

# Global Responsibility

## Environmental Report 2003/2004



## About this report

This Environmental Report, the third to be produced by Bosch, is titled “Global Responsibility” in acknowledgement of the fact that we have expanded reporting to cover not just Europe, as in our previous reports, but also all of our other international sites. We are also publishing globally consolidated environmental data for the Bosch Group for the first time. The report also addresses the formal corporate values we adopted in 2002 and pays particularly close attention to the “Responsibility” value. We hope in this way to demonstrate the great importance of corporate citizenship at Bosch in addition to presenting our achievements in environmental protection.

We devote much of the report to explaining the environmental benefits of our products. The structure of the corresponding section reflects the organization of our business sectors. The site examples selected provide an insight into the latest developments across a whole range of production-related environmental protection issues in the three major business regions of Europe, Asia, and the Americas. The envi-

ronmental data and indicators are presented in a separate section in the appendix.

What do you expect of Bosch in the areas of environmental protection and corporate citizenship, and what does the company have to do to satisfy your requirements? We posed this question to five people from different external stakeholder groups in different countries. Their answers, which are documented in the report, indicate some of the challenges we face over the next few years. Dialogue with our customers, scientific and research bodies, environmental authorities, and trade associations is essential if we are to continue our progress, and we hope that this Environmental Report will stimulate further active communication with these groups and, in particular, with our associates in all of the Group’s regional subsidiaries around the world.

The interviews are reproduced in full along with further information about this Environmental Report at [www.bosch-environment.com](http://www.bosch-environment.com).



# Contents

4	Foreword	
<b>6</b>	<b>The company and its values</b>	
7	The Bosch Group	
8	The business sectors	
9	The Bosch values	
10	The “Responsibility” value	
11	Responsibility and environmental protection	
<b>12</b>	<b>The environmental management system</b>	
13	Challenges	
14	Global environmental policy	
15	Integrated management	
17	Supply chain management	
<b>18</b>	<b>Environmental protection and products</b>	
19	Environmentally-oriented development	
20	Products and their environmental benefits	
21	Automotive technology	
25	Consumer goods and building technology	
28	Industrial technology	
<b>30</b>	<b>Global environmentally-compatible manufacturing</b>	
31	Europe	
33	Asia, Africa, Australia	
35	The Americas	
<b>36</b>	<b>Corporate citizenship</b>	
37	Development projects supported by the Robert Bosch Foundation	
38	The company and society	
39	Social involvement	
<b>40</b>	<b>Global environmental data</b>	
41	Material and energy flows	
44	Environmental objectives of the Bosch Group	
46	Contacts details and addresses	

<b>Bosch Group worldwide key data*</b>	2003	2002	Units
Sales	36,357	34,977	€ m
Sales outside Germany	71	72	%
Associates	231,600	224,341	
Research and development spending	2,650	2,487	€ m
Investment (in property, plant and equipment)	2,028	2,006	€ m
Net income for the year	1,100	650	€ m
Unappropriated earnings (dividend of Robert Bosch GmbH)	60	60	€ m
Energy consumption	7,307,817	5,283,577	MWh
Water consumption	22,194,575	18,046,091	m <sup>3</sup>
Total waste generated	916,840	723,824	t
CO <sub>2</sub> emissions	623,615	308,341	t
* 2003 includes Buderus AG for the first time			

## Foreword

Dear Reader,

The last two years have seen Bosch introduce numerous product innovations to help reduce our impact on the environment. One of the highlights of 2003 was the result of our innovative achievements in pursuit of the eco-friendly diesel engine. We commenced series production of the third generation of our common rail system and took the decision to start manufacturing sintered metal particulate filters from 2005. The new diesel direct injection system reduces pollutant emissions by up to 20 percent as compared with the best existing diesel systems, while the new diesel particulate filter, which requires no maintenance throughout the lifetime of the vehicle, will further reduce overall particulate emissions.



■ Franz Fehrenbach (right), Chairman of the Board of Management of Robert Bosch GmbH and Wolfgang Drees, Member of the Board of Management of Robert Bosch GmbH with responsibility for environmental protection

Environmental awareness has a long tradition at Bosch. We published the first binding environmental protection regulation thirty years ago, which is around the same time as we formally adopted our policy that all future developments in automotive technology should help to make automobiles safer, more eco-friendly, and more economical. This policy originated from our 3-S program, an initiative that, as achievements such as our most recent innovations in diesel technology ably demonstrate, is more pertinent than ever three decades on. The same applies to our environmental principles, which we have recently revised and which are binding on all business sectors worldwide.

Like other companies, Bosch faces new and evolving challenges as a result of contemporary changes in markets and society. The BeQIK company-wide change process we initiated back in 1999 helps us to stay up to speed by keeping our operations flexible and adaptable. As part of

this process, we decided to lay down our corporate values in writing for the first time, so that they might provide us with a source of direction and orientation through the ongoing cultural change and sharpen our focus on results and on the future.

The 3-S program, our environmental principles, and the need to recognize the wider interests of society have all informed our code of values. We are confident that the “Responsibility” value in particular will engender new environmental protection initiatives. In this respect, our values amount to a covenant for the future: we intend to remain a reliable and responsible partner for customers and society all over the world by continuing to work closely with our associates to pursue ambitious objectives in our business sectors and enhance our profitability.

Franz Fehrenbach

Wolfgang Drees



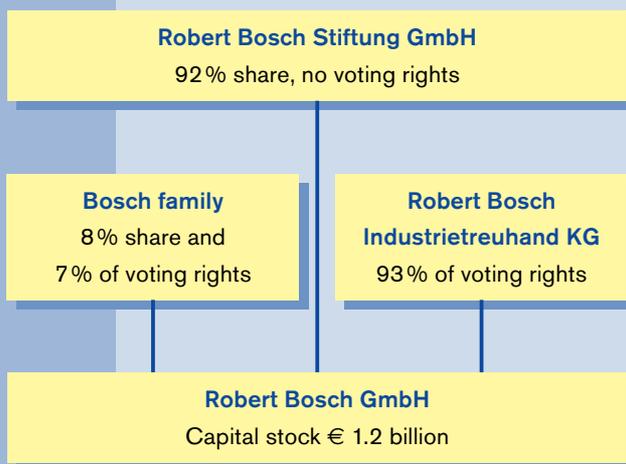
## The company and its values

Bosch is one of the largest industrial enterprises in Germany and the world's second largest automotive supplier. Our more than 200 manufacturing sites span the globe, with locations on every continent. We formally defined our corporate values in writing in 2002 as part of our BeQIK change process. The values are intended to help us keep our bearings and to guide us as we identify and face up to the challenges of the future. Our "Responsibility" value acknowledges both our duty to society and our obligation to protect the environment.

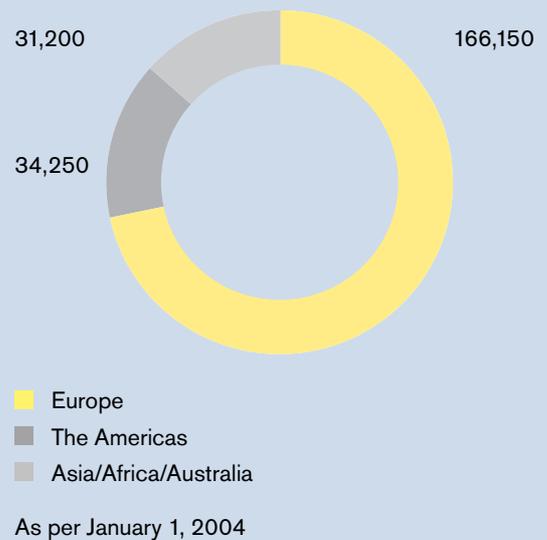


▣ Flashes of inspiration are nothing new at Bosch: products like the spark plug, which have been with us for over a century, never cease to inspire participants in the company's trainee programs.

### The constitution of the Bosch Group



### Associates by region in 2003 (total: 231,600)



## The Bosch Group

Sales of more than € 36 billion (2003) make Robert Bosch GmbH one of the largest industrial enterprises in Germany. The three business sectors Automotive Technology, Industrial Technology, and Consumer Goods and Building Technology together employ some 232,000 people. Based in Stuttgart, the Group has been active all over the world for many years. International business activities have expanded rapidly in recent years and 185 of the Group's 249 manufacturing sites are located outside Germany. With its subsidiaries and affiliates, Bosch has locations on every continent and in more than 50 countries. The share of sales generated outside Germany now stands at 71 percent.

### A broad product range

The Bosch name is closely associated with the automobile. We develop and manufacture a great diversity of products for the major automotive manufacturers, including diesel and gasoline fuel-injection systems, automotive electronics, and chassis systems. Bosch products also enjoy an excellent reputation in the power tools, household appliances, thermotechnology,

automation technology, and packaging technology sectors. Bosch successfully consolidated its market position as the world's second largest automotive technology supplier in 2003. The takeover of Buderus AG completed during 2003 means that Bosch is now also Europe's largest producer of heating technology products.

