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PILLAR OVERVIEW

We preserve resources

By 2030, we are committed to covering at least 80 percent of our products and solutions with our circularity approach and evaluating them according to a set of KPIs that correspond to each product's life-cycle stage.

Within that same timeframe, we will completely eliminate any waste from our own operations that would be sent to landfill or to incineration without energy recovery, wherever doing so is compatible with local conditions and laws. Today, 48 percent of ABB's sites around the world are already sending zero waste to landfill.

We will also extend our circularity approach to our suppliers. In addition to ensuring that at least 80 percent of our supply spending is done in focus countries that are covered by our Sustainable Supply Base Management (SSBM) program, we are taking steps to make certain that the materials we source from third parties form part of our circularity approach. For further information on objectives related to our supply chain, please refer to the chapter "[Responsible sourcing](#)."

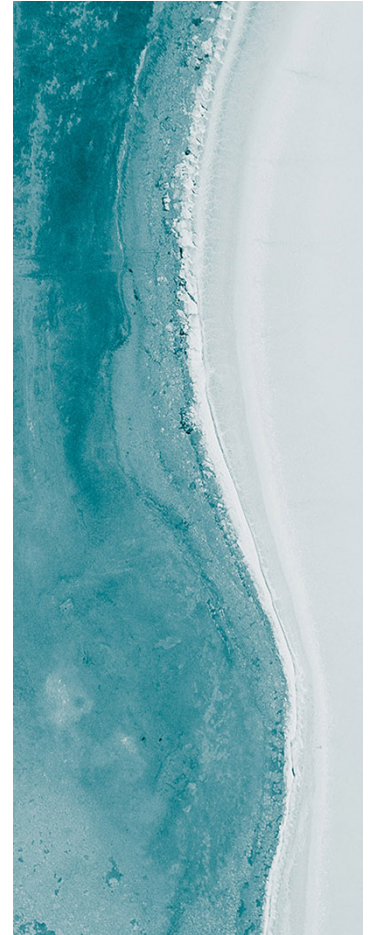
Outside of the scope of our stated 2030 sustainability targets for preserving resources, we have continued to drive progress toward a number of related objectives. We regularly seek to identify our use of restricted or hazardous substances, which we aim to reduce and, where possible, eliminate from our operations. We also run a longstanding program aimed at reducing water risk, water use and water withdrawals in water-stressed areas; we take pride in the water-saving measures we have implemented at ABB sites around the world.

Since introducing our 2030 sustainability targets for preserving resources, we have made continuous progress:

Targets 2030	2019 baseline ¹	2022 status
Cover at least 80% of ABB's portfolio of products and solutions with circularity approach	n/a	We aim to refine our circularity approach to achieve clear alignment with regulations in 2023
Send zero waste to landfill while taking measures to prevent waste generation ²	17.1 kilotons, equivalent to 8.8% of total waste (adjusted for portfolio changes)	11.6 kilotons (equivalent to 6.7% of total waste)

¹ Where a baseline applies.

