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STRATEGY PILLAR OVERVIEW

We preserve resources

To help preserve the earth's resources for future generations, ABB has defined a systematic, company-wide approach to circularity. We seek to minimize the quantity of resources consumed and to keep resources in use across the value chain.

Target overview



- Covering **at least 80 percent** of ABB products and solutions with **circularity approach**
- Sending **0 waste** from own operations to landfill
- Ensuring **80 percent** of supply spend in focus countries is covered by **SSBM**

By 2030, at least 80 percent of our products and solutions will be covered by our circularity approach and evaluated according to a set of KPIs, corresponding to each stage of the product lifecycle.

In our own operations, we will also send zero waste to landfill or to incineration without energy recovery, wherever this is compatible with local conditions and laws. Today, 40 percent of around 440 ABB sites around the world are already sending zero waste to landfill.

At the same time, we are making a concerted effort to identify our use of restricted or hazardous substances, which we aim to reduce and, where possible, eliminate from our operations.

ABB's circularity approach will be extended to our suppliers as well. Through a range of initiatives that we are implementing across our supply chain, we will ensure that the materials we use form part of our circularity approach, among other objectives. For further information on other objectives related to our supply chain, please refer to "[Responsible Sourcing](#)" in this report.



Our approach is built on principles that will drive circularity in our own operations and simultaneously enable our customers to become more circular. By 2030, we will additionally seek to develop innovations that will enable new, circular business models. These innovations will address all stages of a product's lifecycle. All of our KPIs in this area will be based on a clear and transparent scoring system that considers eight circularity levers – two for each stage of the product lifecycle. This systematic, holistic approach will allow for continuous improvement and tracking of progress.

For 2022, our main objective is to start the implementation of our circularity approach as follows:

- Set up common governance rules for our circularity approach
- Continue mapping our initial baseline
- Expand our assessment of each of the eight circularity levers across all four Business Areas and set priorities in each Division

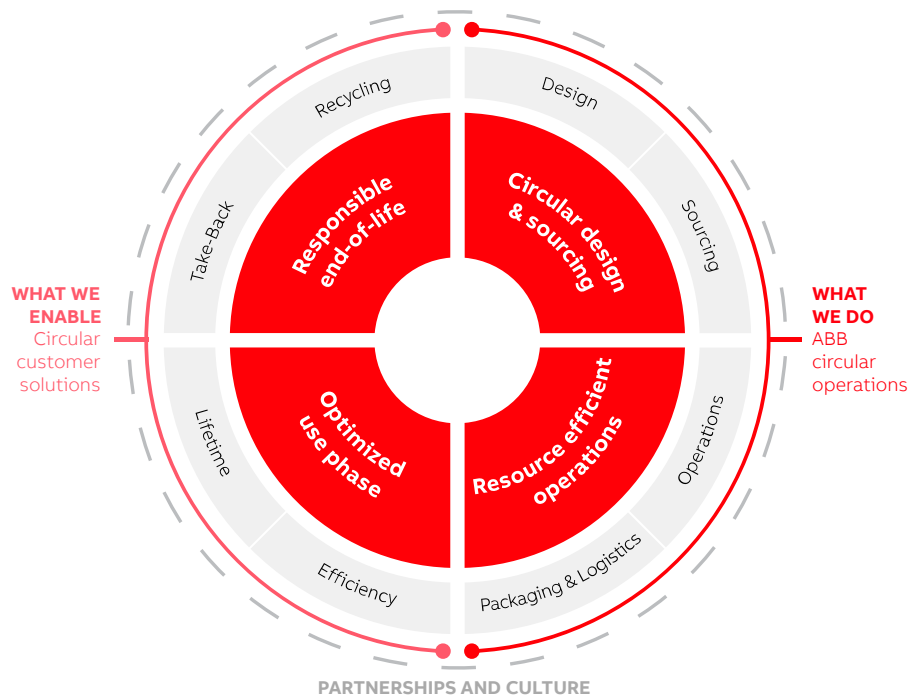


CIRCULARITY

Circularity approach

Target: 80 percent of ABB products and solutions are covered by our circularity approach