### The constitution of the company

The company traces its origins back to the "Workshop for Precision Mechanics and Electrical Engineering" opened by Robert Bosch in Stuttgart in 1886. In 1964, the founder's heirs transferred the majority of their shares to the Robert Bosch Foundation, an organization with purely charitable aims. Today the Robert Bosch Foundation holds around 92 percent of the capital stock of Robert Bosch GmbH – a sum amounting to € 1.2 billion. In accordance with its charter, the foundation uses the annual dividend to support projects that serve the common good. Responsibility for the executive management of the Bosch Group rests with Robert Bosch Industrietreuhand KG, which holds 93 percent of the voting rights.

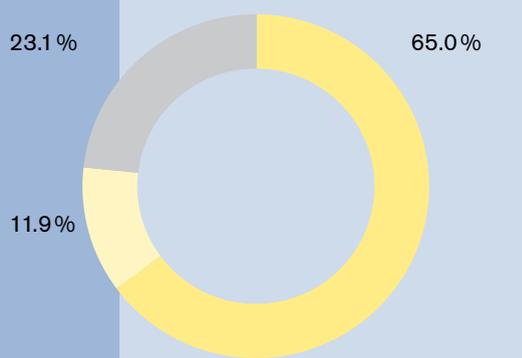


### BeQIK

The BeQIK initiative incorporates an entire series of projects designed to ensure the continuous improvement of all of our internal processes. BeQIK is all about doing everything at a higher speed in order to enhance quality, innovation, and customer focus. Our successful quality assurance program, including the EFQM Excellence Model and Six Sigma methodology, helps to keep our customers satisfied and our quality standards high.

Sales by business sector in 2003

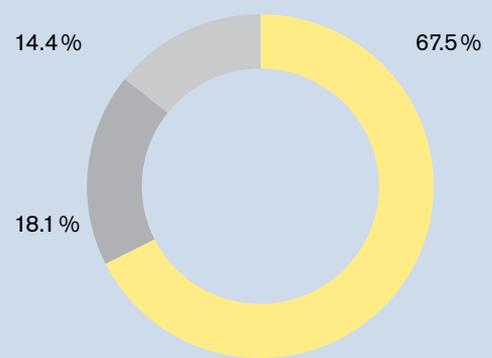
(total: € 36.4 billion)



<span style="color: yellow;">■</span> Automotive Technology	€ 23.6 billion
<span style="color: lightyellow;">■</span> Industrial Technology	€ 4.3 billion
<span style="color: lightgrey;">■</span> Consumer Goods and Building Technology	€ 8.5 billion

Sales by region in 2003

(total: € 36.4 billion)



<span style="color: yellow;">■</span> Europe	€ 24.6 billion
<span style="color: grey;">■</span> The Americas	€ 6.6 billion
<span style="color: lightgrey;">■</span> Asia/Africa/Australia	€ 5.2 billion

## The business sectors

The three business sectors that make up the Bosch Group comprise the following divisions:

### Automotive Technology

- Gasoline Systems
- Diesel Systems
- Chassis Systems
- Energy and Body Systems
- Car Multimedia
- Automotive Electronics
- ZF Steering Systems
- Automotive Aftermarket

### Industrial Technology

- Bosch Rexroth
- Packaging Technology
- Metals Technology

### Consumer Goods and Building Technology

- Power Tools
- Thermotechnology
- Household Appliances
- Security Systems
- Broadband Networks

Bosch achieved sales in excess of € 23 billion in the Automotive Technology Business Sector in 2003. Automotive Technology operates around the world, employing some 143,600 people. The four major business areas are fuel injection technology for internal combustion engines, active and passive vehicle safety systems, electrical machines, and mobile communication systems.

Bosch's Industrial Technology Business Sector employs around 32,900 people in the fields of drive and control engineering, packaging technology, and metals technology. The Group's wholly-owned subsidiary Bosch Rexroth AG is regarded as a technology leader in the manufacture of plant and equipment. Our metals technology business area specializes in casting and special steel products, while our packaging technology business area has developed into a broad-based technology provider.

The Consumer Goods and Building Technology Business Sector includes the power tools, thermotechnology, security systems, and broadband networks business areas, as well as the electrical household appliances such as washing machines and refrigerators produced by the BSH Bosch und Siemens Hausgeräte GmbH joint venture, which is one of the world's leading household appliance manufacturers. Consumer Goods and Building Technology employs a total of around 47,500 people.

### Distribution of sales

The Bosch Group has acknowledged that in the long term it would like to see its sources of revenue spread more evenly across the various business sectors. The share of total sales contributed by Industrial Technology rose to nearly twelve percent in 2003 as a result of the consolidation of Bosch Rexroth AG and Buderus AG, while that contributed by Automotive Technology fell to 65 percent. The Consumer Goods and Building Technology Business Sector yielded a share of around 23 percent in 2003.



A value focus and value management are necessary conditions for lasting success on the international stage. National and international legal systems place enormous emphasis on the prevention of malicious activities such as corruption, fraud, deception, and dishonesty. The political community expects companies to measure up to their economic, ecological, and social responsibilities around the world. This implies the need to put in place clear and binding internal values and codes of conduct and work to see these implemented in everyday business practice.



Prof. Dr. Josef Wieland, specialist in business ethics at the Konstanz University of Applied Sciences in Germany and Director of the Klem Institute for Intercultural Management, Values, and Communication.

## The Bosch values

Our founder attached great importance to values in his lifetime, and the company still shares his conviction. Robert Bosch expressed his views most succinctly in observations such as “It is better to forfeit money than trust” and “I credit my success more to my character than to my knowledge.” The values that guide our company today were committed to writing for the first time in 2002 as part of the change process associated with the BeQIK initiative.

### A sense of direction in a changing culture

The code of values we now have is intended to act as a beacon for all associates and managers in the turbulent period of cultural change in which we find ourselves. Shared values are an important tool for creating unity within an organization, especially one such as ours that brings together people from a wide range of different countries and cultural backgrounds. Our code of values provides a platform for effective cooperation based on trust, and helps to create a common identity uniting the Bosch companies and their associates. It also encourages individual initiative.

### Values and value enhancement

We decided to make “Future and Result Focus” the first value in our code in order to emphasize that whatever else we achieve, everything we do must at the very least help to enhance our economic success. This, in effect, links leadership by values to value based management and to our ultimate objective of boosting the value of the company. Management-level associates have a particular responsibility in this connection: they are expected not only to be seen as people who put our values into everyday practice, but also as people who keep a constant eye on the value of our company and opportunities to enhance it. Our new “Bosch Guidelines for Leadership” provide them with a framework within which to act and help them to fulfill the above tasks.

### The code of values

The seven Bosch values put into words the beliefs that guide us in our business operations. They describe our attitude to business partners, investors, associates, society, and the environment.

- 1 Future and Result Focus
- 2 Responsibility
- 3 Initiative and Determination
- 4 Openness and Trust
- 5 Fairness
- 6 Reliability, Credibility, and Legality
- 7 Cultural Diversity



▲ Robert Bosch's house, headquarters of Robert Bosch Stiftung GmbH, [www.bosch-stiftung.de](http://www.bosch-stiftung.de)

## The “Responsibility” value

### Responsibility

“We accept that our actions must accord with the interests of society. Above all else, we place our products and services in the interests of the safety of people, the economic use of resources, and environmental sustainability.”

(from the Bosch values)

We believe our standing as a corporate citizen entails a particular responsibility in two areas: we have a duty to the society in which we are rooted and we have a duty to the natural environment in which we live. This belief has a bearing first and foremost on our products and services, which, as Robert Bosch himself put it, “must be of use to the public at large.” It means, moreover, that like any decent organization we respect justice and the law and that we stand by our word. Our company, however, also takes a more active role in helping to address the problems of society through the Robert Bosch Foundation, which is funded from our dividend. We believe, furthermore, that there is more to responsibility than just what we owe to the outside world. Responsible local initiatives at numerous points throughout our company help us to seize market opportunities, stay ahead of changes in the market and, in the end, achieve greater economic success.

### A tradition of benevolence

Our long tradition of involvement in benevolent and charitable activities extends all the way back to the diverse initiatives of Robert Bosch (1861–1942). Organizations such as Bosch-Jugendhilfe, which provided support for young people, the society for the promotion of public education, and the Robert Bosch Hospital, for example, all came into being in the period between 1910 and 1940 as a result of our founder’s commitment to social issues. The Robert Bosch Foundation, which is one of the largest company-based benevolent organizations in Germany, ensures that this commitment remains strong today. Founded in 1964, it permanently anchors Robert Bosch’s sense of duty to society and concern for the wider community into the constitution of the Bosch Group. The foundation was created, according to its charter, to support and promote public healthcare, international understanding, social welfare, education and training, arts and culture and the study of the humanities, the social sciences, and science (see page 37 for more about current projects).

