Environmental responsibility
Seeking continuous improvement

(includes GRI indicators EN2, EN9-15, EN21, EN24-27)

ABB has been working for many years to manage and reduce our environmental impacts, both within our own plants and offices, and those caused by our products and projects. We take a life cycle approach to assess the impacts throughout the phases of a product's life cycle – from manufacture and transportation to customer use and final recycling and disposal.

Life cycle assessment (LCA) is required as part of a product's research and development phase. Checklists provide guidance on how to reduce the use of hazardous substances, avoid other environmental and health risks, minimize consumption of resources, and design for recycling and easy end-of-life treatment. As part of our sustainability objectives, we have developed and launched supporting tools and training materials to ensure that these sustainability aspects are embedded in product development.

LCA is also used in the concept development phase for next generation products. In addition, we have developed associated LCA tools, such as the "LCA Light" tool that helps sales representatives to explicitly include environmental aspects in their discussions on the relative costs and benefits of different ABB solutions.

ABB has a long history of involvement in LCA. Our experts participated in the development of the ISO 14040 series of standards covering LCA and the ISO 14020 series on environmental labeling and we are still active participants in the Chalmers Life Cycle Center, a global competence center that continues to develop methodology and tools.

ABB develops Environmental Product Declarations to communicate the environmental performance of our core products over their complete life cycle. Declarations are based on LCA studies, created according to ISO/TR 14025. More than 80 declarations for major product lines are published on our website (www.abb.com).

To ensure continual improvement in our operations, we require all manufacturing and service facilities to implement environmental management systems according to the ISO 14001 standard. For non-manufacturing sites we have implemented an adapted environmental management system to ensure management of environmental aspects and continual improvement of performance. Almost all of these approximately 360 sites and offices currently work in compliance with the requirements of the standard and our environmental management program now covers operations in 59 countries.

Our management systems are underpinned by intranet-based tools and procedures. Our "Sustainability Toolbox" contains information to support the development of eco-efficient products and processes, and the implementation of ABB's sustainability objectives for 2010 and 2011

Hazardous substances

As part of our sustainability objectives, ABB is working to phase out the use of hazardous substances in our products and processes, where technically and economically feasible. We have developed lists of prohibited and restricted substances to guide this process and update them regularly, in line with developments in international regulations. ABB's suppliers are also required to apply this list to their own processes and supply chain.

Plant-specific phase-out programs are showing results, with some materials such as organic lead in polymers almost completely eliminated. This is mostly thanks to an improvement project at ABB's low-voltage products factory at Marostica in Italy, which has led to a significant reduction of organic lead used in extruded PVC products. The project involved the investigation of material requirements and selection and working with suppliers to obtain lead-free alternatives. The project continues, with a goal to obtain lead-free PVC production.

Alongside plant-specific schemes, global Business Unit (BU) focus programs continue. For example, the Volatile Organic Compounds (VOC) reduction program in the Transformers BU of our Power Products division is progressing well. The goal of the initiative is to reduce the solvent emissions from painting across the complete manufacturing spectrum of the business unit. The project aims to reduce the emissions from painting by 80 percent within BU Transformers, which would yield a reduction of 44 percent in the total emissions of ABB.

Conventional paints emit VOC and the main sources in ABB operations are the paint shops for transformers and motor manufacturing. In reduced VOC painting systems, the amount of solvent used as a carrier for the solid paint particles has been significantly reduced or replaced with another type of non VOC carrier, such as water. As well as reducing the environmental impacts of the release of VOCs to the atmosphere, this also makes the paint more pleasant to work with for our employees and reduces the health risks associated with VOC releases.

In cooperation with our suppliers, ABB Corporate Research Center has developed reduced VOC painting systems based on the ISO standard 12944-2. Paint solutions have been standardized globally and four suppliers have been approved for the program. Not only will this result in better environmental performance, but it also promotes standardization and secured quality across the global BU.

