Resource efficiency

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Innovation
Investing in the future

ABB is first and foremost a technology company, and every year we devote more than $1 billion to research and development activities. We maintain seven corporate research centers, employ 8,000 scientists and support 70 university collaborations around the world.

Sustainability remains a top priority for most of our customers, and for ABB as a company, so it commands a significant share of our R&D budget.

Innovation is at the heart of ABB's success and crucial to our long-term competitiveness. Through continuous development of our product and solution portfolio, ABB helps customers improve their operating performance, grid reliability and productivity while saving energy and resources, and lowering environmental impact.

ABB's approach to innovation consists of three pillars: Corporate research and development (R&D), alliances with academic and research institutes, and our corporate venture capital unit, ABB Technology Ventures (ATV).

At the heart of it are our people, in R&D and beyond, together with our partners: customers, suppliers and leading technology institutions around the world. Our R&D centers around the globe are close to both our customers and our technology partners. In recent years, we have strengthened our research presence in growing markets like India and China, as well as in the United States.

The power grid revolution

The growing global population is driving an even greater increase in the demand for electricity. Added to this, governments around the world are focusing on reducing CO_2 emissions by increasing the use of renewable energy sources in the power chain.

Whereas traditional power plants were typically located close to centers of consumption, emerging renewable generation often requires transmission from remote areas. Existing grids are under pressure to meet growing demand for power, as well as provide a stable and sustainable supply of electricity, often over long distances.

High-voltage direct current (HVDC), pioneered by ABB's predecessor company ASEA in the 1950s, is the technology of choice for bulk power transmission over long distances with minimal losses. HVDC lines also require less space and can transmit electricity underwater or underground.

Deployment of HVDC has led to an increasing number of point-to-point connections in different parts of the world. The logical next step is to connect the lines and optimize the network. However, a major stumbling block has been the absence of an HVDC circuit breaker that acts quickly enough to interrupt current and isolate faults and at the same time keep losses to a minimum.

ABB has now developed a solution to this century-old challenge – the world's first circuit breaker for HVDC. It combines very fast mechanics with power electronics, and will be capable of interrupting power flows equivalent to the output of a large power station within 5 milliseconds; that is, 30 times faster than the blink of a human eye.

Considered a game-changing technology, ABB's new breaker will enable the development of HVDC transmission grids. These grids will enable interconnection and load balancing between HVDC power superhighways, integrating renewables and transporting bulk power across long distances with minimal losses. We are now in discussions with power utilities to identify pilot projects for the new development.

In recognition of this groundbreaking development, ABB has been selected as one of the world's 50 disruptive companies by the MIT Technology Review, a publication of the prestigious Massachusetts Institute of Technology in the United States.

Conclusions of a two-year joint research project with General Motors show that the batteries in electric vehicles on the road today could find a new life down the road as energy storage systems in the power grid. The project demonstrated that a device combining five battery packs from plug-in hybrid Chevy Volts is capable of providing enough electricity to power three to five American homes for up to two hours and could serve the grid for at least 10 years.

Collaboration to grow our knowledge

ABB has long recognized the value of teaming up with other pioneers. Investments in research initiatives, fellowships and strategic partnerships have enhanced the ABB portfolio and led to international and cross-industrial cooperation in almost every ABB business.

In addition to our support for 70 university collaborations across the globe, we have recently announced the ABB Research Grant Program, intended to support promising graduate students and senior researchers working on projects with industrial applications in the power and automation area.

We selected 40 research projects for funding from over 500 proposals submitted by more than 250 universities in 46 countries. Grants typically range from $50,000 to $80,000 per year. Funding is initially for one year, but the program is designed to fund projects over multiple years.

Through this university collaboration program, we reinforce our commitment to an open innovation approach. By partnering researchers from the ABB Corporate Research Centers with the best graduate students and professors from around the world, ABB plans to support a truly collaborative innovation ecosystem.

Within ABB, we launched a program in 2012 to support more ambitious and larger internal collaborative research projects called “big bet projects.” These “big bets” are expected to deliver breakthrough technologies that have a significant impact on ABB’s business – for example, by delivering a significant cost reduction or performance improvement, or even a new functionality or product. ABB has selected nine such research projects to pursue in 2013, including the further development of bulk power transmission, active management of local energy flows from renewable energy sources, and potential life-cycle cost reduction in transformers.

