Energy efficiency and climate change
Lowering emissions and raising performance

(includes GRI indicators EC2, EN5, EN6, EN7, EN18)

ABB has been in the energy business for 120 years. Our technologies are used along the entire energy value chain, from the extraction of resources and their transformation into electricity, liquified natural gas or refined petroleum products, to their efficient use in industry, transportation and buildings. We help our customers to use electrical power effectively and to increase industrial productivity in a sustainable way.

The link between energy efficiency and mitigating climate change is clear. According to the 2010 World Energy Outlook, published by the International Energy Agency, more than 70 percent of projected CO_2 emission reductions by 2020 can be delivered by energy efficiency. A combination of energy efficiency measures and renewable power generation could deliver almost 70 percent of the required emissions reduction over the next two decades.

ABB has identified mitigation of climate change and energy efficiency as key drivers for all parts of our business and we are positioning our business to take advantage of these opportunities and to mitigate any related risks. Our large portfolio of products and services help our customers in the utility and industry sectors save energy and reduce greenhouse gas emissions.

For example, our advanced industrial information technology for the control and optimization of integrated systems, electrical power grids, buildings and industrial processes saves energy and reduces emissions. The interconnection of power systems with high-voltage direct current technology makes large savings through a more even distribution of loads and a more efficient use of primary energy resources, thereby reducing CO_2 emissions. It also enables large-scale integration of renewable energy into the power grids.

While motor-driven applications consume two-thirds of electricity in industry and one-quarter of all the electricity used in the world, drives control less than 10 percent of the motors. ABB's high-efficiency motors and variable-speed drives for motors contribute to large emission reductions. The worldwide installed base of ABB drives saves electricity equivalent to the annual consumption of more than 54 million European Union households. Optimizing motor-drive systems worldwide could save power equivalent to the annual output of 250 nuclear reactors.

Reducing emissions through a novel, stable supply of power

Using ABB technology, Statoil's Gjøa platform has become the first floating platform in the North Sea to be supplied with power from shore. When electrical power was connected in July 2010, the platform started to use the world's longest alternating current cable from land to a floating installation.

The nearly 100-kilometer long cable makes it possible to supply the platform off the coast of Sogn and Fjordane County with renewable energy from the Norwegian electricity grid, and means the platform will cut its carbon dioxide emissions by 210,000 tons per year at full production. A traditional solution with power generated by gas turbines on board would have generated emissions equivalent to 100,000 cars every year.

The technology used for power supply to platforms from land has been developed in close partnership between Statoil and ABB. In addition to the power cable, ABB also supplied the high-voltage equipment for the platform, developing compact electrical solutions for transformers and engine drives in order to save space on board.

Working with partners to build capacity

In practice, however, it can be challenging to capture the benefits of new and existing technologies. Governments, businesses and individuals all play a role, but there's no easy way to coordinate their actions. Barriers to investing in energy efficiency can include lack of knowledge, unwillingness to change behaviors and practices, and a reluctance to absorb the upfront cost of retrofitting equipment or installing new technology before older technology has reached the end of its productive life cycle.

ABB in China works with a range of partners to overcome these barriers through energy efficiency training. ABB entered into a strategic partnership with Guangdong Province as early as 2006, and has so far delivered energy efficiency training in six Guangdong cities to more than 1,000 enterprises. At the end of 2009, ABB signed a three-year strategic framework agreement with the Ministry of Industry and Information Technology addressing energy efficiency. The two parties work closely together to organize energy efficiency seminars, technology training and consultancies to help enterprises achieve systematic energy conservation and emissions reductions.

In 2010, ABB partnered with the Beijing Energy Conservation and Environmental Protection Center and the global conservation organization WWF to launch a high-level training program on energy efficiency management. The course, "Low Carbon Management Skills and Technology Applications for Enterprises," is offered to enterprises nationwide and is recognized

as part of the Continuing Professional Education program by the Ministry of Human Resources and Social Security.

ABB executives also take part in global initiatives on energy efficiency and climate change. For example, we are a co-chair of the World Business Council for Sustainable Development's electricity utilities working group, and participate in the energy and climate focus area.