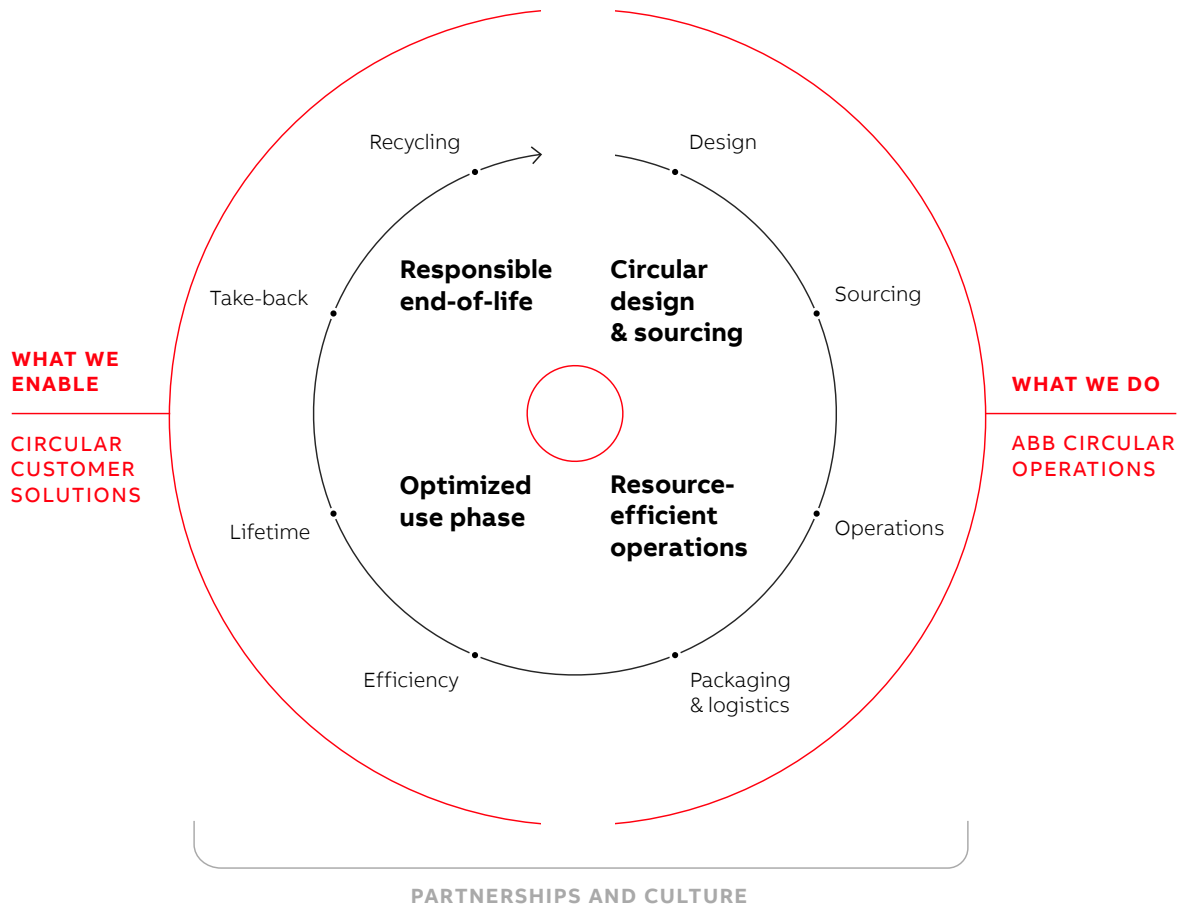
² Where compatible with local conditions.



Circularity

Target 2030: At least 80 percent of ABB products and solutions will be covered by our circularity approach

At ABB, we work with our value chain partners to drive sustainable development. To reduce the environmental impact of ABB’s operations, products and solutions, as well as to preserve the earth’s resources for future generations, we want to enable our customers and suppliers to become more circular and drive circularity across our value chain.




To develop and coordinate our circularity initiatives, ABB has established a cross-business area circularity working group. The goal of this working group is to develop a robust, objective, quantifiable and auditable framework that captures the circularity of our product portfolio. We recognize the need to incorporate external standards into this process and are therefore working to align our framework with existing external

reporting standards and related regulations. These include the EU taxonomy for sustainable activities, the Corporate Sustainability Reporting Directive (CSRD) and GRI Standards, among others. By conducting a gap analysis and reinforcing governance, we aim to finalize our approach to regulatory alignment in 2023.

ABB's circularity KPIs address all phases of the product life cycle. They were developed so we could set ambitious targets and move forward in a coordinated manner, while taking into account the wide range of solutions offered by our divisions and the diverse needs of the customers we serve.

All of ABB's four business areas strengthened their circularity implementation plans over the past year. ABB Electrification introduced circularity KPIs into performance management processes and mandated all divisions to develop circularity plans and commit to quantitative targets through 2025. ABB Motion assigned circularity target leads for each division and launched seven cross-division circularity initiatives. ABB Process Automation designated circularity leads and teams for each division and formalized its top circularity priorities. These included sourcing alternatives to plastics, conducting further life cycle assessments (LCAs), and providing a broad range of services to extend the useful lives of systems and technologies already installed at our customers' sites. ABB Robotics & Discrete Automation started to conduct LCAs for all of its top-selling robots, as well as for every new product it develops.

In 2022, we also created the ABB Circularity Approach Guidelines. These guidelines clarify the purpose of our circularity approach, define KPIs, and establish principles for the assessment of ABB products and solutions.