Investing in technology leadership

The third pillar of ABB’s technology approach is the corporate venture capital unit, ABB Technology Ventures (ATV). ATV investments are used to build technology leadership strategically and drive growth. We make early- and growth-stage investments in novel companies introducing new technologies or improvements to existing technologies. This both complements and adds to the activities of our existing R&D programs.

In 2012, we made a key investment in TaKaDu, a provider of advanced monitoring solutions for water distribution networks. This investment gives ABB access to a field-proven monitoring system that complements our automation portfolio for the water sector. This includes a range of power and automation products and integrated solutions that allow customers to produce, transport, distribute, treat and use water efficiently, reducing energy consumption, minimizing losses and improving reliability.

Girish Nadkarni, managing director at ABB Technology Ventures, has recently been selected for the Global Corporate Venturing Powerlist 100, an inaugural selection made by the monthly magazine “Global Corporate Venturing” that recognizes the most influential corporate venturing units around the world.

This sort of acknowledgement, along with the recognition by MIT and other innovation awards, confirm our commitment to innovation and the future success of ABB and our customers.

GRI indicators

PR1 Health and safety impacts of our products

ABB products generally help improve users’ health and safety. They do this, for example, by improving industrial environments (automation control products), reducing exposure to aggressive, repetitive or hazardous operations (robotics), and reducing potential explosions, fire risks and oil pollution (oil-free capacitors and cables). Products with a potentially negative impact are those that could contribute to global warming (leak of SF_6 gas from substations), require deforestation and present a visual impact (transmission lines), cause losses of energy (most electrical products), or cause electrocution if misused.

PR2 Number of non-compliance incidents relating to product health and safety

All countries in ABB’s sustainability management program are asked to give details of any non-compliance incidents, including those concerning health and safety impacts of products and services. One potential violation was reported for 2012, concerning certification of an ABB supplier's product. This case is still under investigation.

PR3 Product and service information

ABB’s goal is to produce Environmental Product Declarations (EPDs) for our core products. They describe and quantify the environmental impact and performance of ABB products through every phase of their life cycles, covering raw material extraction, component manufacture, transportation and use over their full operating lifetime. They can also contain recovery, recycling and disposal instructions for when the product has completed its useful life. The EPDs are published on ABB’s website and help customers to select products that will improve their own environmental performance. ABB also engages with customers with particular reporting needs, to ensure clarity and completeness of environmental data.

PR6 Adherence to marketing communication regulations PR7 Non-compliance concerning marketing communications

This is not an issue for ABB, which works in the field of advanced technologies and does not supply to the consumer product market.

Environmental responsibility
Pursuing efficiency through the life cycle

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

As a business, ABB focuses on developing world-class products, systems and services to lower our customers' energy use, reduce their emissions and improve resource efficiency on a long-term basis. We take a life cycle approach to assess the impacts throughout the phases of a product's life.

Environmental impact can occur in all phases of a product's life cycle, from raw material supply to manufacture, transportation, customer use and final recycling and disposal. ABB has been working for many years to manage our impacts, both those caused by our products and projects and within our own facilities.

To ensure continual improvement in our own operations, we require all manufacturing and service facilities to implement environmental management systems according to the ISO 14001 standard. Our newly-acquired Baldor sites pursued a robust ISO 14001 implementation program during 2012, and is due to complete it in 2013.

For non-manufacturing sites, we have implemented an adapted environmental management system to ensure management of environmental aspects and continual improvement of performance. Of the more than 390 ABB facilities and offices in 64 countries covered by our environmental management program, approximately 95 percent currently comply with the ISO 14001 standard.

ABB life cycle assessment experts have worked with our sales teams to develop customized tools and environmental reporting approaches tailored to specific customer needs. One tool uses Environmental Product Declarations and other data sources to track specified environmental impacts for a specified project, while another tool helps customers to visualize both the environmental and financial costs and benefits of different ABB solutions.

