

Ecological Responsibility

Future-oriented, efficient and safe

We exercise the greatest possible care towards humankind and the environment. The efficient deployment of resources and energy is at the heart of our environmental protection activities in day-to-day production. We also take very seriously any risks emanating from our products and production processes and evaluate them early in order to develop measures to control them or find alternatives. In the area of climate protection, we have set ourselves particularly ambitious targets and have already partly achieved them.

Through the global “Responsible Care” initiative, the chemical industry acknowledged, earlier than other industries, manufacturers’ responsibility for their products. Bayer’s product-integrated environmental protection policy focuses on all the phases of a product’s life cycle, from the use of the raw material, through production and transport, to handling, use and disposal – in other words, “from cradle to grave.”

Chemical safety at Bayer is organized systematically and efficiently, and receives the necessary financial resources. On the other hand, we do not employ any patent solution because each substance has to be viewed differently according to the specific requirements in its particular field of application. From the legislative point of view, too, the authorities impose different demands from those of customers. The furnishing of customers with safety data sheets plays a key role in Bayer’s open and trustful ongoing relationship with customers. Here, Bayer goes well beyond the legal stipulations: We publish safety data sheets not only for products that are classified as hazardous, but

for all our products, following the principle of “no safety data sheet, no product.”

Another example of the way we responsibly handle potential risks are the safety appraisals we perform in the context of environmental compatibility. At Bayer CropScience, they are an integral part of product development. For example, an examination is made of the effects of crop protection products on representative non-target organisms in the water, soil and air. Laboratory conditions do not necessarily yield definitive information on the variety of possible effects, which is why a comprehensive evaluation of product safety also covers field trials examining the effects of crop protection products. In addition, our global product stewardship measures ensure that our products are used responsibly.

In 2000, to optimize the products that Bayer takes to market, we developed the so-called “Bayer Eco-Check.” This system helps us assess the environmental impact of a product at all stages of its life cycle, and thus enables us to point development in

the right direction early on in the life of a new product. Changes to the company's product portfolio and the experience gained with the Eco-Check over the past few years have indicated that there is a need to make some modifications to it. For this reason, the procedure for product assessment is currently undergoing comprehensive revision.

REACH: Our position regarding a new chemicals policy

With our commitment to product stewardship, we also support the goal of the E.U. Chemicals Policy to improve the safety of everyone involved along the product chain and to further enhance consumer safety and environmental protection. We have therefore been constructively involved in the re-shaping of the E.U. Chemicals Policy by submitting our own proposals. Environmental protection, consumer protection and competitiveness must be harmonized. Numerous discussions with stakeholders confirm that our view is correct. Emphasis must also be placed on the practicability of REACH, so that, with the predicted conclusion of the parliamentary consultations, attention is directed at its implementation: We are calling for support for implementation that is comprehensible for all parties. We are also active within the company itself and have initiated a process to prepare for REACH.

The same applies to the Globally Harmonized System of Classification and Labeling of Chemicals (GHS) formulated at the sustainability summit in Johannesburg in 2002 for the period up to 2008. At that time, the benefits were said to be an easing of cross-border trade that would also ensure a high, globally uniform level of safety in the handling of chemicals. Differing interests on the part of the countries involved are, however, threatening to destroy these benefits, which means that the original objective will not be achieved. Bayer wants to create better draft legislation through industry's involvement.

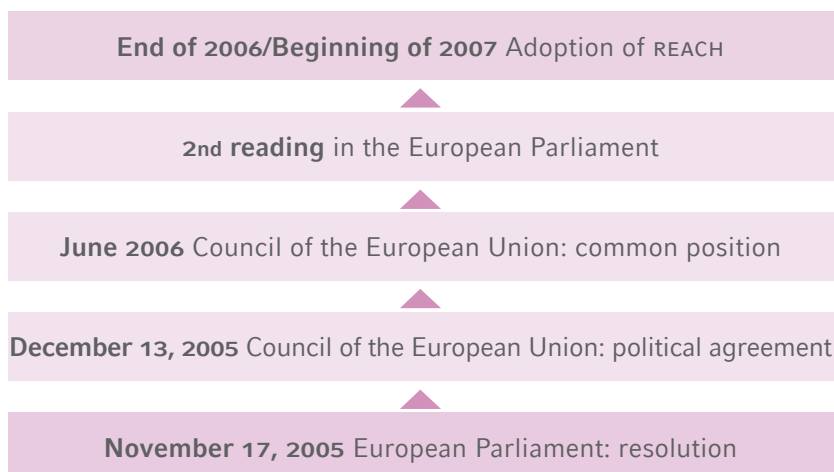
Genetic engineering:

Potential for essential products

Genetic engineering offers enormous potential for vital products and applications in health care, nutrition and environmental protection. Bayer uses this efficient technology in the development of new products and processes in three areas: "white" biotechnology (chemical products, wastewater treatment), "green" biotechnology (useful plants and renewable raw materials) and "red" biotechnology (drug development and production).