To support our customers' circularity journeys and highlight the circularity performance of ABB products, in June 2022, we launched the [EcoSolutions™ label](#) . To be marketed under this product category label, products must provide transparency into their environmental impacts, both through a third-party verified environmental product declaration (EPD) and a circularity KPI assessment under the ABB framework.

Looking ahead, we are continuing to work with our customers and partners on the development of innovative business models that would enable our entire value chain to become increasingly circular. Such models are critical if society is to transition from a linear "take-make-waste" economy to a circular "borrow-use-return" economy.

CASE STUDY

Upcycling recovered marine plastic while showcasing the future of retail



For the month of April 2022, an ABB IRB 6700 robot upcycled plastic recovered from the ocean to 3D-print designer vases, chairs, lampshades and other homewares in a front window at Selfridges, the chic department store in London. This showcase for circular approaches to production received considerable attention on Oxford Street, in one of Europe's busiest shopping areas.

The robot and ABB's simulation software, RobotStudio®, used [Parley Ocean Plastic®](#) – intercepted marine plastic debris – to print personalized designer objects. The objects were selected by customers on a screen and made to order on the premises. Parley for the Oceans, an environmental organization and global network that collected the plastic trash, developed the demonstration in partnership with innovative design brand Nagami. The goal was to encourage consumers to think about how the goods they buy are made and the impact of production processes on the environment.

Parley Ocean Plastic® was developed to help prevent the destruction of oceans by empowering communities across the globe to turn local plastic pollution into business opportunities and useful objects. By reusing plastic from the ocean to print designer objects, ABB highlighted the important contribution of robots to the sustainable manufacturing processes central to a circular economy. This initiative illustrates how ABB is working closely with partners, customers and suppliers to meet our commitment to cover 80 percent of our products and services with a circularity approach by 2030.

How ABB is going full circle

Product design and sourcing

In 2022, we began the process of reviewing and modifying product designs wherever practicable. For example, teams at ABB Motion are redesigning their motors so they can be more easily disassembled. The purpose of this is to reap the full benefits from the 98 percent recyclability rate of these products.

In terms of sourcing, we worked to identify fully renewable, recyclable or biodegradable resource inputs for our manufactured products. Our business areas are gradually raising the bar for supplier qualification and management processes by requiring suppliers to address the circularity of supplied materials and components. The teams also sought to identify viable alternatives to the conventional plastics and metals used in some products.

Production and packaging

In 2022, ABB continued to develop and implement circular solutions for its production processes and packaging materials. Many of the best ideas that were implemented over the course of the year were devised by local teams at our production facilities.

For example, the team at ABB's Portland, Tennessee (USA), factory came up with a way to repurpose scrap plastic from its injection molding processes. By grinding the scrap into pellets and using it as part of a 25 percent recycled/75 percent virgin mixture in production, the facility was able to cut the amount of waste it sends to landfill each month by more than nine metric tons.

Similarly, the team at ABB's St. Louis, Missouri (USA), plant identified a way to reuse scrap from the manufacture of motors, recovering 26,308 metric tons of electrical steel per year. When the plant's primary electrical steel supplier purchased a local recycling company, ABB's team realized they could sell the electrical steel scrap back to their supplier; in turn, the supplier pays ABB an above-standard price for the scrap because they can be certain that the material is of the highest quality.

ABB continued to replace conventional plastics in its packaging with either recycled or bio-based materials. ABB Electrification's Smart Power division, for example, ran a pilot project in 2022 to improve the environmental performance of its packaging and reduce transport emissions. The project adopted an eco-design approach, based on LCAs. Packaging was analyzed based on its geographical origin, transportation distances and the overall environmental impact of its materials, among other factors. Focused on the packaging of Ekip Up digital units, the project yielded strong results. The new packaging is completely plastic-free, uses FSC-certified cardboard and has led to reductions in total cost, environmental impact and weight of the packaged unit, while providing the same level of protection.

Another sustainable packaging pilot project was undertaken by the team at ABB's factory in Frosinone, Italy, in collaboration with ABB's Research Center in Switzerland. Together they developed 100 percent recycled PET plastic blister packs. These will replace the virgin plastic blister packs used for the factory's low-voltage breaker accessories in early 2023. And ABB Robotics & Discrete Automation developed new packaging for B&R's ACOPOS servo drive; the new packaging is 50 percent smaller and 30 percent lighter. Another small adjustment that yielded big results was their decision to ship B&R X20 series I/O and controls in the customized configurations requested by their customers, rather than shipping each component separately.