Life cycle assessment (LCA) is required as part of a product's research and development phase and is also used in the concept development phase for next generation products. ABB designers follow sustainability guidelines in each phase of the product and technology development process. These include standardized LCA procedure and a handbook to guide consideration of environmental, and health and safety aspects during design, such as 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.

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

Water

Even though ABB's manufacturing process does not consume significant amounts of water, we have undertaken a program to better understand the patterns and impacts of ABB's water withdrawal, use and discharge. To start the program, we developed an in-house tool for mapping and analysis of water flows at our facilities. The tool, based on the World Business Council for Sustainable Development Global Water Tool, was piloted at a number of facilities in early 2012 and then rolled out to 42 manufacturing facilities in water-scarce and extremely water-scarce watersheds.[1]

In this extended pilot phase, we targeted manufacturing plants to gain a broader view of both industrial and domestic water use patterns. The facilities were required to gather a team to systematically review water flows, analyze water-related opportunities and threats to their operations and develop a water action plan to minimize risks and to leverage opportunities.

Action plans were received from 34 facilities. A number of small sites that do not use process water were exempted from developing formal action plans, but did work through the process and submitted completed water maps for their facilities.

[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.

Action plans identified both technical solutions, such as waste water treatment plants to enable water reuse and behavioral aspects to improve water efficiency. The most frequently described actions were awareness-raising and training programs, the installation of flow meters to detect leakages and measure usage, the installation of aerators for taps, and the introduction of waterless urinals. How the plans progress will be monitored at Group level through 2013.

When looking at ABB's global operations, more than three quarters of our water withdrawals are used for cooling processes and returned to source at similar or higher quality (44 percent) or are used for domestic purposes such as sanitation, cooking or garden maintenance (32 percent). None of our water extractions caused significant changes to water sources in 2012.

Of those ABB sites that use water for process purposes, approximately 30 percent use closed-loop systems, mainly for cooling, 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 3,700 kilotons of water in 2012. Without these recycling and reuse processes, ABB's water withdrawals would have been almost 40 percent higher.

Our facilities are increasingly installing waste water treatment plants to allow the reuse of domestic and process water in other applications. Most notably in Australia, India and South Africa, rain water tanks have been installed to replace water supplied by utilities for sanitary and gardening uses, and in Italy, a new air conditioning system capable of reusing process cooling water has been introduced.

Not including cooling water, about 52 percent of water was discharged to public sewers, with almost 30 percent of that volume first processed at our own treatment plants. Another 38 percent was discharged to surface or ground water, with 45 percent of that volume pre-treated, and the remainder was handled by hazardous waste water treatment companies.

Thanks to a wide portfolio of products and solutions, we provide our customers with enhanced performance, efficiency and reliability in water management. During 2012, different elements of ABB's water portfolio received industry awards for water efficiency and for innovation in "smart water networks."

At the 2012 H_2O awards, celebrating achievements of the Middle East and North Africa water industry, ABB's AquaMaster3™ flow meter device won the "Most Water Efficient product category." The award recognized the device's effectiveness in addressing water leaks, boosting water efficiency and lowering utilities' environmental impact. The technology heralds a new era in water leakage management and was designed in response to the industry's demands for enhanced metering capability – enabling a more efficient and cost-effective operation and compliance with increasing legislative requirements.

ABB was also recognized through a global leadership award by Frost & Sullivan for our innovation in the sector of "smart water networks/grids." ABB's commitment to the water sector with technology solutions was commended in the areas of automation and control, metering and utility hardware, design and engineering, and information communication technologies.

Waste and recycling

The main waste streams at ABB organizations are metal, wood, paper, oil and plastic. With the ongoing integration of the newly acquired operations of Baldor and Thomas & Betts, the characteristics of our waste streams and the opportunities for waste minimization and recycling are changing. We are working to understand these differences and learn from established good practices, but we continue to aim to reduce the amount of waste sent to landfill and to increase our use of materials that are recycled or made available for reuse.

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.

In 2012, 82 percent of total waste was sent for recycling. In-house recycling, mainly of thermoplastics and packaging material, reduced the amount of waste by approximately 23 kilotons, a significant increase from 3.2 kilotons in 2011. The lead used as counterweights for robots and the cadmium used in industrial batteries are also recycled materials.