We see considerable growth potential for active substances resulting from red, medical and pharmaceutical biotechnology. We are also on course for growth as far as the dynamically developing green biotechnology is concerned, which is opening up completely new opportunities as regards the effective and specific production of renewable raw materials. White biotechnology, on the other hand, offers us alternatives to traditional chemistry. It enables processes to be used for the manufacture of products that are difficult or even impossible to obtain with traditional chemistry – for example, complex molecules such as proteins.

REACH¹ timeline



¹ Registration, Evaluation and Authorization of Chemicals

So that we can use the opportunities it offers and limit or responsibly manage the risks it entails, we attach major importance to the responsible use of genetic engineering. There is a statement in Bayer's Program for Legal Compliance and Corporate Responsibility on the subject of genetic engineering that states: "Our work in genetic engineering is governed by ethical values, and, in particular, by respect for human life and dignity." We therefore reject the idea of using genetic engineering to interfere with the human embryo.

Thanks to new developments, today's crop protection products have also attained a very high level of efficacy. Some time ago, because these products represent absolutely no risk either to man or the environment – provided they are properly used – we initiated, as part of our consulting services, training for local farmers, especially in threshold and developing countries. In the 2004/2005 reporting period, Bayer CropScience extended this service and launched seminars for small farmers in the People's Republic of China, India and Bangladesh. Through such training Bayer CropScience complies – as it does in its day-to-day work – with the "International Code of Conduct on the Distribution and Use of Pesticides" issued by the Food and Agriculture Organization of the United Nations (FAO) in 2002.

Animal experiments: Protecting man and the environment

To ensure the safe development of new active substances and products, experiments on animals (predominantly rats and mice) will continue to be unavoidable in the future. This is a highly emotional topic that affects all three Bayer subgroups. In connection with plans for European legislation (REACH, E.U. Plant Protection Directive), Bayer is therefore intensively involved, together with other representatives of the chemical industry, in the debate on the effect these regulations will have on the number of animal experiments. A broad industry coalition in favor of the "3 R" concept (Refinement, Reduction and Replacement) has already declared its willingness to cooperate with the European Commission. This concept aims to improve

the existing methods as regards careful treatment of the animals and a reduction in the overall number of animals per experiment.

The development of alternative methods is also being pursued. Validation of these tests is nevertheless proving to be a major challenge. For one thing, the results are not comparable in all areas – for example, with regard to the long-term effects and the determination of dose/effect relationships. For this reason, we regard animal experiments as necessary for the future protection of man and the environment. It will be impossible to find a full replacement within the foreseeable future.

We are already proving that the "3 R" concept is a very promising approach, as we have reduced the number of experiments in all departments to an absolute minimum. The number of animal experiments during the period covered by this Report has fallen again – from 112,000 animals in 2003 to 95,000 in 2005. This means we have been able to reduce the number of animals used in experiments by 78 percent since 1990. More than 90 percent of the animal experiments carried out by Bayer are required by law. Among other things, they assure the high standard of drug safety and basically ensure that we can all trust today's drugs. There are other animal experiments that are not legally required but are important because they involve basic research. They try to find answers to questions such as: How do certain processes actually take place in the organism? What factors play a decisive role in this? In such cases, animal experiments help to provide the basic knowledge that is needed to develop new forms of therapy.



Future-oriented climate protection

In the environmental protection activities in its production plants Bayer focuses strongly on climate protection, one of the world's biggest challenges. This is because the chemical industry as an energy consumer makes a not inconsiderable contribution to the emission of gases that are partly responsible for global warming. According to the Kyoto Protocol, these gases comprise not only carbon dioxide (CO₂), but also methane (CH₄), nitrous oxide (N₂O) and halogenated and partially halogenated hydrocarbons. When calculating emissions, their percentages are converted into CO₂ equivalents.