## PRINCIPLES OF WORK SAFETY AND ENVIRONMENTAL PROTECTION

1

### SUSTAINABILITY

We accept that our actions must accord with the economy, the ecology, and the responsibility we take for the community at large, also with a view to future generations. For this reason, respect for people's health and safety, for an economic use of resources, and for a natural and clean environment are basic principles of our business policy.

2

### RESPONSIBILITY

It is the task of all associates to help prevent the endangering of people and the environment, as well as to maintain strict compliance with all laws and regulations pertaining to work safety and the protection of people's health and the environment. It is a leadership task to recognize such dangers, to evaluate them, and to undertake appropriate actions.

3

### PRODUCTS

We develop and manufacture products that are safe, eco-friendly, and economical. Our products enhance people's safety and reduce burdens to the environment, also during their subsequent recycling and disposal.

4

### PROCESSES

We design processes to ensure that – wherever economically feasible – people's health and safety have priority and that effects on the environment are kept to a minimum. We are prepared to cope with emergencies. This is also the spirit in which we cooperate with suppliers of goods and services.

5

### CONTINUOUS IMPROVEMENT

We review our processes and our behavior on a regular basis, just as we measure their effects on people and on the environment. This is how we identify weak points and potential for improvement, and ensure the effectiveness of our program for work safety and protection of people's health and the environment.

## Responsibility and environmental protection

Responsibility for the environment is a core value at Bosch and is firmly anchored in our principles for safety and environmental protection. These principles extend to associates, services, and suppliers, and their aim is the continuous improvement of our environmental performance, allied to a concern for occupational safety. Bosch introduced its first binding guideline on environmental protection thirty years ago. The principles of environmental protection, which have since been updated a number of times, were formulated in 1996 and apply throughout the Bosch Group worldwide.

### The 3-S program

Three decades old and more pertinent than ever is the Bosch 3-S program, on the basis of which we have been working since the 1970's to make automobiles safer, more eco-friendly, and more economical. The program has inspired many of our pioneering achievements, including antilock braking systems (ABS), the electronic stability program (ESP), and direct fuel in-

jection systems for gasoline and diesel engines. The latest version of the ESP is a highly sophisticated and extremely effective safety product: studies carried out by our customers indicate that making ESP standard equipment in road vehicles could cut the number of serious traffic accidents by up to 50 percent. Spurred on by existing and nascent environmental concerns, our development engineers are also continuing their efforts to make road vehicles more eco-friendly and more economical by cutting fleet fuel consumption and emissions of carbon dioxide and pollutants. The 3-S program makes environmental protection a constant and integral component of our business strategy. This, in turn, makes it much easier for us to identify how environmental protection issues interact with other strategic concerns: if we want our eco-friendly and economical diesel systems to succeed, for example, we need to make sure that they also deliver the higher levels of fun and sporty performance expected by today's drivers.



### Environmental protection logo

The Bosch environmental protection logo symbolizes uncontaminated water, clean air, and unspoiled nature. Measures developed to protect the environment often draw attention to potential cost savings. Environmental protection is an integral part of our business strategy and plays a significant role in stimulating and guiding product innovations. It thus helps not only to ensure our profitability, but also to open up new business areas.



## The environmental management system

Bosch introduced a global integrated management system for quality, environment, and safety in 2001. The system translates our values into practical action and helps us to meet new demands placed on us by customers, society, and legislators. An international steering committee set up in 2002 makes certain that we live up to the tenets of our environmental policy wherever our operations take us. Even today, every single site in the Automotive Technology Business Sector has successfully gained accreditation under international environmental management standard ISO 14001. And our new supplier evaluation process will incorporate our suppliers more effectively into our environmental protection efforts.

Second meeting of the international steering committee for occupational safety and environmental protection in Campinas, Brazil (left); Hartmut Müller, Head of our Corporate Department for Environmental and Fire Protection, Safety (right) ▶





For the purpose of keeping the environment continually upgraded, Chinese businesses have to follow a new path with high technologies, low consumption of resources, and little environmental contamination. To encourage businesses into adopting environment-friendly production technologies, the environmental authority has put in place numerous measures. Resulting from the government's incentive of tax reduction, most light motor vehicles manufactured now in China have come to the EU II Standard. We call for further exchange and cooperation with overseas businesses: Get involved in addressing the environmental protection problems faced by China!



Yuansheng Fan,  
Vice President, Chinese  
Research Academy of  
Environment Science  
(CRAES), Beijing (China)



Production of diesel injector pumps on the Indian subcontinent

## Challenges

Our environmental system will face challenges from ever more regulations across the whole of the product life cycle over the next few years, with the EU Directives on waste electrical and electronic equipment (WEEE), restrictions of the use of certain hazardous substances in electrical and electronic equipment (RoHS), and end of life vehicles (ELV) imposing new requirements on both product development and product labeling.

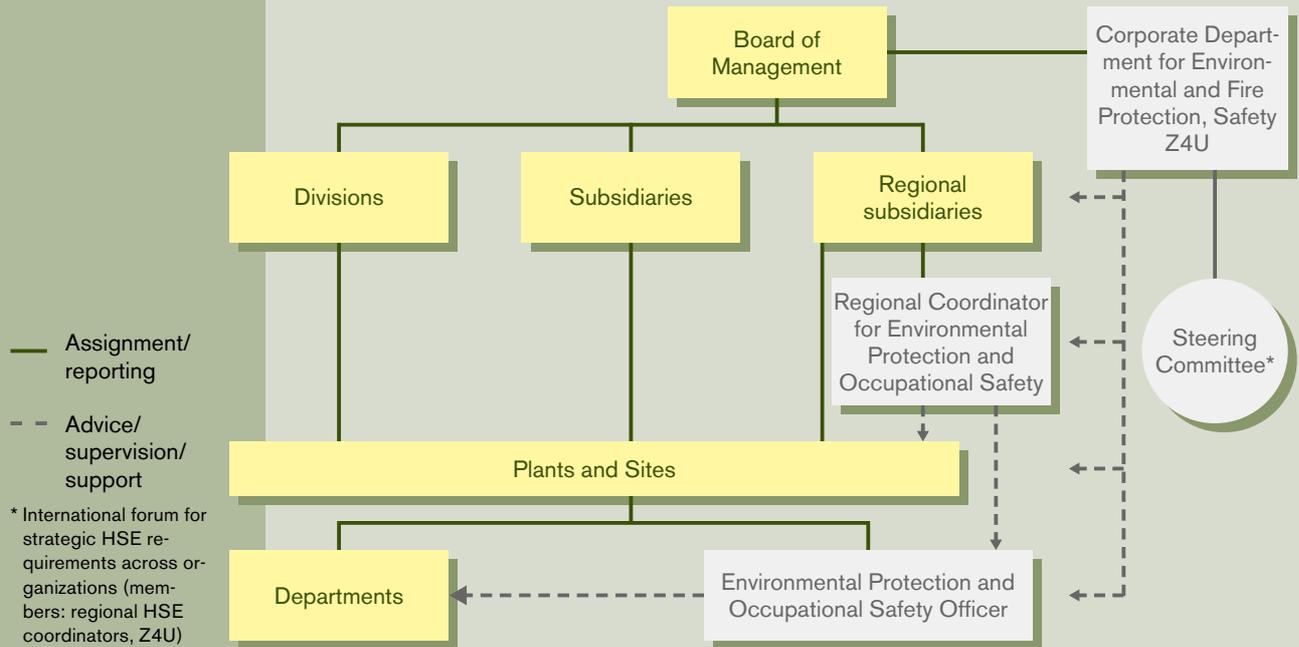
The WEEE and RoHS Directives came into force at the start of 2003. As they relate to electrical and electronic equipment, they are of concern primarily to the Industrial Technology and Consumer Goods and Building Technology Business Sectors. Our power tools and household appliances, for example, are likely to be affected by provisions banning the use of certain heavy metals from mid-2006 and the requirement that from 2007, a certain portion of each obsolete part must be recyclable. The ELV Directive, on the other hand, only affects Automotive Technology. This instrument prohibits the use of certain heavy

metals in automobiles put on the market after July 2003. Rules for the use of recyclable materials come into force in 2006 and will be replaced by a more exacting requirement in 2015.

### Legislation in the automotive area

The most significant challenges for Automotive Technology come from more stringent exhaust gas standards in Europe and the U.S. and from the European automotive industry's self-imposed commitment to cut the carbon dioxide emissions of new vehicles to 140 grams per kilometer by 2008. The new U.S. exhaust gas regulation, which comes into force from 2007, requires further substantial cuts in particulate and NO<sub>x</sub> emissions and will therefore have a particularly pronounced effect on diesel engine technology. More stringent regulations are also expected in China, where the EU II standard is to be introduced in 2004. The relevant international standards are not, however, expected to become mandatory in China until 2010.