Energy efficiency begins at home

At ABB, we aim to steadily increase the efficiency of our own operations, including through the use of our own products. We have set ourselves the target of reducing the energy we use as a company by 2.5 percent per employee per year for 2010 and 2011. To implement the objective, our 23 most energy-intensive production sites are required to conduct energy audits and all sites are required to develop an energy saving program.

As approximately 50 percent of energy is consumed in our buildings, we have set a supporting objective to improve energy efficiency in buildings by 2.5 percent. During 2010, energy savings in buildings programs were developed in our top 20 countries, representing more than 80 percent of ABB real estate. Underpinning this effort, our Green Building Policy was formalized as a mandatory Group Directive and a cross-functional work program, involving Real Estate, Operational Excellence and Sustainability Affairs, was established to develop a common, practical approach to energy efficiency in production processes and in buildings.

As our 2010 results show, there are still improvements to be made. Electricity consumption remained steady, but primary energy consumption increased, driven in part by the need for diesel-fueled back-up power generation in India. With no significant change in global employee numbers, our energy consumption per employee therefore increased slightly from 2009.

We have made good progress in developing key performance indicators to monitor the environmental impact of transport of goods. Pilot projects are under way in Italy, Saudi Arabia and the U.S. to help us understand how these indicators can be applied practically for both domestic and international transport. Draft guidelines have been developed and are due to be tested in 2011. Carbon dioxide emissions from cross-border transportation have been collected and are being reviewed.

For business air travel, we have established the means for data collection and the methodology for emissions calculation, based on the U.K. Department for Environment, Food and Rural Affairs and Department of Energy and Climate Change methodology. Our first data collection, covering 2010, is presented in the greenhouse gas emissions table below.

Concrete action to reduce our emissions

ABB in Italy is pursuing energy efficiency in buildings both at design stage and during refurbishments. The new building hosting ABB's business in Genoa was designed with both passive and active energy saving in mind. Walls and surfaces are insulated to minimize heat dispersion, while a range of technologies recover heat, manage lighting, harvest solar energy, and control ventilation to ensure energy conservation. Similar strategies applied to ABB's existing Santa Palomba site near Rome will avoid 147 tons of CO_2 emissions per year, with a payback time of approximately one and a half years.

The Real Estate organization in ABB Germany was given an award by the Deutsche Energie-Agentur – the German Energy Agency – for its sustainable implementation of ecological real estate management. The main office in Mannheim, the Wabenbau, is one of the projects where ABB has achieved energy savings of 44 percent and a CO_2 emission reduction of 550 tons by restructuring the building. Other ABB sites in Hamburg, Heidelberg, Ladenburg, Lüdenscheid, Mannheim and Ratingen have also been recognized for their achievement of energy savings of 24 percent, CO_2 reduction of 1,956 tons and a cost reduction of almost $800,000 annually.

Energy and climate performance: Other GRI indicators

EN3 Direct energy use by ABB (Gigawatt-hours – GWh)

Primary fuel	2010	2009	2008
Oil (11.63 MWh/ton)	114	87	104
Coal (7.56 MWh/ton)	0	0	0
Gas	427	415	416
Total direct energy	**542**	**502**	**520**

EN4 Indirect energy use: Consumption and losses at utilities (Gigawatt-hours – GWh)

Energy source	2010	2009	2008
District heat consumption	223	259*	250*
District heat: Losses at utilities	33	39	37
Electricity consumption	1,335**	1,321*	1,323*
Electricity: Losses at utilities	1,844	1,824	1,627
Total indirect energy	**3,436**	**3,442**	**3,237**

* The figure is based on reported data from 85 percent of employees and an assumed energy use of 3 megawatt-hours (MWh) per employee for district heat and 12 MWh per employee for electricity for the remaining 15 percent of employees.

** The figure is based on reported data from 87 percent of employees and an assumed energy use of 12 MWh per employee for electricity for the remaining 13 percent of employees.

Megawatt-hours (MWh) **per employee**

2010	**18.0**
2009	17.9
2008	17.5

Direct and indirect* energy use by type for 2010

* Not including losses at utilities.