Use phase

We offer our customers a number of ways to extend the life of their equipment. Retrofits, for example, extend the service life of existing drives and allow customers to replace only the necessary components. By retaining the equipment's original cabinets, cabling, electrical components and automation systems, retrofits make it possible to modernize machinery with minimal expense, waste or interruption to normal operations. The life of the asset can be extended, while adding features and functionality that enhance safety, reliability and performance. As another example, we offer retrofit solutions that not only extend the service lives of marine vessels but also convert them to operate in hybrid and zero-emission modes.

ABB also has expertise in reconditioning aging assets to improve their reliability, performance and service life. In 2022, for example, ABB replaced the outdated ACS800 converters in 24 wind turbines operated by Enefit Green, the largest wind energy producer in the Baltics.

The decision to recondition old equipment is especially important in light of the quantity of GHG emissions involved and the materials required for the manufacture of new equipment. At the same time, reconditioning or rebuilding existing equipment is typically very cost-effective, for assets both large and small. In 2022, Sala Heby Energi Elnät AB, a Swedish electrical distribution company, had ABB refurbish 50 of its HPA circuit breakers, which had been manufactured in the 1980s. The customer was pleased to receive refurbished switches that will last another 20 to 25 years, for half the cost of replacement products.

ABB also offers digital solutions that enable our clients to extend the lives of their assets through optimization, remote operations and preventive maintenance. For example, Gallo NV, a leading Belgian recycling company, implemented ABB Ability Condition Monitoring for powertrains at its facility. By leveraging data insights and service expertise provided by ABB, Gallo has reported a significant increase in uptime and extended the service life of its machinery, with a payback period of just one year.

In addition, some of our divisions began to work with their customers to develop new business models that could drive circularity across the value chain. For example, in 2022,

ABB Motion in Sweden piloted recycling incentives, which are now being rolled out to other countries in Europe.

End of life

In 2022, ABB continued to apply circularity principles to the end-of-life phase of our product portfolio. For example, to further improve the recyclability of ABB's Azipod® electric propulsion systems, we made the materials used in their fabrication easier to reclaim and provided customers and recycling companies with clear end-of-life instructions. Up to 95 percent of the materials used in the production of the Azipod propulsion system is recyclable.

Additionally, ABB has entered partnerships with third-party companies to recycle batteries. One such partnership, between ABB Switzerland and Librec, a Swiss recycling company, assures that industrial batteries produced by ABB will be 90 percent recycled. As local legislation requires all battery manufacturers to either ensure end-of-life management or pay a disposal fee in advance, the partnership is good for the environment while reducing costs for ABB.

Over the last 25 years, ABB's remanufacturing teams have given thousands of used robots a second life by refurbishing or upgrading them. Peripheral equipment, such as controllers and manipulators, is also refurbished to "like-new" condition at ABB's Global Remanufacture & Workshop Repair Centers. Among these is the new robot refurbishment center that we opened in Mosnov (Czech Republic) in 2022. By offering this service, ABB makes it possible for existing customers to sell their redundant robots and equipment back to us rather than scrapping or mothballing them. A life cycle assessment carried out in 2021 revealed that robot refurbishment releases roughly 75 percent fewer GHG emissions than manufacturing a new robot. For robots and other equipment that can no longer be refurbished, ABB has a specialized team that disassembles and sorts the component materials for recycling.