## How environmental protection is organized at Bosch



## Global environmental policy

**European emissions trading**

The EU Directive on the trading of greenhouse gas emissions permits came into force in October 2003. Bosch is committed to climate protection through its environmental policy and has been making the necessary preparations for the start of emissions trading. Emissions trading will affect the few plants in Germany that operate large furnaces and ovens. We are currently working to determine the required quantity of emissions permits and to identify measures to reduce our total emissions.

The creation of our Health, Safety, and Environment Steering Committee represents another milestone in the global implementation of our environmental policy. The primary objectives and duties of this international steering committee, which comprises the occupational safety and environmental protection coordinators from the Asia, Europe, and North and South America regions, are to enhance knowledge sharing and cooperation between countries and improve our performance in environmental protection and occupational safety. The committee held its first meeting in 2002 at the plant in Bangalore, India, and aims to convene once annually. The most recent meeting, which took place at Campinas, Brazil, in May 2003, concentrated on topics including international environmental standards, management systems, the involvement of suppliers, and the expansion of the DfE (Design for Environment, see page 19) coordinator network. The steering committee also agreed to update the internal reporting system in order to make our global reporting more uniform and more efficient.

**Activities in China**

Bosch intends to continue expanding its business activities in China. Our subsidiaries and affiliated companies in China employ just under 9,000 people and achieved sales in 2002 of around € 1.2 billion. A joint venture founded in 2003 by the Bosch Group and China's Wuxi Weifu Group for the development, application, and manufacture of electronic diesel systems has now commenced operations. The rapid pace of economic development in China requires that occupational safety and environmental protection measures be implemented very quickly. We set up a dedicated corporate department in Shanghai in 2002 to coordinate environmental activities and introduce management systems to integrate these requirements into business processes across all 13 Chinese plants. The corporate department organized an environmental conference in its first year, to which the relevant management staff from all of our Chinese plants were invited.

Dr. Robert Kugler, Executive Vice-President of BSH Bosch und Siemens Hausgeräte GmbH with responsibility for product divisions and environmental protection was voted "Eco Manager of the Year" in 2002. ▣



▣ Tarja Halonen, President of the Republic of Finland, awards Bosch the European Quality Award for 2003 at the EFQM Forum in Helsinki.



## Integrated management

Bosch introduced a global management system integrating quality, environmental protection, and occupational safety in 2001. The system is subject to continuous development in a process that considers suggestions from our sites as well as external certification requirements. The scope of the system has recently been expanded to incorporate the areas of site security, data protection, and information security. The resulting modifications are detailed in the updated manual Management System for Quality, Environment, Safety, and Security, published in September 2003.

### Award-winning management

Successful environmental protection is not solely the result of an effective, networked management system. It is the level of personal commitment demonstrated by managers and associates that makes the real difference. One person who has made that difference is Dr. Robert Kugler, Executive Vice-President of our joint venture BSH Bosch und Siemens Hausgeräte GmbH, who was voted "Eco Manager of the Year 2002" by the environmental and conservation group Umweltstiftung WWF Deutsch-

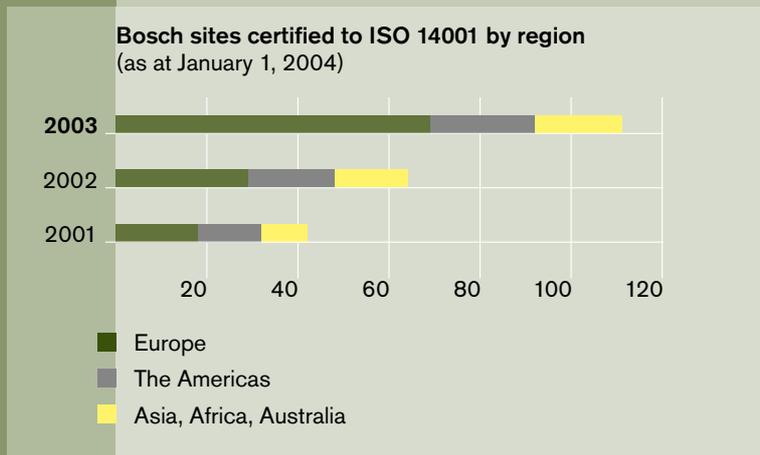
land and the German business magazine Capital. The honor recognizes the company's many years of pioneering work in industrial environmental protection and its exemplary environmental performance indicators: since 1990 BSH has cut specific energy consumption in manufacturing by 34 percent in Germany alone and slashed water consumption by 72 percent.

### Internal quality competition

The success of our business depends in large measure on the quality of our products and services. As part of our quality management offensive, we drew up a new set of principles for quality in 2003. These principles make the quest for quality a duty for everyone, from the newest trainee to the most experienced senior manager. We also used the opportunity to initiate a new internal Bosch quality competition. Our unit injector products, the EV6 fuel injector, and the new ABS 8 system all received the Quality Prize 2003 in recognition of their success in meeting quality and cost targets and of the significant contribution they have therefore made to maintaining and enhancing customer satisfaction.

### EFQM prize

Our regional subsidiary in Bursa, Turkey, had particular cause to celebrate in 2003 when the Diesel Systems Division's local site won the prestigious European Quality Award (EQA) in the Operational Unit category. Presented by the European Foundation for Quality Management (EFQM), the award recognizes outstanding performance across nine different evaluation criteria, including areas such as resources and social issues.



### ISO 14001 certification

An environmental management system has been in place at all Bosch manufacturing sites worldwide since 2000. Our sites are audited internally or externally pursuant to international environmental management standard ISO 14001 in accordance with a formalized plan. Automotive Technology became the first business sector to complete certification of its sites in 2003 and is thus now fully compliant with the stringent requirements of the automotive industry. The certification process has reached an advanced stage in other business sectors and divisions too, and at the start of 2004 no fewer than 111 Bosch sites held an ISO certificate issued by an accredited certification body.

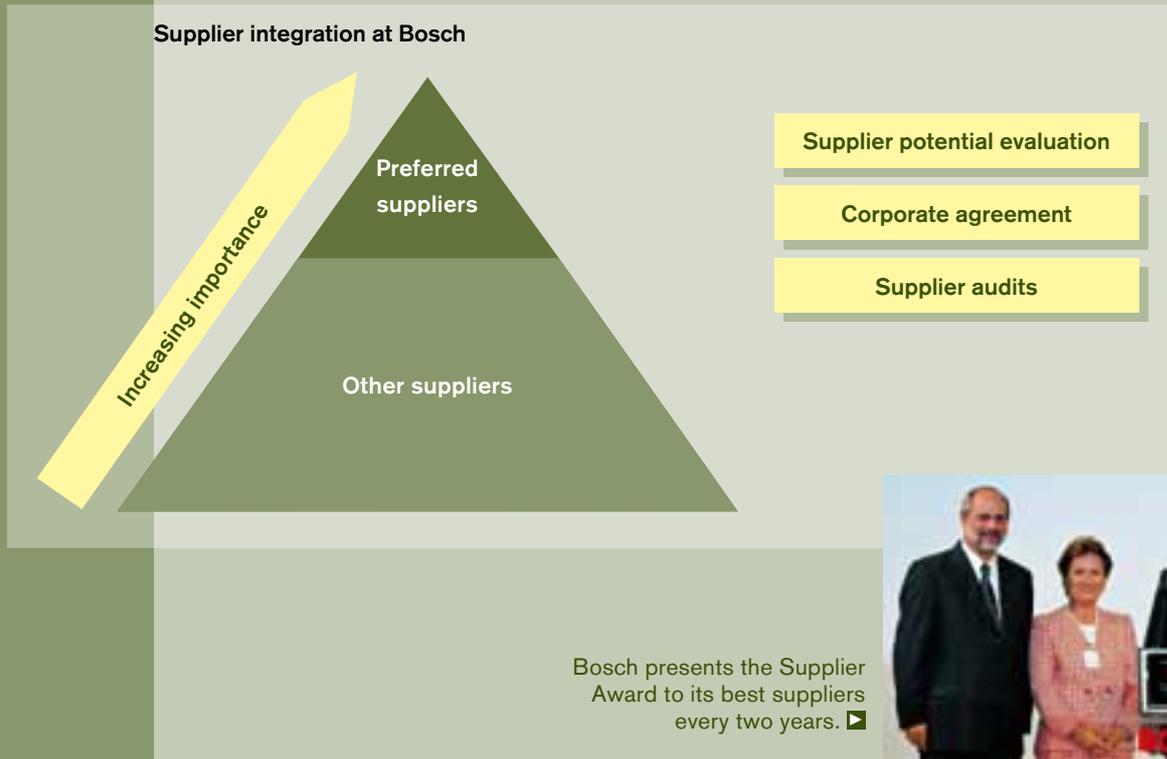
### Expanded environmental controlling

Part of the purpose of the environmental controlling activities is to identify the key environmental aspects of our processes. The environmental impact of each process is assessed using a set of predefined criteria. We introduced a standard procedure for one more area, traffic, in 2003 and are consequently now able to analyze and evaluate the significant traffic parameters consistent-

ly at every site. We require each of our sites worldwide to record certain energy and material flow data. This information is stored in a new database developed on the basis of our existing energy and material flow register. The new system collates all site data and standardizes recording of firmly defined environmental, fire protection, and occupational safety indicators, thereby streamlining our internal reporting regime.