ABB circularity approach



Our comprehensive circularity approach is built around a framework that drives circularity in our own operations and enables our customers to become more circular. By 2030, we aim to innovate towards new circular business models, covering all stages of the product lifecycle:

- We consider the entire product lifecycle at the design and sourcing stage. Our goal is to develop products and solutions that can be produced in a resource-efficient manner that minimizes the use of virgin or hazardous materials. At the same time, we ensure that our product design takes various aspects of circularity into account, such as extended lifetime, repairability, modularity and recyclability, among others.
- In the production phase, we work to eliminate or recycle any waste generated by our processes and packaging.



- Once our products are in service, we help our customers maximize the efficiency and lifetime of their equipment.
- At the end of the product lifecycle, we seek to ensure that products can be refurbished whenever possible, or dismantled and recycled. Steel, aluminum, copper and plastics make up the majority of materials used in our products. Most of these materials are reclaimable at the end of a product's life, and we design our products with this in mind.

Examples of how we cover the four stages of the circularity approach at ABB

Product design and sourcing

In order to make our product design and sourcing processes more circular, in 2021, we continued to implement a series of projects intended to identify fully renewable, recyclable or biodegradable resource inputs for our manufactured products. At ABB's site in Porvoo, Finland, we are using post-consumer recycled (PCR) plastics for the manufacture of box supports and distance rings for our System Ideal range of flush-mounted electrical boxes. The System Ideal components are made of up to 50 percent recycled plastic, depending on the application. Thanks to circular product designs like System Ideal, in 2021, the total weight of recycled materials used in Porvoo was 64,000 kg, resulting in a reduction of some 96,000 kg of GHG emissions. We will continue to develop and release new products made from PCR plastics. Also in 2021, at our site in Ede in the Netherlands, in partnership with Ultrapolymers BC, we began to use PCR plastics for the production of surface-mounted junction boxes. By the third year of this project, we expect that each kilogram of recycled plastics used will result in an associated CO₂e reduction of 1.5 kg.

Production and packaging

In 2021, we carried out initiatives to make our production and packaging more circular. At our Ede site, for example, we made changes to ensure that input materials are reused to the fullest possible extent in our production processes. The materials left behind from our injection-molding processes are now shredded and reused; excess materials that fail to meet our production standards – such as those generated when the production equipment first starts up – are collected and shredded for reuse in non-critical items, such as marking jigs. At our Busch-Jaeger sites in Germany, we collected over 150 tons of plastic production waste and sent it for recycling by a partner, Geba Compounding, after which 43 percent was reused for production.

Water is necessary in many of our production processes and, in 2021, we continued to optimize our sites' use of this vital resource. In India, for example, our site in Nelamangala, Bangalore, has put in place water reduction, water recycling and rainwater harvesting processes, among other conservation measures. The site's water management system was assessed by The Energy and Resources Institute (TERI) and certified as a "Water Positive" factory. Water-saving initiatives such as these resulted in a reduction of



12 percent in ABB's total water withdrawals. Forty-seven percent of our water withdrawals were from stressed watersheds and amounted to 1,252 kilotons for the year, down 1.3 percent from 2020.

Packaging materials represented another focus area in 2021. Initiatives such as ABB Process Automation's "Think Outside the Box" program reduced the amount of cardboard used at the Business Area's site in Ossuccio, Italy, by an estimated 16.9 tons over the past year. Efforts to procure sustainably produced cardboard, certified by the Forest Stewardship Council (FSC), will result in facilities such as ABB Electrification's plant in Frosinone, Italy, using these materials exclusively starting in 2022.

Use phase

Once our products have been placed in service, we offer our customers a number of options to extend the lifecycle of their equipment. Retrofits, for example, extend the service life of existing drives and allow customers to replace only the essential components. By retaining the equipment's original cabinets and cabling, electrical components and automation systems, retrofits enable customers to modernize their machinery with a minimum of investment, waste and interruption to normal operations.