In the 2004/2005 period covered by the Report, the absolute greenhouse gas emissions at Bayer dropped to 5.6 million metric tons of CO₂ equivalents in 2004 and 3.9 million metric tons of CO₂ equivalents in 2005. In total, greenhouse gas emissions throughout the Bayer Group decreased by over 70 percent from 1990 to 2005 – from 15 million metric tons to 3.9 million metric tons of CO₂ equivalents.

The key factors contributing to the reduction in environmental impact of over 5.5 million metric tons of CO₂ equivalent were our wide-ranging investments and technological innovations.

The most important single measures were:

- Incineration of N₂O generated during the production of adipic acid (now part of Lanxess operations) – since 1993, this has eliminated approx. 4 million metric tons of CO₂ equivalents a year;
- Conversion of chloralkali electrolysis from the amalgam to the membrane process (reduction of approx. 0.4 million metric tons of CO₂ equivalents a year);
- In 2003, Bayer trod new ground with an innovative electrolysis process for producing chlorine from hydrochloric acid. The oxygen depolarized cathode technology consumes up to 30 percent less electrical power than the conventional diaphragm process.

Organizational changes such as the sale of Erdölchemie (3.0 million metric tons of CO₂ equivalents) and the carve-out of Lanxess (approx. 1.4 million metric tons of CO₂ equivalents) reduced the Bayer balance sheet by an additional 4.4 million metric tons of CO₂ equivalents, which are now booked to the new companies.

In addition, there has also been a reorganization of energy supply in Dormagen. Two older Bayer coal-fired power plants were closed and the necessary energy is now provided by a modern combined cycle and co-generation plant, with RWE serving as the contractor. This resulted in an additional reduction for Bayer of 1.2 million metric tons.

As a result, one of the goals of the Bayer Group, namely to halve climate-related emissions between 1990 and 2010, has already been achieved.

In December 2005, at the Climate Summit in Montreal, Bayer was presented with the “Low Carbon Leaders Award” by The Climate Group, an international climate protection organization founded in 2004, in recognition of its achievements in this sector. It met with a certain amount of criticism among the general public because the reduction in emissions is attributable not only to energy-efficient measures and the use of new technologies, but also to organizational changes. In this context, however, it is also relevant to look at energy consumption: In the Bayer Group, worldwide energy consumption has been reduced by around ten percent since the beginning of the 1990s. Evidence of the careful handling of resources and of increasing energy efficiency is provided above all by the fact that the reduction in energy consumption in relation to product volume declined by over 40 percent between 1990 and 2004.

Emissions trading:**Higher costs due to higher electricity prices**

Bayer is integrated into the emissions trading system of the European Union (E.U.) with a total of 12 production plants in Germany, the United Kingdom and Spain, and was allocated the corresponding number of emissions allowances. They were sufficient in the first year to ensure day-to-day operation.

In the second trading period, which will extend from 2008 to 2012, the intention is to reduce the overall allocation to industry. From our point of view, this will have a negative effect on economic growth, because the reduction in the number of allowances available will push up their price, and consequently further increase the costs of our electricity and heat. Since we also purchase energy from external suppliers at our German sites, we will be directly affected by price increases.

In order to prevent such disadvantages, we advocate an industry-friendly solution, which, at the same time, supports the European Union's demanding climate protection targets. We are also keen to cut down the time-consuming bureaucracy connected with the current emissions trading system. Our interests are represented by the German Chemical Industry Association (VCI) and the European Chemical Industry Council (CEFIC). We are also a member of a Federal Ministry for the Environment working group looking at emissions trading to combat the greenhouse effect (AGE).

Our contribution to climate protection is, of course, not limited to the nations that have signed the Kyoto Protocol. We endeavor to consistently reduce emissions throughout the world, including in the United States. Through our voluntary participation in the four-year pilot phase on emissions trading of the Chicago Climate Exchange (CCX), we have committed ourselves to cut direct greenhouse gas emissions by one percent a year. At the end of the test phase, we will continue our commitment and also participate in the second phase of the CCX up to the year 2010.

Energy savings:**Bayer materials utilize the potential**

Our responsibility for the global climate goes beyond optimizing our production processes. The products themselves also make an important contribution to lowering energy consumption. Our polycarbonate, for example, is frequently used as a substitute for glass and metal in vehicle parts, reducing the overall vehicle weight and thus lowering fuel consumption. Our polyurethane also reduces energy consumption, whether in the form of an insulating material in refrigerators or as heat insulation in buildings. Its outstanding insulating properties help to cut energy consumption very significantly. The total volume of polyurethane produced every year by Bayer and used in refrigerators alone helps to save around 11 million metric tons of CO₂. As far as the insulation of buildings is concerned, a similar calculation shows an annual worldwide CO₂ saving of between 80 and 175 million metric tons. If we add together all the energy savings resulting from the use of the polyurethane and polycarbonate, we obtain a figure that exceeds the energy required to manufacture them several times over.