### Environmental protection training

Our latest revised training concept especially targets managers, developers, environmental protection officers, and internal auditors. Seminars on environmental management systems and a special course for environmental auditors provide a solid grounding for both internal audits and external certification processes. Another seminar offered gives our designers, developers, and suppliers the opportunity to find out about new requirements and the latest developments in environmentally-compatible product design.



## Supply chain management

The Bosch Group's total purchasing volume of some € 20 billion comprises manufacturing material, commodities, operating resources/services, and capital goods. We expect our suppliers to provide competitive, high quality products and services with good delivery reliability in all purchasing segments. Every two years we present our best performing suppliers worldwide with the Bosch Supplier Award. The most recent award ceremony held in Bamberg, Germany, in July 2003 honored no fewer than 60 suppliers for their achievements in 2001/2002.

### Environmental protection and the preferred supplier concept

In accordance with its environmental principles and purchasing guidelines, Bosch seeks to commit suppliers to environmental protection. The complex and inadequately integrated Environmental Protection Survey previously used to evaluate the environmental performance of our suppliers was replaced with a new and improved method in 2003. This method, which we have also presented before the

Committee for Environmental Management of VDA, the German automotive industry association, incorporates environmental requirements into the preferred supplier concept in such a way that information on environmental performance now flows into our basic supplier evaluation and selection process. Environmental issues and fire safety also form part of the Corporate Agreement, our framework contract with suppliers.

### Evaluating supplier potential

We evaluate supplier potential by carrying out a series of assessments at the supplier's site. The scope of evaluations has recently been expanded to include assessment criteria that estimate the supplier's potential in the areas of environmental protection and fire safety. We plan to integrate environmental protection into the supplier audit program in a similar way in the future, and also intend to ensure that environmental factors are taken into account when purchasing operating resources and plant and equipment.

### IMDS

Changes in the law mean that our customers in the automotive sector are demanding more and more information about the materials and components used in our products. Such disclosures are necessary in order to help them ensure compliance with substance bans and recycling requirements in the supplier chain. The Bosch Group supports a uniform inter-company procedure for the provision of the type of information required when using IT tools such as the International Material Data System (IMDS).



## Environmental protection and products

Environmental labels such as the Blue Angel seal awarded by the German Federal Environmental Agency (UBA) identify products that feature particular environmental and/or health benefits. A number of Bosch products carry the Blue Angel, documenting our commitment to our corporate value of responsibility. Right from the development stage, various programs set the requisite standards. Environmental protection is a major innovation driver – and a significant source of new competitive advantages – in all divisions and each new product generation we release is more eco-friendly, quieter, and more energy-efficient than the last. We operate our own recycling systems and support and encourage the harnessing of renewable energy resources through a number of our products.

The environmentally-oriented design of Bosch power tools simplifies disassembly and facilitates the recycling of end of life equipment. ►





Our relationship with our suppliers has become increasingly interconnected. We work together at all stages of our product life cycle – from product development to sale, to use and service, to end of life. Sustainability, safety and environment remain a challenge and the technologies that Ford and our suppliers, like Bosch, have developed are pushing us in the right direction. The future of our industry depends on creating a sustainable business model that uses renewable resources as it continues to delight and help protect customers, reward shareholders and protect the planet. Continue to bring us your ideas. Your creativity is essential to our future and to yours.



Susan M. Cischke,  
Vice President, Environmental and Safety Engineering, Ford Motor Company, Dearborn (USA)



## Environmentally-oriented development

Endeavors to limit the environmental impact of our products start in the design phase. Bosch Standard N33-6 Environmentally-Oriented Product Development provides clear directions to help designers and developers optimize the environmental performance of our products throughout their life cycle, as specified in the European Union's Integrated Product Policy (IPP) requirements. This ensures that our products are able to meet the demands both of the law and of our customers.

Bosch Automotive Technology's 3-S program (see page 11), which is in effect one module of an integrated product policy, has proved to be particularly effective in reducing product resource consumption during the use phase; its stated development objectives, "more passive and active security," "lower motor vehicle emissions," and "more efficient driving" will thus continue to guide our development activities.

### Design for environment

The rather more recent Design for Environment (DfE) program primarily targets those stages of the product life cycle that

come before and after use. The program aims to minimize overall material consumption and increase the proportion of environmentally-friendly materials used right from the outset by encouraging appropriate design considerations. It also tries to improve environmental performance at the end of the product life cycle by ensuring straightforward product disassembly and maximum recyclability of the materials used. There is more to the Bosch DfE program than limiting material consumption and improving end of life performance, however, with knowledge management also playing a central role. Effective sharing of expertise and experience right across the company is invaluable in areas such as environmental design. Our DfE network, which we set up in 2000, now links 24 coordinators from the various divisions and regional subsidiaries. The seminar concept for environmentally-oriented product design, which was revised in 2003, has done much to assist the implementation of the DfE program.



**Abstatt development center**  
Nature conservation and environmental protection played a central role in the design and construction of our new development center at Abstatt, Germany. The open space plan provides for the planting of 1,063 trees and for vegetation to cover two thirds of the total area and 23,480 square meters of roof space. An ecologically valuable belt of mixed fruit trees has been created around the site, while design features such as separate sewerage and wastewater systems, heat recovery systems, and a rainwater collection and utilization system minimize ongoing resource consumption.

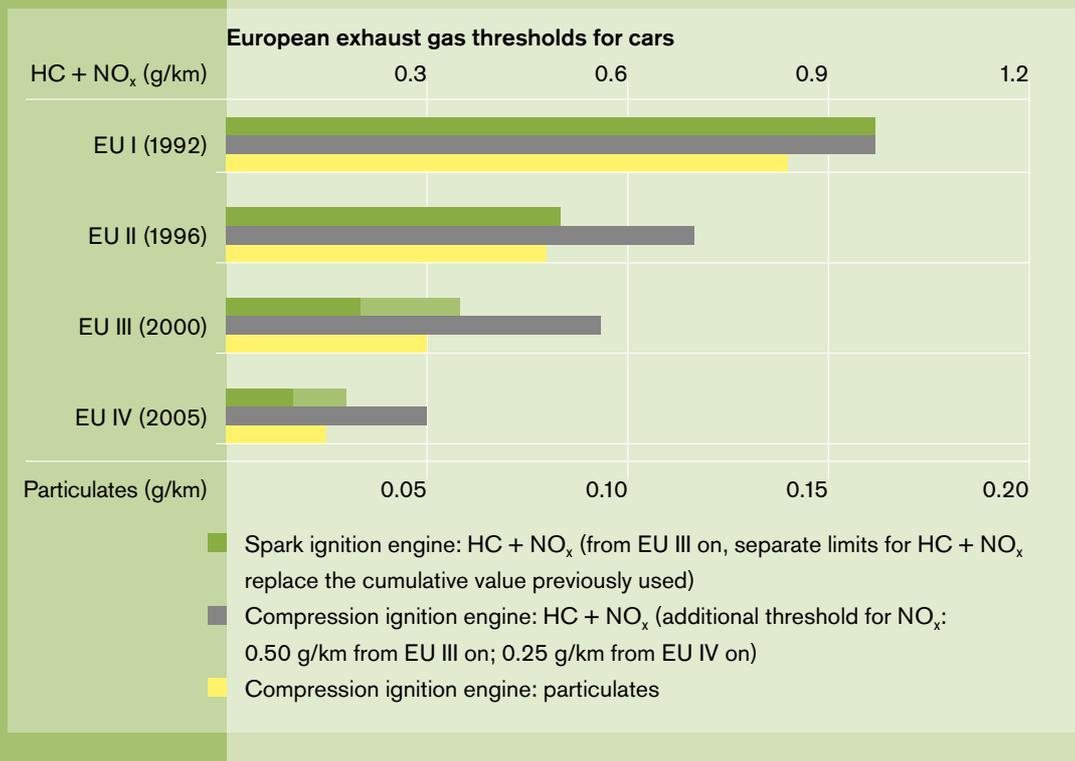
<b>Products and their environmental benefits</b>			
Area of activity	Typical products	Main environmental benefits	Page
<b>Automotive Technology</b>			
Diesel Systems	Common rail system (3rd generation), diesel particulate filters	Lower fuel consumption, reduced emissions	21
Gasoline Systems	Electronic gasoline direct injection (DI-Motronic) and additional functions	Lower fuel consumption, reduced emissions	22
Energy and Body Systems	LI-X generator, engine thermal management, automatic start-stop systems	Lower fuel consumption, reduced emissions, recycling	23
Automotive Electronics	Electronic transmission control, sensors	Lower fuel consumption, reduced waste generation	23
ZF Steering Systems <sup>1</sup>	Electric power steering system	Lower fuel consumption	23
Car Multimedia <sup>2</sup>	Travelpilot EX navigation system	Recycling	24
Automotive Aftermarket	Factory remanufacturing through the eXchange Program	Recycling	24
Chassis Systems	Braking systems, brake calipers	Damage/accident reduction, recycling	24
<b>Consumer Goods and Building Technology</b>			
Thermotechnology <sup>3</sup>	Condensing boilers, solar collectors, heat pumps	Improved energy efficiency, reduced emissions, harnessing of renewable energy resources	25
Household Appliances <sup>4</sup>	Washing machines, dishwashers, refrigeration appliances, cookers	Improved energy efficiency, lower water consumption	26
Power Tools	Silent shredders, rotary hammers	Reduced noise, recycling	26/27
Security Systems	Fire alarm systems	Damage/accident reduction, reduced release of harmful substances, recycling	27
<b>Industrial Technology</b>			
Drive and Control Engineering	Pitch drives for wind turbine generators, axial piston pumps (whispering hydraulics)	Harnessing of renewable energy resources, reduced noise	28/29
Packaging Technology	Bag form, fill and seal machines	Reduced packaging material consumption	29
Metals Technology	Special steel products, cast iron pipes, brake disks	Recycling	29