Direct energy use increased by about eight percent during 2010, driven in part by the need for supplementary on-site power generation in India. Electricity consumption remained steady. For 2010, we did not assume additional district heating consumption for the 13 percent of employees not covered by the reported data, as most are located in regions not using district heating, contributing to an apparent decline in district heat consumption.

The pattern of energy consumption was relatively unchanged during 2010, but energy consumption per employee increased slightly. We expect to see further improvements in energy efficiency as production volumes rebound and energy savings programs gain traction.

EN16, EN17 Greenhouse gas emissions (kilotons CO_2 equivalents)

EN29 Significant environmental impacts of transportation (kilotons CO_2 equivalents)

	2010	2009	2008
Scope 1			
CO_2 from use of energy	117	107	112
SF_6	247	263	406
CO_2 from transport by own fleet	350*	350*	350*
Scope 2			
District heat consumption	49	57	55
District heat: Losses at utilities	8	9	8
Electricity consumption	293	290	287
Electricity: Losses at utilities	405	400	397
Scope 3			
Air travel**	645	N/A	N/A

* Estimated figures.

** Note that this data is not included in the scope of the DNV assurance process.

Emissions of SF_6 continued to decline as we pursued emission reduction programs at different sites. However, challenges remain to ensure appropriate handling procedures at both ABB and customer sites.

We are working to improve our data collection around transport emissions, from our own fleet, from transport of our goods by external suppliers and from business air travel. In 2010, we made the first calculation of greenhouse gas emissions from business air travel and we are now reviewing the first data on international transport of goods.

Environmental responsibility
Improving our performance, helping customers reduce their impact

(includes GRI indicator EN26)

Environmental impact occurs in all phases of a product's life cycle – from manufacture and transportation to customer use and final recycling and disposal. ABB has been working for many years to manage our impacts, both within our own plants and offices, and those caused by our products.

To ensure continual improvement, 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.

ABB's 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.

Product development

ABB has Group-wide mandatory sustainability checks in place, which are applied in the development of new products and projects. This GATE model requires consideration of an environmental and health and safety checklist that provides 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. One of our sustainability objectives is to reinforce the full application of these checklists in product development.

To determine how well and how widely the checklist is used, we conducted a survey in 2010 among product and project managers of current practices. We are using this feedback to improve presentation and communication of the checklist, and to further embed sustainability aspects in product development.

ABB is developing Environmental Product Declarations to communicate the environmental performance of our core products over their complete life cycle. Declarations are based on Life Cycle Assessment studies, created according to the international standard ISO/TR 14025. More than 70 declarations for major product lines are published on our Web site (www.abb.com).

Hazardous substances

ABB is committed to phasing 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. Based on feedback from those using the lists, we have commenced a program to enhance the usability and application of the lists.

During 2010, we further investigated the use of hazardous materials and the status of phase-out programs in countries and business units. Alongside local, plant-specific programs, some business units (BU) have established global BU focus programs. For example, the Transformers BU in the Power Products division has established a Volatile Organic Compounds (VOC) reduction program.

VOC can react with other pollutants and sunlight to form ground-level ozone and are also one of the causes of summer smog. Conventional paints emit VOC and the main sources in ABB operations are the paint shops for transformers and motor manufacturing. The Power Products division accounts for more than 70 percent of the Group's VOC emissions.

VOC reductions can be achieved by changing to water-borne, high solid, powder paints or by installing special equipment such as carbon filters. Building on 10 years' experience with reduced VOC paints on some of our power transformers, and in cooperation with qualified global suppliers, ABB Corporate Research Center has now developed reduced VOC painting systems based on the ISO standard 12944-2.

ABB transformers are designed to last many years in various environments. Their location can range from a clean, heated, indoor installation to open deck installations offshore. By using ISO 12944-2 it will be possible to standardize the available paint systems across all manufacturing sites globally and to ensure performance in different installation environments. Sub-suppliers of painted parts will also be required to use comparable low VOC systems.

ABB is now introducing these systems as a standard for all our transformers. By switching our transformer manufacturing plants to lower VOC painting systems, ABB will reduce solvent emissions and also lower the energy consumption and costs involved in the application and drying of paints.

Waste and recycling

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.