CASE STUDY

Replacing raw materials in ABB products with lower-carbon alternatives

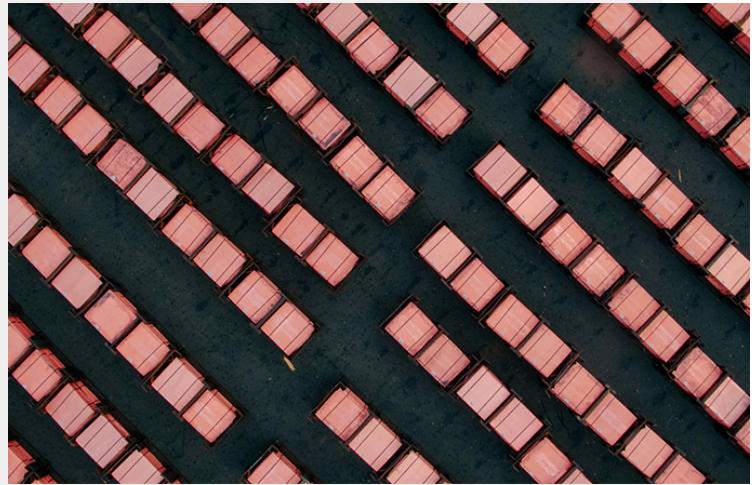


ABB is working with Boliden, the Swedish mining and smelting company, to source copper with a lower carbon footprint for use in ABB's electromagnetic stirring (EMS) equipment and high-efficiency electric motors.

The agreement with Boliden is part of our push to reduce the environmental impact of the raw materials used in our products by replacing them with lower-carbon alternatives. In addition to using recycled copper, we are committed to using more recycled electric steel (e-steel) and recycled aluminum. Recycling copper, aluminum and steel results in energy savings of between 75 and 95 percent, compared to virgin production.

Copper is a vital material for the use in industrial electrical equipment, but its production is energy-intensive. To address this, Boliden has developed low-carbon copper that is mined using fossil-free energy; it also produces copper using secondary raw materials from recycled products. The carbon footprint of these products is 65 percent lower than the industry average.

Hollow conductor wire made from Boliden's certified recycled copper will be used in ABB's EMS products for steel and aluminum manufacturing. Switching to recycled copper for just one stirrer will save 4,050 kilos of GHG emissions – equivalent to the amount generated by charging nearly half a million smartphones.

Furthermore, as of 2023, we will buy Boliden's low-carbon and recycled copper for use in our IE5 Ultra-Premium-Efficiency and e-mobility motors produced in Europe. We have also signed a memorandum of understanding to help Boliden identify inefficient low-voltage motors across its own operations. These motors can then be replaced with high-efficiency motors under ABB's take-back upcycling framework; the old motors will be recycled to provide raw materials for Boliden's recycled copper.

Waste

Target 2030: Zero waste from our own operations will be disposed of in landfills, wherever this is compatible with local conditions and regulations

For more than a decade, ABB has been launching intensive waste-reduction and recycling programs at its sites around the world. In addition to reducing ABB's impact on the environment, these programs deliver cost savings to our business areas.

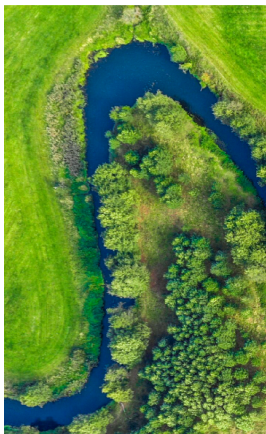
Globally, we now have 159 sites that send zero waste to landfill, while around 170 are making progress toward this goal. In the course of 2022, we reduced the amount of waste that ABB generates by 4.8 kilotons. Altogether, we implemented nearly 60 recycling and waste reduction projects in 2022. These projects reduced the waste we generate annually by an estimated 700 tons. Of these projects, 55 percent have an expected payback period of less than two years. In total, 86 percent of our waste in 2022 was recycled, and 6.7 percent was sent to landfill, down from 7 percent in 2021.

Non-hazardous waste to landfill

2019

8.8%

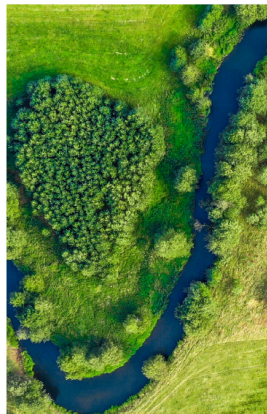
(17.1 kiloton)



2020

8.4%

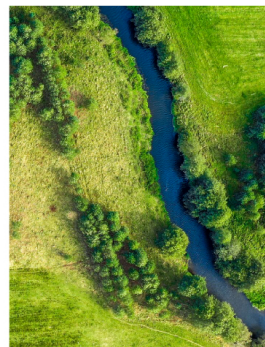
(14.6 kiloton)



2021

7%

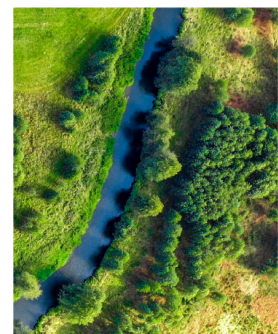
(12.3 kiloton)



2022

6.7%

(11.6 kiloton)



Figures in the graph are adjusted for portfolio changes.