<sup>1</sup> ZF Lenksysteme GmbH (50 % Bosch)

<sup>2</sup> Blaupunkt GmbH (100 % Bosch)

<sup>3</sup> including Buderus AG (more than 97 % Bosch)

<sup>4</sup> BSH Bosch und Siemens Hausgeräte GmbH (50 % Bosch)



Sintered metal diesel particulate filter ▼



## Automotive Technology

The market for diesel vehicles is currently booming, with Bosch alone supplying around 10 million diesel injection systems worldwide in 2002. While the short-term future looks bright for diesel technology, we cannot overlook the possible increased competition from alternative hybrid drives and fuel cell systems in the longer term.

The likely course of events suggests three main drivers:

- The need to make further reductions in emissions as a result of more stringent exhaust gas standards in Europe and the U.S.
- The need to achieve the ongoing cuts in consumption to which the European automotive industry has voluntarily committed itself.
- The need to satisfy customer expectations and demand for an ever more enjoyable driving experience.

### Reducing emissions

We are confident that even the diesel engine will be able to meet future U.S. emissions standards. Progress has been made thanks to a steady flow of significant innovations, many of them generated by

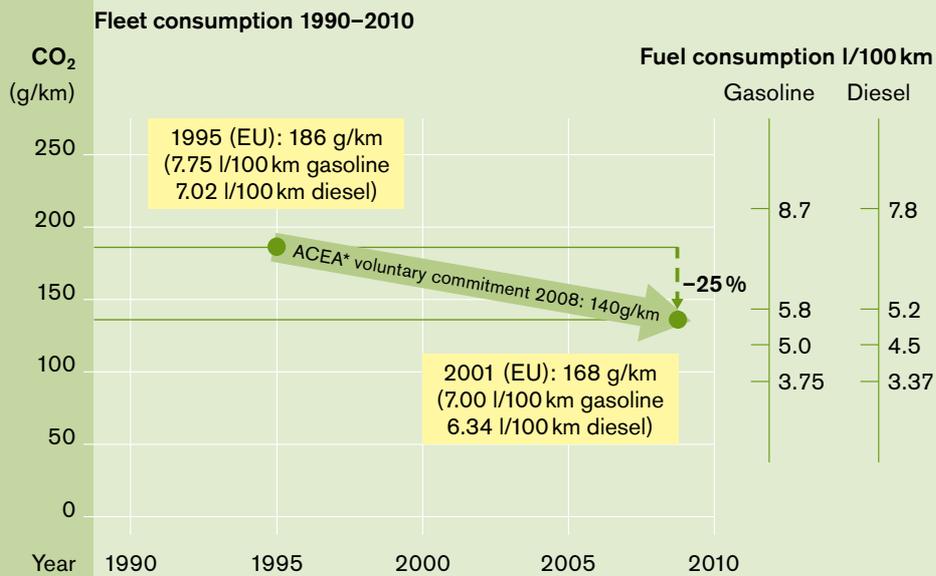
Bosch, and there are no indications that this trend will let up. Since the early 1990s, particulate emissions from diesel cars have thus been cut by 80 percent and emissions of other substances such as carbon monoxide, oxides of nitrogen, and hydrocarbons have fallen by at least 90 percent.

### Innovations in diesel engine technology

Three innovations announced by Bosch in 2003 – the third generation of the common rail injection system, the sintered metal particulate filter, and the Denoxtronic system – provide an excellent basis for future progress. The new generation of the common rail system, which uses fast piezoelectric inline injectors, promises to help deliver a further cut in emissions of up to 20 percent. Putting the particulate filter into series production in 2005 will help to move forward our preparations for U.S. exhaust gas standard US07, which comes into force in 2007 and is the next big challenge for diesel systems. Bosch Denoxtronic, a system for selective catalytic exhaust gas reduction, substantially improves exhaust gas values in commercial vehicles over 7.5 metric tons.



▲ DI-Motronic high pressure injector for gasoline engines



\* ACEA: European Automobile Manufacturers Association

To convert liters per 100 km into miles per (U.S.) gallon, divide 235.21 by the number of liters per 100 km.

### DI-Motronic

Engine management with the DI-Motronic system cuts fuel consumption, especially under partial load, by enabling a very lean air-fuel mixture. Its closed-loop exhaust gas recirculation control system also reduces nitrogen oxide emissions. Used in combination with a lean NO<sub>x</sub> catalytic converter and a special catalytic converter control system, DI-Motronic is also well prepared for stringent future NO<sub>x</sub> limits.

### Reducing consumption

The great strength of diesel direct injection as compared with traditional gasoline manifold injection is its 30 percent lower fuel consumption. The average fleet fuel consumption of the passenger vehicles sold in Germany has improved over the last decade from 8.7 to 7.2 l/100 km, an improvement that coincides with and is to a large degree attributable to the growing market share of efficient high pressure direct injection diesel engines.

### Innovations in spark ignition engine technology

The spark ignition engine, however, has now started to close the gap in fuel consumption. Bosch's DI-Motronic electronic gasoline direct injection system uses stratified charge technology to reduce fuel consumption by up to 15 percent over manifold injection. Other developments will make gasoline direct injection even more efficient in future. Downsizing, for example, will see conventional engines replaced by smaller turbo-charged engines that offer the same power but lower fuel consumption, while the direct start system, with its efficient start-stop function, and the continuing development of the DI-Motronic

system from wall-guided to spray-guided combustion promise further savings.

### A look at the future

Given the innovations currently planned, we expect further savings of 20 percent for gasoline engines and 15 percent for diesel engines. Overall, this means that modern internal-combustion engines will be just as capable of meeting the strict U.S. thresholds of the future as hybrid drives and fuel cell systems. A cost-benefit analysis of the various alternatives, however, reveals some substantial differences. Reducing the carbon dioxide emissions of a compact car by one percent involves an additional cost of around one percent for a diesel or gasoline engine. According to present calculations, the same improvement would cost approximately twice as much with a hybrid drive and at least four times as much with a fuel cell system. Looking to the future, therefore, we can conclude that optimized spark ignition and compression ignition engines will remain the dominant source of motive power for private vehicles for a long time to come, with predicted market shares above 90 percent until 2015 and still in the region of 85 percent until 2025.

Environmental benefits of energy systems		
Energy system	Peak power	Environmental benefits
LI-X Generator	4,000 watt	Fuel saving of up to 0.5 l/100 km, reduced emissions, up to 5 dB(A) quieter
Electromagnetic valve control	4,000 watt	Fuel saving of 10 %
Electrically heated catalyst	4,000 watt	Reduced emissions
Electrical power steering	1,500 watt	Fuel saving of 3 to 6 %
Electrical water pump with engine thermal management	600 watt	Fuel saving of 5 %



▲ LI-X generator with improved efficiency

### Power supply system efficiency

Work on developing and refining our power supply systems for motor vehicles never ceases. We concentrate here on three primary objectives: we have to improve the capacity and efficiency of our systems to keep pace with the growing number of electrical loads, we have to achieve further cuts in volume and weight on account of the shrinking installation space available, and we have to ensure that both fuel consumption and costs continue to fall. The new LI-X generator, which will be launched in 2004, serves as a good example of how to combine all three aims. Its efficiency has been boosted to over 70 percent, its volume reduced by up to 20 percent and its fuel consumption cut by up to 0.5 l/100 km. Not only that, but it is also very noticeably – 5 dB(A) – quieter in operation.