At Ludvika in Sweden, ABB's Full Service team has developed a site-wide concept for handling waste products. Careful sorting of different types of waste, better management of waste contracts and addressing waste transportation have brought significant improvements and lower costs.

The process has not been without its challenges, however. Changing behaviors and attitudes was critical to success, and was achieved step by step, through committed leadership, appropriate training and the creation of a better work environment.

The improved handling generates an economic gain of more than $1 million per year and environmental benefits in the form of a 25 percent increase in recycling of materials, a 75 percent reduction of waste transportation, and a 33 percent reduction of incineration waste.

In May 2010, the ABB New Berlin Campus Green Team in the United States started collecting and recycling clear plastic wrap, clear plastic bags and clear bubble wrap, in addition to the plastic drive covers already being recycled. More than 3,000 kilograms of plastic wrap, bags, bubble wrap and drive covers were recycled, and over $500 collected. The funds were donated to the Schlitz Audubon Nature Center to continue the legacy of environmental education and stewardship.

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, as part of the "green transformer" program, ABB offers transformer remanufacturing and engineering services to reduce waste, recycle components and extend useful life. ABB can certify aged transformer components, typically the transformer tank and core, for re-use and replace the rest of the components with modern technology. The remanufactured transformer has the same life expectancy as a new transformer. ABB also offers a process that cleanses and extends the life of transformer oil instead of replacing it. This eliminates the need for new oil and the need for disposal of old oil.

Water

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]

At a country level, 10 sites are located in extremely water-scarce countries, nine sites in water-scarce countries and 33 in water-stressed countries. When considering watersheds, 41 sites are located in extremely water-scarce watersheds, 46 in water-scarce watersheds and 64 in water-stressed watersheds.

We are now mapping reported water withdrawals for the sites classified above and will use this information to help us determine appropriate activities at site and Group level.

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, we have developed a Water Leak Management solution that allows users to better monitor and manage losses throughout the distribution network. The solution uses flow and pressure data to identify new losses. In Thailand, ABB supported Bangkok Metropolitan Waterwork Authority (MWA) in managing the health of its wide and complex water distribution network. MWA is now able to monitor the network's performance and to determine non-revenue water levels, to detect bursts more efficiently, to differentiate between background leakage and bursts, and to develop appropriate repair strategies.

[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) is below 1700 m^3 per person and year, water scarce if below 1000 and extremely water scarce if below 500.

Environmental performance: Other GRI indicators

EN1 Use of hazardous substances (tons)

	2010	2009	2008
Phthalates – softener for PVC	31	16	25
PBB and PBDE – flame retardants in plastics	0	3.1	2.3
Lead in submarine cables	3,632	3,600	6,596*
Organic lead in polymers	52	24	36
Lead in other products, e.g. backup batteries and counter-weights in robots	265	313	354
Cadmium in industrial batteries delivered to customers	1.7	2.2	2.0
Cadmium in rechargeable batteries	5.9	4.7	6.4
Cadmium in lead alloy	2.7	2.5	5.3
Cadmium in other uses	0.18	0.05	n.a.
Mercury in products delivered to customers	0.038	0.011	0.015
SF_6 insulation gas (inflow to ABB)	968	962	987
SF_6 insulation gas (outflow from ABB)	959	951	969

* Increase due to higher business volume

Water

EN8 Water consumption

EN9 Water sources affected by withdrawal of water

EN10 Water recycled and reused

EN21 Total water discharge by quality and destination

EN25 Water bodies/habitats affected by water discharges and runoffs

Water withdrawals (kilotons)

	2010	2009	2008
Purchased from water companies	3,300*	3,300*	3,100
Groundwater extracted by ABB**	2,700	2,900	2,700
Surface water extracted by ABB**	2,900	2,700	2,800
Total water withdrawal	**8,900**	**8,900**	**8,600**
Water saved through recycling and reuse (kilotons)	3,000	800	900

* The figure is based on reported data from 87 percent of employees and an assumed water consumption of 10 tons/year/employee for the remaining 13 percent of employees.
** Estimated (rounded) figures

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.