Over a two-year roll-out period, all ABB transformer manufacturing sites will convert to the lower VOC painting systems. This transition requires intensive work, site by site, including local system evaluation and testing, process mapping, quality assurance, transition planning and intensive training. Significant plants in Sweden, Finland, US, Poland and elsewhere have already converted to low VOC systems and work is ongoing in other countries. It is a complex process that sometimes must be shaped around commercial aspects, such as long-term frame contracts that require certain types of painting treatments and coordination of changeover in plants that supply to many customers.

When this internal initiative is completed, we intend to extend the program to our sub-suppliers who paint parts on our behalf.

Water

ABB's manufacturing processes do not use significant amounts of water, with extractions of groundwater and surface water used mainly for cooling purposes. None of these extractions caused significant changes to the water sources in 2011.

Approximately 50 percent of ABB's manufacturing sites use water for process purposes, and of these sites, about 60 percent use water for cooling. Water used for cooling is sourced mainly from local water sources and is returned to these sources without contamination. The use of closed-loop processes and reuse of waste water in other ways saved approximately 3,900 kilotons of water in 2011. In China, South Africa, Colombia and India, for example, water treated in ABB's own treatment plants is reused for local irrigation and in sanitary services.

About 81 percent of ABB locations discharge water to the public sewers, with 27 percent of these sites first processing that water through their own treatment plants. Excluding cooling water returned to the source of extraction, about 19 percent of locations discharge to local water sources, with about 50 percent of these sites first applying their own treatment. Two sites with their own treatment plants consider that their discharge of water affects the recipient. One site is currently addressing the capacity of its treatment plant to ensure that the water is of sufficient quality prior to discharge, while the discharge from the other site affects the receiving body as it is a near-permanently dry riverbed.

In order to better understand the impacts of ABB's water withdrawals, we have used the World Business Council for Sustainable Development Global Water Tool to characterize the renewable water resource availability in the countries and watersheds in which we operate. We have classified water resources according to the Food and Agriculture Organization methodology.[1]

When considering watersheds, 44 sites are located in extremely water-scarce watersheds (of these, 27 are manufacturing facilities), 48 in water-scarce watersheds (of these, 17 are manufacturing facilities) and 67 in water-stressed watersheds (of these, 33 are manufacturing facilities).

We have now developed an in-house tool for mapping and analysis of water flows at our facilities. Following pilot testing at a number of facilities in early 2012, the tool will be used in developing action plans at manufacturing facilities in water-stressed regions.

Thanks to a wide products and solutions portfolio, we provide our customers with enhanced performance, efficiency and reliability in water management. ABB's goal is to optimize the employment of water and energy resources to manage the integrated water cycle.

For example, ABB is providing a turnkey electrical control instrumentation and mechanical solution for the Réseau de Collecte water transfer scheme in Algeria, one of the largest water projects ever undertaken in the Sahara region. When completed, the water transfer scheme will pump and deliver 50,000 cubic meters of water a day via pipeline through the Sahara Desert from In Salah to Tamanrasset, a distance of almost 750 kilometers.

[1] *Food and Agriculture Organization of the United Nations (FAO) (2003). Review of world water resources by country. Water Reports 23. Rome.* According to this methodology, a watershed is considered water-stressed if the total actual renewable water resources (TARWR) are below 1,700 m^3 per person and year, water-scarce if below 1,000 and extremely water-scarce if below 500.

The ABB solution will power the whole water collection system and connect the In Salah site to the local power grid to ensure a safe and reliable supply of electricity to site operations. ABB instrumentation will measure the flow, temperature, pressure and quality of the water, and an ABB distributed control system will monitor and control the entire process. Earmarked as one of the Algerian government's key infrastructure projects, the capacity of the scheme is expected to triple to 150,000 cubic meters a day by 2030 to meet the needs of Tamanrasset's rapidly growing population.

Waste and recycling

ABB products contain mostly steel, copper, aluminum, oil and plastics. Approximately 90 percent of the material is reclaimable after the end of a product's useful life. ABB enhances the ability to recycle by designing products that can be dismantled more easily, and by providing users with recycling instructions.

The main waste streams at ABB organizations are metal, wood, paper, oil and plastic. We aim to reduce the amount of waste sent to landfill and to increase our use of materials which are recycled or made available for reuse.