### Electrical loads

The energy demands of new safety systems and features are such that engine thermal management and energy saving have also become issues for the electrical loads. We are increasingly concentrating our efforts in this area on technical innovations such as electrical power steering,

electromechanical brakes, electromagnetic valve control, and heated catalysts. The purpose of engine thermal management is to optimize onboard thermal economy in energy terms. Good engine thermal management can trim fuel consumption by up to five percent, which of course also delivers a corresponding drop in emissions.

### Steering and transmission systems

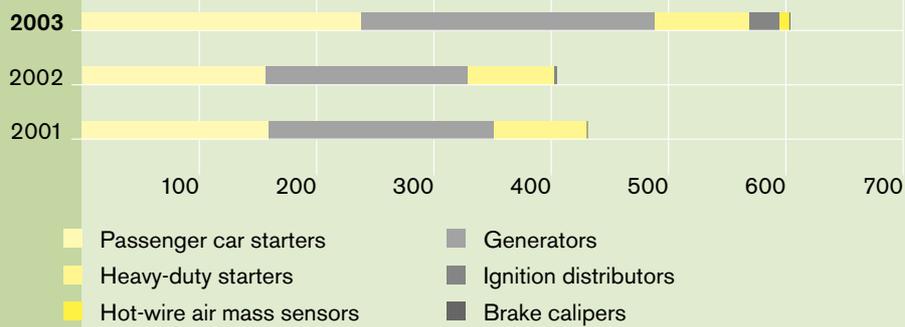
The new electric power steering system (Servolectric) completely eliminates the need for hydraulic oil and, consequently, the need for complex hose assemblies. Moreover, depending on vehicle type, the Servolectric system consumes up to 85 percent less energy than hydraulic power steering, since power only has to be supplied when the driver actually steers. Electronic transmission control for automatic transmissions also helps to reduce energy consumption. Adaptive shifting strategies make it possible to change gear at lower engine speeds.

### Sensors

Sensors supply a wide range of data for vehicle management and thus contribute to cleaner and more efficient driving. Knock sensors, for example, monitor for irregular combustion in the engine. Controlling engine knock can cut fuel consumption by up to nine percent. Another sensor, the oil condition and level sensor, makes it possible to leave longer intervals between oil changes, which obviously reduces oil and filter waste.

### Factory remanufacturing at the Göttingen plant 2001–2003

(in thousands of units)



#### The eXchange Program

The eXchange brand seal identifies remanufactured parts such as generators, starters, and injection and braking system components. All parts bearing this seal carry the same warranty as new products and are ideal for keeping repair costs proportionate to the current value of the respective vehicle.

#### Factory remanufacturing

Bosch has been remanufacturing used parts on an industrial scale since the 1960's. Our facility in Göttingen, Germany, alone currently remanufactures more than 565,000 generators and starters to full working order every year by repairing worn-out parts and defective components or replacing them with original spare parts. All remanufactured products are tested before leaving the facility to ensure that they are as good as new. Once identified with the eXchange brand seal, they carry the same warranty as new products. The international eXchange Program not only goes a long way toward implementing the end of life vehicle directive, but also fits in very well with the trend toward keeping repair costs proportionate to the current value of the vehicle concerned and helps us to meet our replacement parts supply obligations. Air mass sensors and brake calipers were added to the remanufacturing program in 2003. This expansion and its highly competitive performance have enabled the Göttingen plant to increase output over the past year.

#### End of life automobile recycling

The European end of life vehicle directive stipulates that, from 2006, at least 80 percent of the average weight of an end of life vehicle must be made up of recyclable material and reusable components. This figure rises to at least 85 percent if recovered material used for energy generation is included. Although these requirements are aimed first and foremost at manufacturers, the recovery and disposal of automobile components is plainly also an issue for us as a supplier.

Bosch subsidiary Blaupunkt is consequently conducting a pilot project to investigate options for removing and recycling the Travelpilot EX navigation system. The study uses a special software package to calculate the recycling and recovery rates for the device and to establish how easily it can be removed. One of the results of the project will be a product recycling pass that tells the customer about the materials used and the options for recovery and reuse.

**Bosch gas condensing appliances**

Blue Angel (environmental label RAL-UZ 61)

"for low emissions and energy consumption"

**Junkers**

- ▶ CERAPUR Types ZBR/ZSBR/ZWBR 3-16A, ZBR/ZSBR/ZWBR 7-28A, ZBR 11-42A
- ▶ CERASMART Types ZB/ZSB/ZWB/ZBS 3-16A, ZWB 7-26A
- ▶ SUPRAPUR Type KBR 15-60

**Bosch solar collectors**

Blue Angel (environmental label RAL-UZ 73)

"for high efficiency"

**Junkers**

- ▶ Flat plate collector Type FK 260

**Buderus**

- ▶ Flat plate collector DIAMANT Type SKS 2.1
- ▶ Flat plate collector TOPAS Type K 108
- ▶ Flat plate collector Type K 218
- ▶ Flat plate collector Type Logasol SKN 2.0



## Consumer Goods and Building Technology

The products of our Consumer Goods and Building Technology Business Sector deliver most of their environmental benefits in the home. Bosch refrigeration appliances, for example, help to reduce domestic energy consumption, while innovations from the Thermotechnology Division seek to exploit the potential of renewable energy resources.

### Environmentally-friendly heating technology

For the Bosch Thermotechnology Division, providing safe, energy-saving, and environmentally-friendly products is one of its main tasks. Efficient and environmentally-compatible technologies are the basis of a significant competitive advantage and open up new business opportunities. Condensing technology, for example, deserves much of the credit for the division's growth in Europe. The product portfolio of Bosch's new subsidiary Buderus, especially its condensing and solar systems, further strengthens our position in this area.

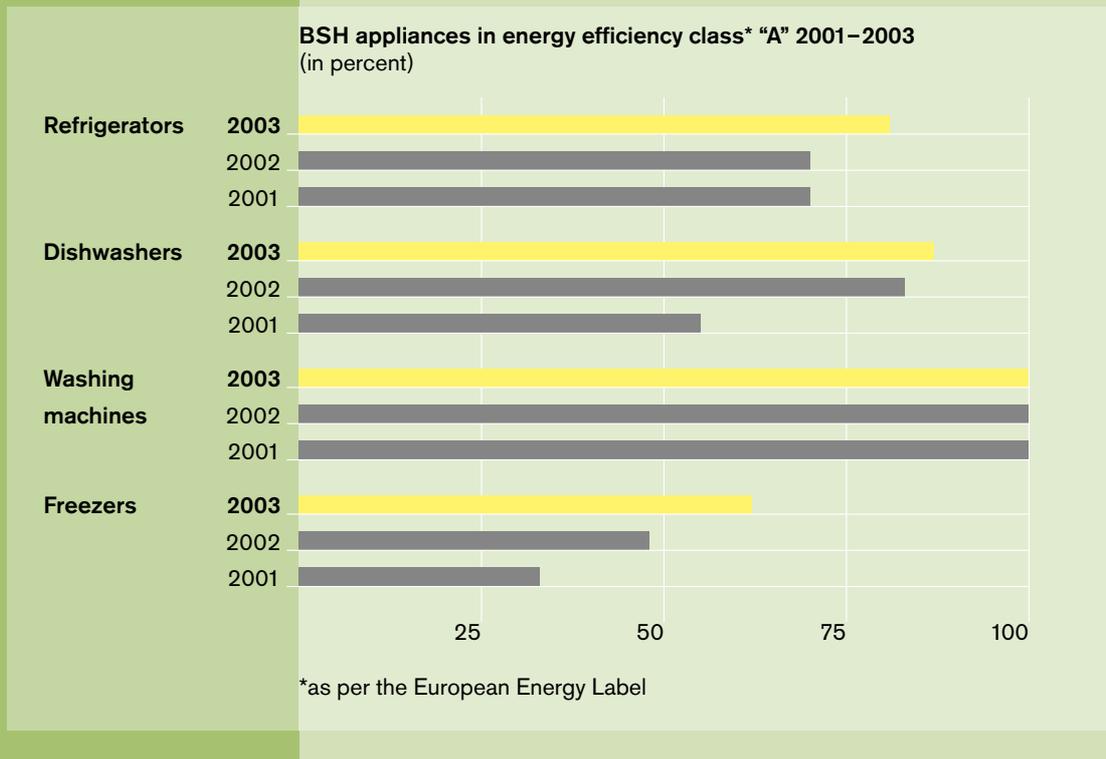
Gas condensing heating systems cut energy consumption by up to 40 percent over traditional boilers, because they also make use of what would otherwise be wasted exhaust heat. They thus achieve excellent energy conversion rates and also have very low pollutant emissions. The Cerasmart and Cerapur condensing appliances have both received the Blue Angel seal from the German Federal Environmental Agency (UBA) in recognition of their low emissions and energy consumption ([www.blauer-engel.de](http://www.blauer-engel.de)). We expanded our range of condensing heaters in 2003 to include new higher capacity appliances.