Digitalization plays an important role in augmenting the positive impact of our products and solutions. Our digital solutions enable our clients to extend the lifetime of their assets through optimization, remote operations and preventative maintenance. For example, one of our digital solutions, ABB Ability™ Genix, brings together the combined power of industrial analytics and artificial intelligence to help our customers unlock the value of contextualized data, improve industrial productivity and achieve operational excellence.

We also continued to explore new circular business models, such as outcome-based service models. Through this approach, customers could contract with ABB to deliver a specified level of cost savings, energy efficiency, water efficiency or raw material efficiency, among other actionable outcomes that relate to our domain expertise.

End-of-life phase

In 2021, we worked to incorporate products at the end of their lifecycle into our circularity approach by joining forces with sustainable recycling specialists and other partners. For example, in the Netherlands, ABB and HKS Metals forged a partnership that helps close the loop in the lifecycle of an electric motor. Through this agreement, HKS will collect and recycle obsolete ABB electric motors and then send the recovered raw materials to smelters across Europe to be melted down and made available to ABB for reuse in new products – including new motors.

In Sweden, ABB, Stena Recycling and SCA are also working together on motor recycling. Through this partnership, 11 tons of decommissioned motors have been processed by Stena Recycling. Nearly 100 percent of the material weight of these motors has been recycled, avoiding an estimated 34 tons of GHG emissions. In addition, an estimated 326 MWh of energy and more than 100,000 cubic meters of water were saved by not having to mine new metals.



In Italy, we collaborated with INTERSEROH TSR Italy for the collection and management of our products at the end of the lifecycle. Through this collaboration, ABB Electrification's Smart Power Division can guarantee its customers that, when they replace an ABB product at the end of its lifecycle with a new ABB product, the discarded ABB product will be collected and more than 80 percent of its components will be recycled. Additionally, INTERSEROH TSR Italy will issue the customer a certificate of proper waste management, specifying the calculated amount of avoided GHG emissions.

Over the last 25 years, thousands of used robots have been given a second life by ABB's remanufacturing teams, which refurbish and upgrade them. Peripheral equipment, such as controllers and manipulators, is also refurbished to "like-new" condition at ABB's Global Remanufacture & Workshop Repair Centers. Remanufacturing enables existing robot users to sell redundant robots to ABB rather than scrapping or mothballing them. A lifecycle assessment undertaken in 2021 revealed that the process of refurbishing a robot releases roughly 75 percent fewer GHG emissions compared with manufacturing a new robot.

CASE STUDY

Reinvigorating old equipment with new retrofit solutions



As part of ABB's commitment to cover 80 percent of products and services with its circularity approach by 2030, we are working closely with partners, customers and suppliers to extend the useful service life of equipment.

As an example of this approach, in 2021, ABB Motion's Services Division worked with Mondi SCP, the largest wood processor and producer of pulp and paper in Slovakia, to implement a retrofit solution for the ACS600 drive units used in Mondi's paper machines. The units were at the end of their lifecycle, so ABB's engineers helped Mondi determine the optimal scope and timing for a program of modernization, based on the condition of the existing drives. Together, the two teams agreed on which hardware solutions and control system updates to deploy before setting a detailed schedule for the installation. The retrofit solution was then carried out in just one week.



By offering thoughtfully tailored retrofits to extend the lifecycle of existing drives, ABB enables its customers to replace only the necessary components, while retaining most of their existing infrastructure, cabinets and cabling, electrical equipment and automation systems. Older generations of multidrives can be updated to the latest ACS880 technology, which is compatible with nearly any industrial process, automation system, user group or business requirement. The approach minimizes the costs of modernization, while limiting any interruption to operations. Best of all, it extends the useful life of valuable assets and enables greater circularity when it comes to managing the lifecycle of the equipment.