ABB generated approximately 12 kilotons of hazardous waste in 2012, but around 34 percent of that amount was sent for recycling rather than disposal, including batteries, electronics and used oil. The waste sent for disposal 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.

Many different plant level waste reduction and recycling programs were undertaken during 2012, depending on the characteristics of the production process and the local waste infrastructure. Facilities in India reduced scrap metal quantities through specialized material yield projects, while in South Africa the focus was on reducing copper wire offcuts. Many plants investigated how to recycle used oil instead of sending it for incineration, including developing methods to separate the used oil from water-based mixtures. In another plant, scrap wooden pallets were ground and sent to a paper mill for reuse and as fuel.

Hazardous substances

ABB continues 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 international regulations.

Our recent acquisitions, Baldor Electric Company and Thomas & Betts, use different processes and products at their facilities, so we are looking at the substances they use and, where necessary, we will update their monitoring and reporting processes related to hazardous substances. As ABB's suppliers are also required to apply the list of prohibited and restricted substances to their own processes and supply chain, we will also work towards including these areas in the integration process.

Possibly the most extensive ABB program to reduce hazardous substances is the ongoing Volatile Organic Compounds (VOC) reduction program in the Transformers Business Unit of our Power Products division, involving 62 factories in 27 countries. The challenge is to reduce VOCs by replacing the solvent-based paint used on transformer tanks with water-based and high-solid paints.

The roll-out is a complex process that must be planned around commercial aspects such as frame contract conditions and coordination of customers with differing requirements, as well as robust quality assurance and training programs. Plants in Finland, Poland, Saudi Arabia, Sweden, Turkey, the United States and elsewhere have already converted to low VOC systems and work is ongoing in other countries.

Conventional paints emit VOC and the main sources in ABB operations are the paint shops for transformers and motor manufacturing. Previously, the transformers business has been the most significant source of VOC emissions for ABB. However, the acquisition of the Baldor Electric Company, specializing in motor manufacturing, has resulted in a significant increase in our Group VOC emissions.

Plant-specific hazardous substance phase-out programs are showing results, with some materials such as organic lead in polymers almost completely eliminated. During 2012, the use of lead solder was eliminated in some U.S. facilities and some Indian facilities switched to non-chlorinated solvents.

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 and conservation efforts.

For example, in China the anti-desertification efforts of ABB, Inner Mongolia Electric Power, and Ordos Electric Power Bureau are succeeding in preventing soil erosion and in protecting power transmission lines.

Desertification and soil erosion are major issues in China. Every year sandstorms engulf the region even as far away as Beijing, which not only threatens the environment and the livelihoods of people, but also the infrastructure that feeds the region with electric power, the loss of which has huge economic implications.

ABB has worked with our partners to plant a corridor of fast-growing plants that thrive in desert environments in Inner Mongolia to bind the sand and prevent it from forming dunes that damage the pylons and overhead power lines.

Prior to the creation of the corridors, maintenance teams from the Inner Mongolia Power Company had to constantly clear the ever-drifting sand to prevent power interruptions and maintain the compulsory 11-meter safety distance between the lines and earth. Now that the dunes are more stable, a further agreement to expand the initiative has been signed by the three parties.

Additionally, ABB supports local forest preservation and tree planting schemes in China, Italy and the U.S. ABB employees in the Philippines and Qatar help to preserve local beach and marine environments, while ABB in Malaysia, Peru and Taiwan partner with local parks to support the rehabilitation and maintenance of wetlands.

