth in certain product businesses.

($ in millions)	December 31, 2017	2016	% Change
Current liabilities			
Accounts payable, trade	5,419	4,446	22%
Billings in excess of sales	1,251	1,241	1%
Short-term debt and current maturities of long-term debt	738	1,003	(26)%
Advances from customers	1,367	1,398	(2)%
Provisions for warranties	1,231	1,142	8%
Other provisions	1,882	1,765	7%
Other current liabilities	4,385	3,936	11%
Liabilities held for sale	—	218	n.a.
Total current liabilities	**16,273**	**15,149**	**7%**

Accounts payable increased 22 percent (14 percent in local currencies) primarily as a result of continuing efforts to negotiate extended payment terms with suppliers.

The decrease in Short-term debt and current maturities of long-term debt was primarily due to the repayment at maturity of both the USD 500 million and AUD 400 million bonds partially offset by increases in the U.S. commercial paper program of $202 million and the reclassification to short-term debt of $391 million, mainly from the CHF 350 million bond.

Advances from customers decreased 2 percent (9 percent in local currencies) due to the impact of lower level of advances received on orders, especially in the Transformers business, which was partially offset by the increase in advances received in the Robotics and Drives businesses.

Provisions for warranties increased 8 percent (decreased 1 percent in local currencies), primarily due to a decrease in warranty expenses in the solar business offset by the acquisition of B&R.

Other provisions increased 7 percent (flat in local currencies) as higher contract-related provisions were offset by lower restructuring provisions in local currencies.

The increase in Other current liabilities of 11 percent (5 percent in local currencies) was primarily due to increases in non-trade payables and income tax payable partially offset by lower derivative liabilities.

($ in millions)	December 31, 2017	2016	% Change
Non-current assets			
Property, plant and equipment, net	5,363	4,743	13%
Goodwill	11,199	9,501	18%
Other intangible assets, net	2,622	1,996	31%
Prepaid pension and other employee benefits	144	90	60%
Investments in equity-accounted companies	158	170	(7)%
Deferred taxes	1,250	1,118	12%
Other non-current assets	587	532	10%
Total non-current assets	**21,323**	**18,150**	**17%**

In 2017, Property, plant and equipment increased 13 percent (6 percent in local currencies) partly due to the acquisition of B&R and also due to the investment in a new robotics factory in the U.S. and the ongoing investment in the Xiamen hub in China.

In 2017, Goodwill increased 18 percent (14 percent in local currencies) due primarily to the acquisition of B&R.

Other intangible assets increased 31 percent (27 percent in local currencies) primarily due to the addition of intangibles related to the acquisition of B&R, partially offset by the impact of amortization of intangibles in 2017. For additional information on intangible assets see “Note 11 Goodwill and other intangible assets” to our Consolidated Financial Statements.

($ in millions)	December 31, 2017	2016	% Change
Non-current liabilities			
Long-term debt	6,709	5,800	16%
Pension and other employee benefits	1,882	1,834	3%
Deferred taxes	1,099	918	20%
Other non-current liabilities	1,950	1,604	22%
Total non-current liabilities	**11,640**	**10,156**	**15%**

Long-term debt increased 16 percent of which 7 percentage points were due to movements in foreign exchange rates. The remaining change was due primarily to the issuance of the new EUR 750 million bond for the proceeds of $824 million, offset by the reclassification to short-term debt of $391 million mainly from the CHF 350 million bond. See “Liquidity and Capital Resources-Debt and interest rates” for information on long-term debt.

The increase in Pension and other employee benefits was primarily due to foreign exchange rate movement. For additional information, see “Note 17 Employee benefits” to our Consolidated Financial Statements.

The increase in Deferred taxes was primarily due to the deferred taxes recorded from the acquisition of B&R.

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

In the Consolidated Statements of Cash Flows, the effects of discontinued operations are not segregated.