WASTE

Zero waste

Target: Zero waste from our own operations will be disposed of in landfills, wherever this is compatible with local conditions and regulations

We are committed to eliminating the impact of ABB's waste on the environment. We are working towards this target by means of a wide range of waste reduction and recycling programs at our sites around the world.

Total waste to landfill



Globally, we now have 185 sites that send zero waste to landfill, with around 255 making progress towards this goal. Over the past year, through in-house recycling and reuse, mainly of packaging materials and thermoplastics, we reduced the amount of waste that ABB generates by 2,300 tons.

We implemented more than 40 recycling and waste reduction projects in 2021. These projects reduced the waste we generate annually by 140 tons, while delivering annual savings of some \$100,000. More than 40 percent of these projects have a payback period of less than two years.

Initiatives such as switching from polyurethane-based packaging to paper, as was done at our Ossuccio site in 2021, are helping us become a zero-waste enterprise. This one initiative alone eliminated 35 tons annually of non-recyclable waste produced from hazardous chemicals. In the United States, several ABB sites have opted to pay a premium to send their waste to an energy-recovery facility instead of the local landfill. Such initiatives demonstrate that we are willing to pay more to uphold our commitment to operating in an environmentally responsible manner.



CASE STUDY

Frosinone joins growing group of ABB zero-waste facilities



In 2020, ABB Smart Power's low-voltage circuit breaker factory in Frosinone, Italy, achieved its goal of disposing zero production waste to landfill. In operation since 1969, the 150,000-square-meter facility with more than 800 employees implemented a whole-factory program to do its part in meeting ABB's commitment to zero waste to landfill at all of its sites by 2030.


The site is recognized as a lighthouse plant by the Italian government, together with two other Electrification sites in Italy (Dalmine and Santa Palomba), and serves as a model for innovative digital transformation and Industry 4.0. In both its operations and its products, the Frosinone facility promotes smart, digital, connected operations that increase efficiency across the full value chain. To make the facility's production even more sustainable, the team established thorough waste-sorting and identification procedures at the key points where waste originated. The site now features roughly 150 differently-labeled production waste containers, and there are separate containers for paper and plastic waste at each workstation. Staff training was critical to making the project a success, as it empowered colleagues to make waste separation decisions and engaged them fully in the initiative.



In achieving zero production waste to landfill well ahead of ABB's commitment, as well as going beyond the European Union's Circular Economy Package target of no more than 10 percent to landfill by 2035, the facility demonstrated that fast and effective progress in preserving resources is well within reach.



RIGHT MATERIALS

Eliminating unsafe materials from our operations

The [ABB List of Prohibited and Restricted Substances](#)  serves as our guide in reducing and, where possible, eliminating our use of hazardous materials. This list applies to all our operations, including procurement, product development, production processes, products, packaging materials, service activities and construction sites. We update the list twice a year in keeping with international regulations, in particular the EU REACH regulation.

To help suppliers meet their obligations – which include partnering with us to identify and prevent restricted substances and conflict minerals from entering ABB's supply chain – we have developed a [companion guide](#)  to the above-mentioned list. ABB's Global Terms and Conditions for suppliers and our [Supplier Code of Conduct](#)  address prohibited and restricted substances in the context of regulatory compliance.

In 2021, we launched 16 new projects to reduce and phase out hazardous substances. Due to the variety and specialized nature of our Group's products and processes, the reduction of hazardous substances is typically addressed on a site-by-site basis.

Under our new business model, described in ABB's 2020 Sustainability Report, our Business Areas assumed full ownership of their respective product material compliance duties. These include ensuring that ABB complies with EU requirements for chemicals and products listed in the Substances of Concern in Products (SCIP) database. One example of the success of this approach is the screening program developed by ABB Electrification and its suppliers, which monitors and eliminates hazardous substances from components supplied to ABB. In 2021, through this program, we gathered data on more than 370,000 components and worked with more than 10,000 active suppliers to satisfy our mutual obligations under the European Union's REACH and RoHS regulations.