Efficient resource management

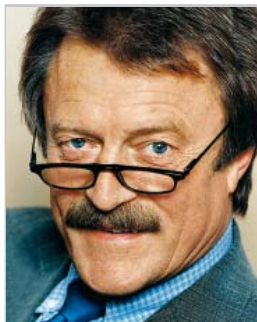
For Bayer, the efficient utilization of resources makes an important contribution to sustainable development. To reduce the consumption of energy and raw materials at its production plants – and thus cut emissions at the same time – Bayer utilizes every existing possibility for process optimization. That we are successful in this, and that resource productivity has risen consistently in the last few years as a result, is shown by the environmental statistics for solid waste, wastewater and energy (see page 69 et seq.).

Interest in renewable raw materials is growing, and we too apply them as starting products for our product range. Bayer MaterialScience uses sugar, glycerin, castor oil, soybean oil and other renewable materials in polyurethane and coating materials. At Bayer CropScience and Bayer HealthCare, the use of non-fossil raw materials is restricted to specialties and formulating aids. Their use will rise as their quality improves. At the same time, however, various technical and economic obstacles preventing the large-scale industrial application of non-fossil raw materials must be overcome. For technical reasons, it is not possible to change over to renewable raw materials for all products.

Water: High investment in wastewater treatment

Water plays an important role in our production processes. Because it is such a precious commodity in many regions of the world, Bayer takes various measures to ensure that it is used sparingly at all its facilities around the world. Between 1994 and 2004, our water consumption remained virtually constant at around 2.2 million cubic meters a day, despite the acquisition of Aventis CropScience. Without what are now Lanxess operations, it fell to 1.2 million cubic meters per day in 2005. 54 percent of the water comes from surface waters, 35 percent from the groundwater and about 3 percent from the public drinking water supply. The lion's share of the water, namely just under 67 percent, is used as cooling water. It is taken from the sur-

face waters and returned there, without having been polluted. We operate high-efficiency wastewater treatment plants to treat contaminated wastewater.



Cooperation with Bayer on the supply of drinking water

Klaus Liedtke, Editor-in-Chief of National Geographic Germany

While the global population is constantly growing, the supply of drinking water – our most precious resource – is becoming constantly scarcer. Conflicts are brewing. The UN has therefore declared this decade "The Water for Life Decade" and aims to halve the number of people with no access to clean drinking water. At the same time, it wants to make people more aware generally of the need to conserve our water supplies and use the resources on a sustainable basis.

In a unique cooperation project, the National Geographic Society and Bayer AG decided to back this initiative by supporting scientists who carry out research on this topic. Nearly 100 project applications were submitted, nine of which have been selected for sponsorship following intensive evaluation. I am delighted about this response to our Global Exploration Fund and very happy that it brings together two globally operating enterprises to help solve one of mankind's most urgent problems.

Bayer AG is, after all, affected not only as a technology-producing company, but also, in many different ways, as a user of the raw material water. In collaborative projects such as this, Bayer also displays a responsibility to society. This commitment and its confession of faith to sustainable management create a direct bridge to the goals of the National Geographic Society, the largest non-profitmaking scientific organization in the world, which sees itself as a guardian of the cultural heritage and the natural resources of our planet (see page 49).

A project launched in October 2005 by Bayer Industry Services (BIS) involves a considerable investment in wastewater treatment. By 2010, at a cost of €15 million, Bayer will modernize the clarification basins at its Waste Management Center in Leverkusen, which, apart from the effluent from the Chemical Park, also treats the wastewater from 300,000 residents in the catchment area. Through this modernization project, the inorganic nitrogen load will be cut by more than 40 percent.

The measures being taken at Bayer's U.S. sites are also exemplary. In 2004, the Baytown site in Texas (United States) received the Industrial Water Quality Achievement Award from the Water Environment Federation (WEF) because Baytown had, over a period of five years, complied fully with all the regulations despite consuming 40 million cubic meters of water a year, and had not, on one single occasion, exceeded the permitted wastewater thresholds.