ABB sent approximately nine kilotons of hazardous waste for disposal in 2011, unchanged from the previous year, despite increased business volumes and plant refurbishments and consolidation. This waste was mostly used for heat recovery at specialized plants. ABB follows legal regulations to transport and dispose of hazardous waste only through officially authorized disposal agents.

In 2011, 72 percent of total waste was sent for recycling. In-house recycling, mainly of thermoplastics and packaging material, reduced the amount of waste by approximately 3.2 kilotons. Additionally, the lead used as counterweights for robots and the cadmium used in industrial batteries are recycled materials.

As well as working to cut waste and improve material efficiency in our manufacturing processes, ABB also works to improve administrative processes and reduce costs. In many cases, this involves partnering with suppliers to develop win-win solutions. For example, in Australia, ABB is working with Fuji Xerox to exploit the potential of managed print services. This potential includes environmental and cost savings, as well as improvements in business workflows and efficiencies. By optimizing the employee to print device ratio, the Australian operation expects to make significant reductions in the number of printers running concurrently, potentially cutting annual CO_2 emissions by up to 66 tons through electricity savings. Additionally, paper-saving default settings on the new printers are expected to reduce annual paper consumption by 15 percent.

ABB provides an extensive range of maintenance, repair and refurbishment services to help customers minimize costs and lengthen the life cycle of their products. These services cover control systems, as well as diverse products such as drives, robots, analytical instruments and transformers.

For example, many of ABB's low-voltage and medium-voltage products have successfully served their application for over 10 or 20 years and may continue to do so for some years to come. In order to enable an extension to the product life cycle, ready-made and easy-to-apply upgrade and retrofit kits are designed for several product lines. These include conversion kits for legacy low-voltage breakers, upgrades for legacy low-voltage switchgear with modern intelligent technology for motor control, and upgrade kits for medium-voltage drive controllers, to allow better control, using the same equipment.

Biodiversity and conservation

ABB's manufacturing and workshop facilities are not located in, or adjacent to, protected areas or areas of high biodiversity value, as defined in internationally recognized listings or national legislation or internationally recognized listings such as the International Union for Conservation of Nature Protected Areas Categories 1–4, world heritage sites or biosphere reserves. Nonetheless, ABB works to rehabilitate our own sites and some of our operations are working with partners to contribute to local biodiversity. For example, ABB employees in Indonesia, Philippines and Qatar participate in activities to preserve local beach and marine environments, while ABB supports local forest preservation and tree planting schemes in the US, China, Italy and Dubai. ABB in Peru, Taiwan, and Malaysia contributes to wetland conservation, partnering with local parks to support the rehabilitation and maintenance of these valuable sites.

ABB in Switzerland focuses on its own premises and aims to landscape them in a natural way. Site maintenance using native trees and plants, and avoiding the use of fertilizer and biocides, helps to conserve biodiversity. Untouched flower fields, for example, are home to butterflies and many other insects. Sites in Deitingen and Dättwil are now certified as nature parks by "Natur und Wirtschaft," a foundation set up by the Swiss federal office for the environment and local trade associations with the goal to turn 10 percent of Swiss industrial real estate into green and natural areas.

Environmental performance: Other GRI indicators

EN1 Use of hazardous substances (tons)

	2011[a]	2010	2009
Phthalates – softener for PVC	47	31	16
PBB and PBDE – flame retardants in plastics	~0	~0	3.1
Lead in submarine cables	5,725	3,632	3,600
Organic lead in polymers	1.3	52	24
Lead in other products, eg, backup batteries and counter-weights in robots	227	265	313
Cadmium in industrial batteries delivered to customers	1.6	1.7	2.2
Cadmium in rechargeable batteries	10	5.9	4.7
Cadmium in lead alloy	4.3	2.7	2.5
Cadmium in other uses	0.02	0.18	0.05
Mercury in products delivered to customers	0.030	0.038	0.011
SF_6 insulation gas (inflow to ABB)	1,052	968	962
SF_6 insulation gas (outflow from ABB)	1,040	959	951

[a] ABB operations only, not including Baldor facilities

Water

EN8 Water consumption

EN10 Water recycled and reused

Water withdrawals (kilotons)