Environmental performance: Other GRI indicators

EN1 Use of hazardous substances (tons)

	2012[a]	2011[b]	2010
Phthalates – softener for PVC	28	47	31
PBB and PBDE – flame retardants in plastics	~0	~0	~0
Lead in submarine cables	5,633	5,725	3,632
Organic lead in polymers	0.9	1.3	52
Lead in other products, e. g. backup batteries and counter-weights in robots	363	227	265
Cadmium in industrial batteries delivered to customers	5.6	1.6	1.7
Cadmium in rechargeable batteries	6.3	10	5.9
Cadmium in lead alloy and other uses	4.5	4.3	2.9
Mercury in products delivered to customers	0.011	0.030	0.038
SF_6 insulation gas (inflow to ABB)	1,139	1,052	968
SF_6 insulation gas (outflow from ABB)	1,118	1,040	959

[a] Baldor facilities included; Thomas & Betts facilities not included
[b] Baldor facilities not included

Water

EN8 Water consumption
EN10 Water recycled and reused

Water withdrawals (kilotons)

	2012[a]	2011[b]	2010
Purchased from water companies	3,900[c]	3,400[c]	3,300[c]
Groundwater extracted by ABB[d]	3,000	3,200	2,700
Surface water extracted by ABB[d]	2,800	2,600	2,900
Total water withdrawal	**9,700**	**9,200**	**8,900**
Water saved through recycling and reuse	3,700	3,900	3,000

[a] Baldor facilities included; Thomas & Betts facilities not included
[b] Baldor facilities not included
[c] The 2010 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). In 2012 the data covered 88 percent of employees (not including Thomas & Betts) and an assumed water of consumption of 19.6 tons/year/employee for the remaining 12 percent of employees.
[d] Estimated (rounded) figures

Air emissions

EN19 Emissions of Volatile Organic Compounds (tons)

	2012[a]	2011[b]	2010
Volatile Organic Compounds (VOC)	1,355	810	786
Chlorinated Volatile Organic Compounds (VOC-Cl)	12	13	11

[a] Baldor facilities included; Thomas & Betts facilities not included
[b] Baldor facilities not included

The major constituents of VOCs and VOC-Cls are xylene, thinner and perchloroethylene. The significant increase in 2012 was due to the inclusion of Baldor facilities.

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

	2012[a]	2011[b]	2010
SO_X from burning coal	0	0	0
SO_X from burning oil	69	68	84
NO_X from burning coal	0	0	0
NO_X from burning oil	52	51	63
NO_X from burning gas	120	90	92

[a] Baldor facilities included; Thomas & Betts facilities not included
[b] Baldor facilities not included

These figures are for fossil fuels consumed in ABB premises for heating and process purposes. The significant increase in NO_x from burning gas in 2012 is due to the inclusion of Baldor facilities, which use higher quantities of gas than the existing ABB facilities.

Waste and recycling

EN22 Waste generated (kilotons)

	2012[a]	2011 +Baldor[a]	2011[b]	2010
Scrap metal sent for recycling	150	161	97	135[c]
Other waste sent for recycling	41	42	39	44
General waste sent for disposal	43[d]	47[d]	45[d]	38[d]
Hazardous waste	12[d]	11	9	9
Total waste	**246[d]**	**262[d]**	**190[d]**	**227[c]**

[a] Baldor facilities included; Thomas & Betts facilities not included
[b] Baldor facilities not included
[c] 51 kilotons are scrap metals from several locations in South Africa that have now been consolidated to one site.
[d] The 2010 figure is based on reported data from 87 percent of employees (85 percent in 2011) and an assumed waste output of 0.33 tons/year/employee for the remaining 13 percent of employees (15 percent in 2011). In 2012 the data covered 88 percent of employees (not including Thomas & Betts) and an assumed general waste output of 0.21 tons/year/employee and hazardous waste output of 0.05 tons/year/employee for the remaining 12 percent of employees.

Environmental incidents and penalties

EN23 Numbers of significant spills

EN28 Significant fines for non-compliance

Number of incidents

	2012[a]	2011[b]	2010
Oil spills	6	5	4
Chemical spills	0	0	0
Emissions to air	5	4	0
Others	0	0	3

[a] Baldor facilities included; Thomas & Betts facilities not included
[b] Baldor facilities not included

The emissions to air involved the accidental release of SF_6 gas in four incidents and one release of HCFC-22 from an air conditioning system. The oil spills were contained and adequate decontamination procedures were implemented to prevent any permanent contamination of soil and water. Root causes of the incidents were analyzed and corrective actions, such as improved control systems, upgraded secondary containment and additional training, have been taken to reduce the risk of future spills or emissions. Combined costs of remediation and corrective actions were approximately $150,000.