A large number of companies throughout the world have successfully deployed Bayer Tower Biology® for the treatment of industrial effluent over the past two decades. The biological treatment process takes up significantly less space than conventional clarification basins, and is used above all where there is not enough room for a traditional wastewater treatment facility.

Energy: Process for using biogas from sewage sludge

At present, Bayer Industry Services is working on a new process to reduce sewage sludge. The project, which was launched in Leverkusen in 2005, aims to treat sewage sludge in such a way that biogas can be obtained from the organic con-

tent and used to generate energy. The residual inorganic content would then be deposited on a hazardous waste landfill. The European Commission is supporting the development of the process (which is based on three stages) as part of its "Life" environment program.

Solid waste: Progress in the incineration of hazardous waste

Since the end of the 1990s, we have been able to almost halve the total volume of waste. Compared with 2004, there was an increase in the volume of waste in continued operations in 2005, the majority of which was attributable to decommissioning and modernization activities (see page 75).

The positive overall development is the result of constant optimization of the production processes. The less raw materials the processes consume, the less waste they create. All the Bayer sites are duty bound to make efficient use of this waste. Our Berkeley site in California (United States) received the Environment Responsibility Award 2005 from Bayer HealthCare for the consistent reduction of its waste volumes and its recycling quota of 77 percent.

We have made considerable progress in the incineration of hazardous waste. Since 2002, Bayer Industry Services has been using a process in its incinerators that separates off the mercury from the flue gas. This readily volatile heavy metal causes problems in the purification of flue gas. The process has since been patented and, under Bayer license, has been helping for around two years to reduce mercury emissions worldwide in a technically proven and efficient manner.

Safe production

Safe production plants, equipment and supplies are essential for successful manufacturing. Our specialists develop and build safe processes and production facilities throughout the world. And they also look after their operation, working in accordance with the very latest safety standards. There is probably no other segment that works within such a tight framework of legal regulations and controls. Our management systems, internal directives and tools for preventive and comprehensive product evaluation ensure that we comply with all the necessary aspects of safety, both during production and in transport.

Despite all the standards and innovations, however, we must not become complacent about safety, and must be prepared for every conceivable accident. For this, the individual subgroups have devised detailed emergency plans.

In addition to the emergency response plans at the individual production sites, Bayer CropScience has established a global emergency organization with a special control center in Norwich (United Kingdom). From there, the incoming emergency calls are passed to the departments on duty, which initiate and coordinate the emergency response measures. Incidents that have to be reported to the global control center include serious accidents, large fires, explosions, environmental hazards, and also other safety risks such as natural disasters, sabotage, extortion, attacks, riots and strikes. Every year, the center in Norwich takes between 10 and 15 emergency calls, most of which fortunately later prove to be less urgent than originally thought.

At Bayer, a Group-wide reporting procedure was introduced in 2000. In this "Bayer Emergency Response System," all information on dangerous incidents is collected. The aim of the system is to inform the relevant management levels quickly and comprehensively in crisis situations and following exceptional incidents.

Safety at the workplace:

Focus on avoiding accidents

In the field of occupational safety, our safety experts are on hand to prevent illnesses and accidents by implementing preventive and protective measures. Proof of the high level of safety at Bayer is provided by the excellent statistics for occupational injuries. Occupational injuries were reduced again during the period covered by the Report (see page 79). As far as incidents at our sites are concerned, we do everything we can to improve the work processes so that comparable incidents can be excluded in the future.

Health management:

Wide-ranging services

All Bayer sites offer their employees a comprehensive range of health care services, extending from basic care from company physicians, through acute medicine and investigative medicine, to psycho-social consulting, addiction consulting and addiction therapy. Our company health management system extends beyond health care at the place of work, also aiming to increase motivation and encourage and maintain the physical, mental and social well-being of the workforce.



Team spirit learnt through sports inspires environmental commitment

George Muchina Nguri Kenya

George Muchina Nguri is convinced that sports improve environmental protection, which is why he is involved in the Green Space Project of the Mazingira Club in north-eastern Kenya. By playing sports together, young people learn to overcome indifference and selfishness and to behave with a social conscience. "This is the most important precondition for recognizing that our environment is a valuable resource that we must all work together to protect. The team spirit that sports inspire in these young people from the poorest regions of Kenya helps them to believe in their dreams, and to fight for the preservation of an environment in which these dreams can actually become true."

Photo: George Muchina Nguri from Kenya in front of the hazardous waste incinerator in Dormagen