	2011+Baldor[a]	2011[b]	2010	2009
Purchased from water companies	3,400	3,400[c]	3,300[c]	3,300[c]
Groundwater extracted by ABB[d]	**N/A**	3,200	2,700	2,900
Surface water extracted by ABB[d]	**N/A**	2,600	2,900	2,700
Total water withdrawal	**9,200**	**9,200**	**8,900**	**8,900**
Water saved through recycling and reuse (kilotons)	N/A	3,900	3,000	800

[a] ABB and Baldor facilities included
[b] ABB operations only, not including Baldor facilities
[c] The figure is based on reported data from 87 percent of employees (85 percent in 2011) and an assumed water consumption of 10 tons/year/employee for the remaining 13 percent of employees (15 percent in 2011).
[d] Estimated (rounded) figures

Air emissions

EN19 Emissions of Volatile Organic Compounds (tons)

	2011[a]	2010	2009
Volatile Organic Compounds (VOC)	810	786	782
Chlorinated Volatile Organic Compounds (VOC-Cl)	13	11	5

[a] ABB operations only, not including Baldor facilities

The major constituents of VOCs and VOC-Cls are xylene, thinner and perchloroethylene. Increases in 2011 were due to increased business volume involving certain processes.

EN20 Emissions of NO_X and SO_X (tons SO_2 and NO_2)

	2011[a]	2010	2009
SO_X from burning coal	0	0	0
SO_X from burning oil	68	84	64
NO_X from burning coal	0	0	0
NO_X from burning oil	51	63	48
NO_X from burning gas	90	92	90

[a] ABB operations only, not including Baldor facilities

These figures are for fossil fuels consumed in ABB premises for heating and process purposes.

Waste and recycling

EN22 Waste generated (kilotons)

	2011+Baldor[a]	2011[b]	2010	2009
Scrap metal sent for recycling	161	97	135[c]	71
Other waste sent for recycling	42	39	44	46
General waste sent for disposal	47[e]	45[e]	38[d]	29[d]
Hazardous waste	11	9	9	6
Total waste	**262[e]**	**190[e]**	**227[c]**	**153**

[a] ABB and Baldor facilities included
[b] ABB operations only, not including Baldor facilities
[c] 51 kilotons are scrap metals from several locations in South Africa that have now been consolidated to one site.
[d] The figure is based on reported data from 87 percent of employees and an assumed waste output of 0.33 tons/year/employee for the remaining 13 percent of employees.
[e] The figure is based on reported data from 85 percent of employees and an assumed waste output of 0.33 tons/year/employee for the remaining 15 percent of employees. All Baldor employees covered by the relevant reporting.

Environmental incidents and penalties
EN23 Numbers of significant spills
EN28 Significant fines for non-compliance

Number of incidents

	2011	2010	2009
Oil spills	5	4	3
Chemical spills	0	0	0
Emissions to air	4	0	1
Others	0	3	0

Incidents were analyzed and adequate decontamination procedures were implemented to prevent any permanent contamination of soil and water due to these spills. Corrective actions, such as improved control systems, have been taken to reduce the risk of future spills. One incident related to an oil spill remains under consideration to determine the appropriate system improvements to prevent a recurrence.

During 2011, a $74,000 penalty was imposed on a US facility for a failure to report a complete Form R in a timely manner to the US EPA and the State of Virginia, a violation of Emergency Planning and Community Right-to-Know (EPCRA) Section 313. The issue occurred during 2009 and the case is now settled. An ABB plant in Italy was fined approximately $4,000 during 2011 for exceeding a water discharge parameter.

EN30 Environmental protection expenditure and investments

For 2011, ABB's expenditure on environmental management throughout its global sustainability affairs network was as follows:

Expenditure on environmental management	$ thousands
Group level	11,200
Country level	5,200
Site level	3,850
Total	**20,250**

ABB limits the accounting of sustainability to the costs of implementing and maintaining environmental management systems to ISO 14001, health and safety management systems to OHSAS 18001, and running the sustainability network, including personnel costs and the cost of developing sustainability tools, education and training.

This does not include costs related to improvement projects. For example, the decision to invest in a new manufacturing process is the result of integrating many decisions in addition to environmental considerations.