During 2012, one of our U.S. facilities was fined less than $1,000 for the late submission of an annual air report in 2011.

EN30 Environmental protection expenditure and investments

For 2012, ABB's expenditure on environmental management throughout our global sustainability affairs network was as follows:

Expenditure on environmental management	$ thousands
Group level	10,750
Country level	5,300
Site level	4,300
Total	**20,350**

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.

Energy efficiency, renewable energy and climate change
Improvements for the long-term

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

ABB's Growth Strategy 2011–2015 identifies mitigation of climate change, renewable energy and energy efficiency as key drivers and growth opportunities for our business. Already, about 55 percent of our revenues are related to products and services in our energy efficiency portfolio that help customers save energy and reduce greenhouse gas emissions.

ABB can help industrial and utility customers improve energy efficiency by providing specialists to audit energy use and identify areas for improvement, and with equipment, systems and solutions to use energy more efficiently.

We have a wide range of products and services based on pioneering innovative technologies to reduce energy consumption and improve productivity. Our technologies are used along the entire energy value chain from the extraction of resources, the liquefication of natural gas or refinement of petroleum products, to their transformation into electricity and their efficient use in industry, transportation and buildings.

The link between energy efficiency, renewable energy and mitigating climate change is clear. The International Energy Agency (IEA), in its 2012 World Energy Outlook, says that economically viable energy efficiency measures could halve energy demand growth by 2035. Energy efficiency could delay the "lock-in" of CO_2 emissions foreseen under the 2°C scenario from 2017 to 2022. Renewable energy is likely to become the world's second largest source of power generation by 2015, second only to coal. However, without policy support, up to two thirds of the economically viable potential to improve energy efficiency will remain unrealized through 2035.

Despite the strong financial and environmental case for energy efficiency, many barriers remain blocking implementation of such measures. To overcome some of these barriers, ABB has designed a new approach to improving energy efficiency in industry. Using this approach, ABB has identified energy savings of five to 20 percent across a wide range of industries and utilities.

ABB in the United Kingdom has demonstrated its commitment to reducing greenhouse gas emissions by gaining the Certified Emissions Measurement and Reduction Scheme (CEMARS) certification. CEMARS is a carbon verification scheme that recognizes organizations for credible carbon measurement, management and reduction. The certification requires companies to audit their carbon footprint and demonstrate year on year reduction of emissions, while taking steps to mitigate emissions in the future.

ABB partners with the customer, assuming the performance risk for the solutions implemented and bundling multiple small projects into one major project to simplify execution. Providing the expertise and tools to execute efficiently, financing where needed, and measurement technologies to demonstrate performance improvement, ABB works to overcome customers' risk aversion and to provide confidence in the delivery of real energy savings.

This approach is bringing real rewards for customers and the environment. For example, ABB worked with ArcelorMittal to identify annual energy savings of $13.5 million at a steel mill in France. The measures identified cover 53 individual energy savings opportunities, including both electrical and gas savings, along with some zero capital investment opportunities.

ABB in the United Kingdom has taken a similar approach to persuade customers to adopt energy-saving measures for motor-driven applications. Their Energy Efficiency Plan consists of a targeted energy appraisal that identifies energy and CO_2 savings potential for no more than five selected applications, simplifying the process for the customer. The approach was recently recognized by the Engineering Employers' Federation of the United Kingdom with the Future Manufacturing Green Growth Award.

In addition to our robust energy efficiency portfolio, ABB continues to make research and development investments as well as exploring early stage technologies and business processes through venture capital activity. Past activities have ranged from e-mobility to solutions for energy efficiency in data centers and smart grid communications.

After pioneering high-voltage direct current (DC) technology, ABB is now applying DC to medium- and low-voltage applications in electric vehicle charging, power distribution systems in ships, in buildings and in data centers. These investments are bringing rewards for the environment and for our business.

For example, ABB has supplied 165 web-connected DC chargers to Estonia to form the backbone of the world's first nationwide fast-charging network for electric vehicles. Each charger can recharge an electric vehicle in just 15 to 30 minutes, a fraction of the eight hours standard chargers typically require.