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

($ in millions)	2017	2016	2015
Net cash provided by operating activities	3,799	3,843	3,818
Net cash used in investing activities	(1,450)	(1,305)	(974)
Net cash used in financing activities	(1,735)	(3,355)	(3,380)
Effects of exchange rate changes on cash and equivalents	268	(104)	(342)
Net change in cash and equivalents-continuing operations	**882**	**(921)**	**(878)**

Operating activities

($ in millions)	2017	2016	2015
Net income	2,365	2,034	2,055
Depreciation and amortization	1,101	1,135	1,160
Total adjustments to reconcile net income to net cash provided by operating activities (excluding depreciation and amortization)	(385)	1	(55)
Total changes in operating assets and liabilities	718	673	658
Net cash provided by operating activities	**3,799**	**3,843**	**3,818**

Operating activities in 2017 provided net cash of $3,799 million, a decrease from 2016 of 1 percent as lower cash-effective net income (net income adjusted for depreciation, amortization and other non-cash items) was mostly offset by the cash effects of stronger net working capital management. Working capital improvements included a significant increase in trade and non-trade payables, resulting from continuing company-wide efforts to extend payment terms with suppliers. Partially offsetting these benefits were cash

outflows resulting from higher inventories and trade receivables. In addition, the timing of income tax payments positively impacted cash provided by operating activities.

Operating activities in 2016 provided net cash of $3,843 million, an increase from 2015 of 1 percent as Net income was steady and net working capital improvements continued to contribute to positive cash flows. Net working capital management improvements included a reduction of inventories and a significant increase in trade payables, resulting from focused efforts to extend payment terms with suppliers. The timing of income tax payments also improved cash provided by operating activities. These benefits were offset by impacts from lower advances from customers. In addition, cash flows from operating activities was negatively impacted by the misappropriation of $103 million in cash by the treasurer of our subsidiary in South Korea.

Investing activities

($ in millions)	2017	2016	2015
Purchases of marketable securities (available-for-sale)	(312)	(1,214)	(1,925)
Purchases of short-term investments	(393)	(3,092)	(614)
Purchases of property, plant and equipment and intangible assets	(949)	(831)	(876)
Acquisition of businesses (net of cash acquired) and increases in cost- and equity-accounted companies	(2,130)	(26)	(56)
Proceeds from sales of marketable securities (available-for-sale)	514	1,057	434
Proceeds from maturity of marketable securities (available-for-sale)	100	539	1,022
Proceeds from short-term investments	945	2,241	653
Proceeds from sales of property, plant and equipment	66	61	68
Proceeds from sales of businesses (net of transaction costs and cash disposed) and cost- and equity-accounted companies	607	(1)	69
Net cash from settlement of foreign currency derivatives	63	(57)	231
Other investing activities	39	18	20
Net cash used in investing activities	**(1,450)**	**(1,305)**	**(974)**

Net cash used in investing activities in 2017 was $1,450 million, compared to $1,305 million in 2016. Cash used to fund acquisitions of businesses (primarily B&R) was significantly higher than in 2016 but was partially offset by sales of marketable securities and short-term investments as well as the proceeds received from sales of businesses (primarily the high-voltage cables and cable accessories businesses). In addition, changes in the impacts from derivative cash flows classified as investing activities reduced cash used in investing activities by $120 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. We also had higher purchases of property, plant and equipment and intangible assets due to higher investments in information technology assets as well as specific investments in facilities in the United States and China.

Net cash used in investing activities in 2016 was $1,305 million, compared to $974 million in 2015. The change was primarily due to the change in the cash impacts from derivative cash flows classified as investing activities as in 2016 we had net outflows of $57 million, compared to inflows of $231 million in 2015, on settlement of foreign currency derivatives relating to investing activities.

Total cash disbursements for the purchase of property, plant and equipment and intangible assets were lower in 2016 compared to 2015. The change was primarily due to movements in foreign exchange rates and an increase in the amount of unpaid purchases.

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

($ in millions)	2017	2016	2015
Construction in process	672	595	568
Purchase of machinery and equipment	155	168	200
Purchase of land and buildings	44	28	50
Purchase of intangible assets	78	40	58
Purchases of property, plant and equipment and intangible assets	**949**	**831**	**876**

In 2017, we decreased the amount of our excess liquidity invested in marketable securities and short-term investments as funds were needed for acquisitions of businesses while in 2016 and 2015, we increased the amounts invested in marketable securities and short-term investments. Marketable securities and short-term investments at December 31, 2017, consisted primarily of fixed-term deposits with banks, available-for-sale debt securities as well as amounts placed in reverse repurchase agreements. At December 31, 2016, amounts were placed primarily in fixed-term deposits with banks and in short-term money market funds. At December 31, 2015, amounts were placed primarily in short-term money market funds and corporate commercial paper. The net decrease in investments during 2017 resulted in an inflow of

$854 million while in 2016 and 2015, the net increase in investments resulted in outflows of $469 million and $430 million, respectively.