Approximately two-thirds of ABB's manufacturing sites use water for process purposes. Thirty percent of the sites using process water use closed-loop processes, mainly for cooling systems, surface treatment processes and the production of electrical insulation paper. Excluding cooling water returned to the source of extraction, the use of closed-loop processes and reuse of waste water in other ways saved approximately 3,000 kilotons of water in 2010. 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 84 percent of plants discharge process water to the public sewers. About 13 percent discharge decontaminated process water via their own treatment plants. The remainder use water from local water sources, mainly for cooling water systems and test plants, which is then returned to these local water sources without any contamination. Two sites with their own treatment plants consider that their discharge of water affects the recipient, as the receiving bodies are near-permanently dry riverbeds.

Biodiversity and conservation

EN11 Land used in protected or high biodiversity value areas

EN12 Significant impacts on biodiversity in protected or high biodiversity value areas

EN13–15 Biodiversity and protected habitats

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 in Taiwan focuses on wetland conservation, partnering with the Guandu Nature Park and Chouchai Wetland Park. Both parks are significant habitats and breeding grounds for a wide variety of bird species and ABB supports the rehabilitation and maintenance of these valuable sites.

At Grave Mountain in Georgia, U.S., ABB has made significant progress in rehabilitating a kyanite mine opened in the 1960s. The mining process created tailing ponds that could not support vegetation/ecological habitats, and also created acid mine runoff. Four tailings ponds covering 40 hectares of land have been rehabilitated.

Four series of wetlands were constructed to treat the acid mine runoff using a cutting edge approach. Through the addition of limestone and mushroom compost, water quality has been improved and natural plant life encouraged to return. The acid runoff from the mine now flows into the wetland where it is passively treated. The water discharged at the outfall is of good quality and does not disturb the downstream ecology. Today the mine is a showcase for responsible and sustainable mine reclamation.

Air emissions

EN19 Emissions of Volatile Organic Compounds (tons)

	2010	2009	2008
Volatile Organic Compounds (VOC)	786	782	909
Chlorinated Volatile Organic Compounds (VOC-Cl)	11	5	6

The major constituents of VOCs and VOC-Cls are xylene, thinner and perchloroethylene. Increases in 2010 were due to increased business volume involving certain processes. We expect to see reductions in VOC as the ABB low VOC paint program is implemented in the Transformers business unit.

EN20 Emissions of NO_x and SO_x (tons SO_2 and NO_2)

	2010	2009	2008
SO_x from burning coal	0	0	0
SO_x from burning oil	84	64	76
NO_x from burning coal	0	0	0
NO_x from burning oil	63	48	57
NO_x from burning gas	92	90	90

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

Waste and recycling

EN2 Percentage of materials used that are recycled input materials
EN22 Waste
EN24 Handling of hazardous waste
EN27 Percentage of products reclaimable after use

Waste generated (kilotons)

	2010	2009	2008
Scrap metal sent for recycling	135*	71	92
Other waste sent for recycling	44	46	47
General waste sent for disposal	38**	29**	35
Hazardous waste	9	6	7
Total waste	**227***	**153**	**182**

* 51 kilotons are scrap metals from several locations in South Africa that have now been consolidated to one site.

** 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.

In 2010, 79 percent of total waste was sent for recycling. In-house recycling, mainly of thermoplastics and packaging material, reduced the amount of waste by approximately 3.5 kilotons. Additionally, the lead used as counterweights for robots and the cadmium used in industrial batteries are recycled materials.

In 2010, ABB sent approximately nine kilotons of hazardous waste for disposal, up some 50 percent from 2009 mostly due to 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.

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.

Environmental incidents and penalties

EN23 Numbers of significant spills
EN28 Significant fines for non-compliance

Number of incidents

	2010	2009	2008
Oil spills	4	3	6
Chemical spills	0	0	1
Emissions to air	0	1	2
Others	3	0	3

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.

During 2010, a $50,000 penalty was imposed for a spill from a coating process that occurred at a U.S. facility in 2009. The coating process has now been discontinued at that site.

EN30 Environmental protection expenditure and investments

For 2010, ABB's expenditure on environmental management throughout its global sustainability affairs network was as follows:

Expenditure on environmental management	$ millions
Group level	10,250
Country level	5,100
Site level	3,850
Total	**19,200**

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.