ABB partnered with HP and Green, one of the top information and communications technology service providers in Switzerland to open the world's most powerful data center using DC technology. ABB installed the one megawatt DC power distribution solution for the 1,100 m^2 expansion of Green's Zurich-West data center. The facility recently earned the Watt D'Or award, a prestigious energy efficiency award from the Swiss government,

for the scale of energy savings achieved through the pioneering use of DC technology.

Solar technology in action

To demonstrate ABB's solar capabilities, as well as reduce our own environmental impacts, more and more ABB facilities are installing on-site photovoltaic (PV) power plants. Currently, PV plants are installed or are being constructed at 18 ABB sites in 14 countries across Europe, Asia and Latin America. Globally, the installations contribute less than one percent of our annual electrical energy needs, but can contribute up to 50 percent of the installation's electricity needs, such as in Hungary and Mexico.

Focus on "green" real estate

ABB also carefully considers potential environmental impacts when investing in our global real estate portfolio. The ABB Green Building Policy guides site selection, building design and choice of materials in order to maximize water and energy efficiency, minimize resource use and provide a comfortable and safe indoor environment for employees and visitors. The policy guides new development, refurbishment and selection and management of rented space.

Several recent and ongoing projects demonstrate the benefits of this approach:

- At Lodz in Poland, design of a new transformer factory is improving energy efficiency by incorporating upgraded insulation, skylights, renewable energy generation, a building management system to optimize ventilation, heating and cooling, energy efficient lighting design, as well as ABB electrical equipment with lower losses. Projections show that, compared with a standard building complying only with local requirements, the new building will save approximately 1,000 tons of CO_2 emissions per year.

- A planned new HVDC center in Ludvika, Sweden will be certified to Leadership in Energy and Environmental Design (LEED) Gold status. Similar to Lodz, design has focused on good insulation, use of ABB systems for energy efficient building management, renewable energy, and water management.

- ABB's new headquarters in Budapest, Hungary is one of the most environmentally efficient commercial development projects on the Hungarian office market and the first one to be pre-certified to LEED Platinum level. Intelligent building control systems, including ABB's KNX-iBus technology, solar panels on the roof, gray water recycling and innovative heating and cooling solutions all help to minimize impacts.

Overall performance

As part of our goal to steadily increase the efficiency of our own operations, we have set ourselves the target of reducing energy use by 2.5 percent per year. This includes both direct and indirect energy use, for manufacturing processes and to operate buildings. For 2012, we have included Baldor operations in this target, using the baseline established in 2011.

We achieved our energy efficiency objective for 2012, reducing energy consumption per employee by more than three percent from 2011. Gas consumption was significantly reduced and electricity consumption decreased slightly in 2012, despite organic growth in production and employee numbers. District heat consumption, although a small contributor to our overall energy consumption, increased by 12 percent.

ABB facilities implemented a range of activities to achieve these results. Among the most common measures: switching to energy efficient lighting solutions, investigating and enhancing the insulation of buildings, implementing or updating heat recuperation from machines and processes, and optimizing heating, ventilation and cooling systems, often using ABB's own technology. We expect to see further improvements in energy efficiency as energy savings programs gain traction.

Emissions of SF_6 increased by more than 25 percent year on year. The majority of this increase was due to a 60 percent increase in volume from a particular type of production process. During 2012, that business undertook considerable work to adapt the design of the product and the production process, with the goal to eliminate up to three quarters of the SF_6 consumed. We await approval of the new design by the relevant certification body. We continue to pursue emission reduction programs at different sites, with actions ranging from improved handling and inventory procedures to leak detection and improvements in storage methods. However, challenges remain to ensure appropriate handling procedures at both ABB and customer sites.

During 2012, we continued to work with our logistics suppliers to improve the quality and availability of emissions data from cross-border transportation and air and sea transportation of goods. A Transportation Council of regional and Group logistics managers helps to guide and coordinate Group transport and logistics strategy and programs.