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 business. In 2016 and 2015, there were no significant acquisitions or divestments of businesses.

Financing activities

($ in millions)	2017	2016	2015
Net changes in debt with maturities of 90 days or less	207	(152)	3
Increase in debt	921	912	68
Repayment of debt	(1,007)	(1,249)	(101)
Delivery of shares	163	192	107
Purchase of treasury stock	(251)	(1,299)	(1,487)
Dividends paid	(1,635)	—	(1,357)
Reduction in nominal value of common shares paid to shareholders	—	(1,610)	(392)
Dividends paid to noncontrolling shareholders	(127)	(122)	(137)
Other financing activities	(6)	(27)	(84)
Net cash used in financing activities	**(1,735)**	**(3,355)**	**(3,380)**

Our financing 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.

In 2017, the net cash inflow for debt with maturities of 90 days or less primarily related to an increase of $202 million in borrowings outstanding under our commercial paper program in the U.S. In 2016, the net cash outflow related primarily to a reduction of $75 million in the amount outstanding under our commercial paper program in the U.S. and net repayments of short-term borrowings in various countries.

In 2017, the increase in debt was due primarily to the issuance of our EUR 750 million 0.75% Notes due 2024 (equal to $824 million at date of issuance). In 2016, the increase in debt was due primarily to the issuance of our EUR 700 million 0.625% Notes due 2023 (equal to $807 million at date of issuance). In 2015, increases in other debt included cash flows from additional borrowings in various countries.

During 2017, $1,007 million of debt was repaid, reflecting primarily the repayment at maturity of both the USD 500 million 1.625% Notes and the AUD 400 million 4.25% Notes (in total equivalent to $803 million at dates of repayment). During 2016, $1,249 million of debt was repaid, reflecting primarily the repayment at maturity of the USD 600 million 2.5% Notes and CHF 500 million 1.25% Bonds (in total equivalent to $1,106 million at dates of repayment). In 2015 repayment of debt reflects repayments of borrowings in various countries.

In 2017, “Purchase of treasury stock” reflects the cash paid to purchase 10 million of our own shares on the open market. In 2016 and 2015, the amount reflects the cash paid to purchase 65 million and 73 million, respectively, of our own shares in connection with the share buyback program which was announced in September 2014 and completed in September 2016. For additional information on the share buyback program see “Note 19 Stockholders’ equity” to our Consolidated Financial Statements.

Disclosures about contractual obligations and commitments

The contractual obligations presented in the table below represent our estimates of future payments under fixed contractual obligations and commitments. The amounts in the table may differ from those reported in our Consolidated Balance Sheet at December 31, 2017. Changes in our business needs, cancellation provisions and changes in interest rates, as well as actions by third parties and other factors, may cause these estimates to change. Therefore, our actual payments in future periods may vary from those presented in the table. The following table summarizes certain of our contractual obligations and principal and interest payments under our debt instruments, leases and purchase obligations at December 31, 2017.

($ 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	6,953	378	1,558	2,532	2,485
Interest payments related to long-term debt obligations	1,370	191	328	192	659
Operating lease obligations	1,516	390	541	315	270
Capital lease obligations[1]	292	48	71	46	127
Purchase obligations	4,967	4,104	685	156	22
Total	**15,098**	**5,111**	**3,183**	**3,241**	**3,563**

(1) Capital lease obligations represent the total cash payments to be made in the future and include interest expense of $116 million and executory costs of $2 million.

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

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

Of the total of $1,230 million unrecognized tax benefits (net of deferred tax assets) at December 31, 2017, it is expected that $32 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, ($ in millions)	Maximum potential payments 2017	2016
Performance guarantees	1,775	193
Financial guarantees	17	69
Indemnification guarantees	72	71
Total	**1,864**	**333**

The carrying amounts of liabilities recorded in the Consolidated Balance Sheets in respect of the above guarantees were not significant at December 31, 2017 and 2016, 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 the Company 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, 2017 and 2016, the total outstanding performance bonds aggregated to $7.7 billion and $7.9 billion, respectively. There have been no significant amounts reimbursed to financial institutions under these types of arrangements in 2017, 2016 and 2015.

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