

PRODUCTS AND SERVICES

Quantum leap in digital

We are on the cusp of two revolutions: a fourth industrial revolution and an energy revolution. The first is driven by an explosion of data, computing power and ubiquitous connectivity between machines and people. The second is driven by environmental and energy independence concerns.

ABB is well positioned to play a leading role in the new era. As early as the 1970s, we were already building software and connectivity into our devices and systems to improve efficiency. In fact, ABB introduced the world's first electric robot, controlled by a microprocessor, in 1972. Over several decades we have built up a wide portfolio of products and services to cope with the growing complexity of energy systems and, with the world's largest installed base of connected industrial devices, we have the ability to fully leverage digital technology, making the power of our collected knowledge count in the physical world.



>70,000,000

digitally enabled devices
connected

Industry-leading digital solutions

ABB has dedicated itself to helping customers improve three important metrics: uptime, speed and yield. One of the most significant tools in realizing this is digitalization. Whereas past breakthroughs in productivity were typically achieved on the level of devices and individual technologies, the new revolution will center on collaboration between devices and systems and across value chains. Real-time information is shared and processed digitally.

In 2016, ABB launched our industry-leading digital solutions offering, ABB Ability™, which brings together all of our digital products and services to create real business value for our customers. ABB Ability helps customers in utilities, industry, transport and infrastructure develop new processes and advance existing ones by providing insights and optimizing planning and controls for real-time operations.

The digital offerings we have developed in ABB Ability include performance management solutions for asset-intensive industries; control systems for process industries; remote monitoring service for robots, motors, and machinery; and control solutions for buildings, electric-vehicle charging networks and offshore platforms. Some

of the more specialized offerings address energy management for data centers and navigation optimization for maritime shipping fleets, among many others.

For example, the ABB Ability Asset Health Center 3.0 uses predictive and prescriptive analytics and customized models to identify and prioritize emerging maintenance needs based on failure probability and asset criticality. The ABB Ability smart sensor connects low-voltage electric motors to the industrial internet, allowing them to be monitored continuously. Early indications are that the smart sensor leads to reductions in downtime of up to 70 percent and in energy consumption by as much as 10 percent.

The ABB Ability digital substation incorporates fiber optic current sensors and disconnecting circuit breakers to reduce maintenance requirements and the need for extensive conventional cabling. The combination of electrical hardware with digital sensors and cloud computing enables grid operators to make decisions based on comprehensive, up-to-date information, while predictive algorithms can improve maintenance practices and asset management.

In the transport sphere, ABB Ability marine performance optimization is one of the former standalone systems that is now being integrated into the ABB Ability platform. Logistics companies will now be able to use one integrated control and monitoring system to keep track of ships, cargo flights, trucking operations, warehouse operations and other assets, all in one place, allowing them to identify logistical bottlenecks and take preventive action to avoid conflicts or maintenance issues, saving resources, time and money.

Pushing the boundaries of technology and innovation

To achieve these outcomes, ABB invests significantly in research and development (R&D), focusing on developing and commercializing the technologies that are of strategic importance to our future growth. In 2016, we invested \$1,300 million, or 3.8 percent of revenues, in R&D activities, along with \$155 million on order-related

development activities. To support this R&D effort, we maintain corporate research centers in seven countries (China, India, Germany, Poland, Sweden, Switzerland and the U.S.) and employ 7,900 technologists in more than 30 countries.

ABB's R&D technologists are also key to ensuring our health, safety and environmental (HSE) ambitions are designed into our products and solutions. The ABB Gate Model process defines our Group-wide approach to product and technology development and HSE aspects are built-in via a standardized Life Cycle Assessment procedure. A handbook and "HSE checklist" provide further guidance on HSE aspects during design, supported by specific training packages. In 2016, we initiated a review and expansion of the HSE checklist to account for recent changes in applicable ISO standards and to better cover safety aspects of manufacturing and service during design. Training activities related to HSE in design were therefore postponed until the checklist update is completed.

Collaboration: Sharing expertise, harnessing creativity

Even though we maintain significant R&D capabilities within ABB, the change to a digital economy is so comprehensive, touching almost all areas of business, that no single company can hope to master all aspects alone. The complexity of today's industrial ecosystem means that collaboration with other, best-in-class companies is essential. That is why we place great store on sharing our expertise with leading industry players. We recently announced a far-reaching partnership with Microsoft to develop next-generation digital solutions on an integrated cloud platform, and we continue to work closely with household names, from Hitachi to Ericsson and Volvo Buses.

ABB invests heavily in university collaborations to develop long-term disruptive technologies as well as mid- to short-term evolutionary innovations for our existing products and services. We maintain partnerships with more than 100 universities worldwide, helping us to shorten the time to turn basic ideas into viable products, as well as to attract new talent.

To make sure that we are harnessing the creativity of the next generation of researchers, we established incubators, such as the Synerleap growth hub at our R&D center in Västerås, Sweden, which fosters contacts between ABB researchers and tech start-ups working on innovative technology in the fields of industrial automation, robotics and energy. Additionally, our strategic venture capital arm, ABB Technology Ventures, invests in high potential industrial technology and energy companies aligned with ABB's mission of improving the efficiency, productivity and quality of our customers' operations while minimizing environmental impact.

We further encourage young engineering talent through a variety of awards and "innovation challenges". In 2016,

ABB announced the winner of the first ABB Research [Award in Honor of Hubertus von Grünberg](#). The prize, named after ABB's former chairman, will be awarded every three years to a pioneering post-doctoral research project. ABB in China and Malaysia also run local competitions to encourage engineering innovation, while ABB in the U.K. partnered with the IdeaHub innovation platform to seek innovations focused on variable speed drives.

Contributing to a more sustainable world

As part of our sustainability objectives, ABB committed to increase revenue from our portfolio of energy efficiency-related products, systems and services by 20 percent by 2020, from a 2013 baseline. The criteria defining the ABB energy efficiency portfolio were developed in 2011, based on the technology standards and ABB's business scope of the time.



55% of revenues
related to eco-efficiency
portfolio in 2016

Given the subsequent technology improvements, significant organic and inorganic changes in ABB's business portfolio and the launch of our Next Level strategy in 2014, we reviewed the nature of the portfolio during 2015 to account for these changes. After extensive consultation, we developed an expanded "eco-efficiency" portfolio that now includes energy efficiency, renewable energy and resource efficiency criteria. We also strengthened the methodology defining the portfolio to provide greater transparency and consistency.



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abb.com/sustainability

According to the updated criteria, 55 percent of ABB revenues were related to the eco-efficiency portfolio in 2016, with 54 percent in 2015 and 53 percent in 2014.

Considering the evolution of ABB's business to address the energy and digitalization revolutions, including the launch of ABB Ability in late 2016, as well as feedback from our stakeholders requesting a greater focus on assessment of impacts rather than on the revenue generated by the eco-efficiency portfolio, we have decided to review our stated sustainability performance indicator and target for products and services. During 2017, we will consider alternative proposals and plan to publish an updated indicator and target in our next report.

With our eco-efficiency portfolio, including industry-leading digital solutions, ABB continues to push the boundaries of technology and innovation to decouple economic growth from environmental impact and support the growth of a sustainable and resilient global economy.