Logistics optimization programs have also been initiated at Business Unit (BU) level. One good example is the cooperation between our BU Transformer factories in Lodz, Poland and Ludvika in Sweden. The challenge was to find a more efficient way to load trailers to reduce the number of trips from Lodz

to Ludvika and to identify an efficient use for the return trips to ensure that the trailer did not return empty. Now, the loading has been optimized, the number of departures reduced from five to two per week and, with cooperation of a third factory at Figeholm in Sweden, the trailers return with production materials for Lodz. Costs have been reduced by €400,000 annually and associated CO_2 emissions reduced by 70 percent.

In addition to existing programs to optimize modes and routes of transport, we started a project in 2012 to investigate packaging design. Improved packaging has the potential to reduce environmental impacts both through more efficient resource use for the packaging itself and through reduced transport emissions from lighter packaging and more efficient loading. The program is still in its pilot stages, with several ABB facilities currently screening the tools and methodology.

Greenhouse gas emissions from business air travel decreased by seven percent during 2012. Whilst there is slow progress in implementing action plans to reduce the environmental impacts of air travel, we are observing incremental changes. For example, many sites have improved or installed videoconferencing facilities to enable fuller participation in virtual meetings.

Energy and climate performance: Other GRI indicators

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

	2012[a]	2011 +Baldor[a]	2011[b]	2010
Oil (11.63 MWh/ton)	93	94	92	114
Coal (7.56 MWh/ton)	0	0	0	0
Gas	556	589	417	427
Total direct energy	**649**	**683**	**509**	**542**

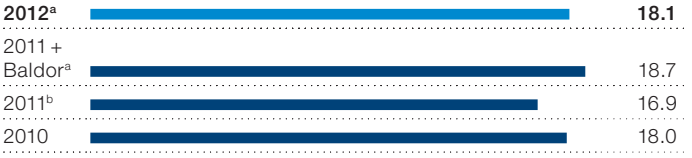
[a] Baldor facilities included; Thomas & Betts not included
[b] Baldor facilities not included

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

	2012[a]	2011 +Baldor[a]	2011[b]	2010
District heat consumption	219[c]	195	195	223
District heat: Losses at utilities	33	29	29	33
Electricity consumption[d]	1,599	1,621	1,447	1,335
Electricity: Losses at utilities	2,208	2,239	1,999	1,844
Total indirect energy	**4,058**	**4,084**	**3,670**	**3,436**

[a] Baldor facilities included; Thomas & Betts not included
[b] Baldor facilities not included
[c] The figure is based on reported data from 88 percent of employees (not including Thomas & Betts) and an assumed energy use of 1.3 megawatt-hours (MWh) per employee for district heat for the remaining 12 percent of employees.
[d] The 2010 figure is based on reported data from 87 percent of employees (85 percent in 2011) and an assumed energy use of 12 MWh per employee for electricity for the remaining 13 percent of employees (15 percent in 2011). In 2012 the data covered 88 percent of employees (not including Thomas & Betts) and an assumed energy use 7.7 MWh/year/employee for electricity for the remaining 12 percent of employees.

Megawatt-hours (MWh) per employee



[a] Baldor facilities included; Thomas & Betts not included
[b] Baldor facilities not included

Direct and indirect[c] energy use by type for 2012[a] (2011[b])

[a] Baldor facilities included; Thomas & Betts not included
[b] Baldor facilities not included
[c] Not including losses at utilities

EN16, EN17 Greenhouse gas emissions (kilotons CO_2 equivalents)
EN29 Significant environmental impacts of transportation (kilotons CO_2 equivalents)

	2012[a]	2011 +Baldor[a]	2011[b]	2010
Scope 1				
CO_2 from use of energy	137	144	109	117
SF_6	332	263	263	247
CO_2 from transport by own fleet[c]	350	350	350	350
Scope 2				
District heat consumption	48	43	43	49
District heat: Losses at utilities	7	7	7	8
Electricity consumption	337	348	309	293
Electricity: Losses at utilities	465	480	427	405
Scope 3				
Air travel	171	n/a	185	160

[a] Baldor facilities included; Thomas & Betts not included
[b] Baldor facilities not included
[c] Estimated figures, not included in the scope of DNV assurance