In late 2022, our Xiamen and Xinhui, China, facilities were the first ABB sites to be certified as “Gold” waste-to-landfill operations under the UL2799 and UL2799A standards from UL (Underwriters Laboratories), a third-party company that tests products and validates and certifies claims for manufacturers. Xinhui achieved 95 percent diversion and 1 percent thermal processing with energy recovery, while Xiamen earned a diversion rate of 99 percent and 5 percent of thermal processing with energy recovery.

CASE STUDY

Santa Palomba and Dalmine become ABB’s next zero-waste facilities



ABB Electrification’s Santa Palomba and Dalmine factories in Italy achieved zero production-waste-to-landfill in 2022, saving 1,190 metric tons of waste annually combined.

Both facilities are well ahead of ABB’s commitment to produce zero waste to landfill at all of its sites by 2030.

Santa Palomba, a factory that produces 15 million residual current devices per year, partnered with waste and environment specialist Ecosystem to implement new waste management processes. By mapping and analyzing data on waste generated according to production processes and life cycles, ecosystem technicians identified the best ways to recover waste. The factory’s 350 employees were also trained in new waste handling procedures, which was crucial to the project’s success, as it empowered colleagues to make waste separation decisions and engaged them fully in the initiative.

Dalmine, which manufactures medium-voltage circuit breakers and switchgear, deployed a sorting program for all waste generated by its production. The entire workforce is trained and involved, while a dedicated team identifies potential improvements and waste reduction activities. The reduced waste volume is then processed by an external waste treatment specialist (certified as a secondary raw material producer) for further treatment, separation and reuse.

Both facilities have demonstrated that progress in preserving resources is well within reach and that these measures can reduce costs and improve processes. Next on their path to circularity, Santa Palomba and Dalmine plan to reduce their use of non-reusable materials and employ reusable materials for their own packaging. As an example, Dalmine now uses reusable packaging made from recycled plastic to ship components between factories.



Water

While the majority of our manufacturing processes are not water-intensive, clean water has become an increasingly scarce resource. As a result, we closely monitor how water is managed across ABB's operations.

To assess our facilities according to the level of baseline water stress of the local watershed, we make use of the World Resources Institute's Aqueduct global water risk tool. Of the 332 ABB locations mapped in 2022, 36 face an extremely high level of water stress and 58 face a high level. The tool not only helps us assess water stress at our sites, but also the levels of groundwater depletion, flood risk and seasonal variability of water availability at our sites. All of this data informs our efforts to better manage water risk.

For all ABB sites in stressed watersheds, total water withdrawals in 2022 amounted to 1,112 kilotons, 39 percent of our total water withdrawal.

The use of closed-loop processes and other strategies to recycle or reuse water is the foundation of our approach to saving water. In 2022, such processes saved 65 percent of all industrial water use and 80 percent of all cooling water use at ABB sites worldwide. There are 13 projects currently under way to improve water management across ABB, with expected annual savings of 17 kilotons.

Materials

To reduce and, where possible, eliminate the use of hazardous materials from our operations, we rely on the [ABB List of Prohibited and Restricted Substances](#). This list applies to every aspect of our operations, including procurement, product development, production processes, products, packaging materials, service activities and construction sites.

This is a heavily regulated area of activity, and we update the list twice yearly in keeping with local and international regulations and legislation. These include the TSCA, Prop 65, REACH, RoHS, POP and other local material compliance legislation, both within and beyond the European Union. We are also tracking likely future regulatory requirements regarding PFASs in the EU and the United States, DPP in the EU, and the ECO design regulatory requirements that will come into force in 2025.

We have developed a [companion guide](#) to the list to help ABB's suppliers meet their obligations – which include partnering with us to identify and prevent restricted substances from entering ABB's supply chain. In addition, 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 2022, we launched 13 new projects to reduce and phase out the use of hazardous substances. The reduction of hazardous substances is typically addressed on a site-by-site basis because of the variety and specialized nature of our Group's products and processes.

ABB's four business areas have full ownership of their respective product material compliance obligations, which include the EU requirements for chemicals and products listed in the Substances of Concern in Products (SCIP) database.