### The renewable energy vision

The Bosch Thermotechnology Division used the opportunity afforded by the ISH international trade fair for building and energy technology in Frankfurt in 2003 to present its vision of a renewable energy future with new products launched under the Junkers brand. The range includes more efficient solar collectors, heat pumps, and a complete package for low energy houses. Two new solar collectors from Junkers have further enhanced the

### Condensing technology

Condensing technology is particularly efficient because it makes use of exhaust heat. The exhaust gases from the burner are cooled to below the dew point and the additional heat released on condensation of the water vapor component of the exhaust is fed back into the system. This technique enables condensing appliances to achieve nominal utilization ratios of up to 110 percent depending on thermal power. Old boilers achieve no better than 70 percent and standard appliances a maximum of 94 percent. Condensing appliances can cut carbon dioxide emissions by up to 38 percent as compared with an old system too, so some countries, including Germany, offer financial incentives to encourage their use. The U.K. intends to legislate to ensure that condensing appliances are used for all new installations from 2005.



division's tried and tested solar program, which now includes products capable of providing up to 35 percent of the total energy required for heating and hot water. Heat pumps are a particular attractive option in areas not connected to the gas supply. They are able to supply a house with heat and warm water throughout the year and reduce carbon dioxide emissions by 40 percent as compared with an oil-fired heating system.

► [www.aktionblau.de](http://www.aktionblau.de)

#### Resource-friendly household appliances

A trailblazer in product-related environmental protection in its sector, our joint venture BSH Bosch und Siemens Hausgeräte GmbH has built its sustainability strategy around the concept of efficient and economical household appliances that set the standard worldwide for resource conservation. In the period between 1990 and 2003, BSH managed to achieve cuts of more than 40 percent in the average energy consumption of all of its appliances, and of between 30 and 50 percent in average water consumption. Around three-quarters of the household appliances produced by BSH in Germany qualify for the European Energy Label's "A" energy efficiency rating.

► [www.sun21.de](http://www.sun21.de)

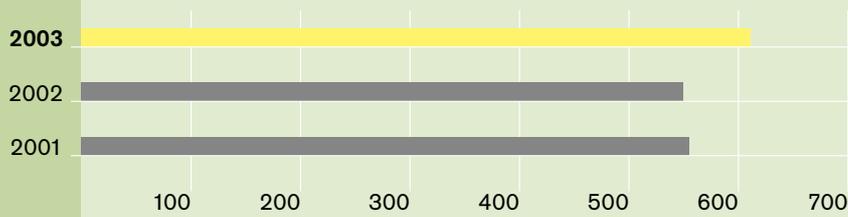
#### Innovations in garden products

Shredders and hedge trimmers were the star performers in the Power Tool Garden Product Group in 2003 and were thus also the focal point of our innovative efforts. The silent shredder received the Blue Angel seal in recognition of its low noise emissions and also featured prominently in the "Aktion Blau" campaign launched by the German Federal Environmental Agency (UBA) in summer 2003 to celebrate the 25th birthday of the Blue Angel seal. Associates of the Power Tool Division were pictured with the silent shredder in the Germany-wide photo campaign ([www.aktionblau.de](http://www.aktionblau.de)) that accompanied the event.

#### Power tool design

SUN 21 is our Power Tool Division's program to "protect nature and the environment in the 21st century". The extensive website at [www.sun21.de](http://www.sun21.de) and events such as the annual environmental day, which celebrated its tenth anniversary in 2003, provide information about the program not only for associates, but also for suppliers, customers, and the public. The environmentally-oriented design of the division's products also owes much to SUN 21.

**Take-back of end of life power tools at the Willershausen service center  
2001–2003 (in metric tons)**



For example, the fourth revised edition of the Environmentally-Oriented Power Tool Development guideline has recently been released. The guideline's aims include encouraging the use of environmentally-compatible materials wherever possible. One exemplary result of the guideline is the Bosch rotary hammer, which features easily removable plug-in connections, one standard screw size, and clear labeling on the plastic parts. The rotary hammer also uses biodegradable lubricants and has no components that contain cadmium.

#### Recycling center for power tools

Germany's leading power tool manufacturers set up a joint recycling system back in 1993. The initiative set up a recycling center under the management of Bosch at Willershausen, the site of our power tools service center in Germany. A total of 15 manufacturers representing 23 different brands and more than 80 percent of the market volume have now joined the system, which returns in excess of 560 metric tons of old power tools to the raw material cycle every year. The system also covers gardening tools, digital measurement tools, and batteries.

#### Take-back system

Private users are able to return end of life drills or jigsaws to their specialist retailer free of charge. Professional users can also take advantage of the system at no extra expense, as the manufacturers involved meet all costs. The Willershausen recycling center organizes the logistics, sorting, and recovery. Virtually all parts are labeled, which makes it much easier to separate out the 13 different types of material. Once processed, the raw materials are either used to produce new power tools or sold on for other industrial applications.

#### Battery recycling

The recycling center at Willershausen collected more than 100 metric tons of batteries in 2003, around 50 percent of which were returned together with the power tools collected. The number of nickel-cadmium batteries returned has more than quadrupled since the new German legislation was introduced. The cadmium recovered from the batteries, 83 percent of which are suitable for recovery, is used in the manufacturing of new batteries.

#### Discontinuation of chrome surfaces

Our security technology fire and smoke detector units no longer use components with yellow chromed surfaces, as these have been phased out in compliance with the requirements of the EU's waste electrical and electronic equipment and hazardous substance prohibition directives. Instead, we are now using non-corroding alternative materials or, in exceptional cases, galvanized surfaces. The smoke detectors are recyclable and can be sent for recovery via certified specialist agents.



▲ “Green” energy generation with hydraulic control technology from Rexroth

- 1 Pitch drive for setting angle of rotor blades
- 2 Drive train brake for rotor braking
- 3 Yaw adjustment to allow for changes in wind direction

#### The pitch drive

Pitch drives adjust the rotor blades of wind turbine generators according to the wind strength or the mains capacity. When the wind is light, the pitch drive swivels the rotor blades flat against the wind, in order to maximize the power generated. In strong winds, it turns the blades far enough out of the wind that they produce only the rated output, thus preventing the drive train or generator being overloaded. And in stormy conditions, the pitch drive “feathers” the blades edge-on to the wind direction, and the system shuts down.

## Industrial Technology

Industrial Technology is made up of the Packaging Technology, Metals Technology, and Bosch Rexroth AG divisions. In its Packaging Technology Division, Bosch manufactures fill and seal machines, cartoning machines, and multi-bag packers, for use in the foodstuffs, confectionery, pharmaceuticals, and cosmetics sectors. The Metals Technology division, set up in 2003, comprises casting and special steel products. Our subsidiary Bosch Rexroth operates in the fields of industrial hydraulics, electrical drives and controls, linear motion and assembly technologies, pneumatics, and mobile hydraulics.

#### Hydraulics for wind power systems

One area of application where Bosch Rexroth’s hydraulic control technology demonstrates its value is the generation of renewable energy. Visitors to the 2003 HUSUMwind trade fair in Schleswig-Holstein saw us demonstrate our comprehensive expertise in the drive, control, and regulation technology of wind power systems. With its broad-based range of gears and hydraulic modules, Bosch Rexroth is playing a

defining role in the further development of eco-friendly wind power, and in making it more efficient: generator gears, yaw gears, pitch gears and drives, and braking units provide complete solutions for all the rotational and braking movements in wind power plants.

#### “Whispering” hydraulics

Bosch Rexroth is looking to solve a classic dilemma with its “whispering” hydraulics range: the performance of hydraulic systems can only be increased by boosting the pressure applied, something that is inevitably linked with higher noise levels. Thanks to computer-aided modal analysis, it has now proved possible to harmonize and ultimately reduce the overall noise and vibration produced by the individual components. The year 2003 saw us augment our wide-ranging program of noise-reduced power units and valves by introducing a new generation of extra-silent axial piston pumps. Compared with previous models, they achieve greater efficiency while cutting noise levels sharply, by up to 20 dB(A).

The manufacture of a cast boiler commences with the smelting procedure, which predominantly makes use of casting scrap, making possible a closed-loop recycling process. The parts of the boiler are then individually cast. ▼



### Packaging optimization

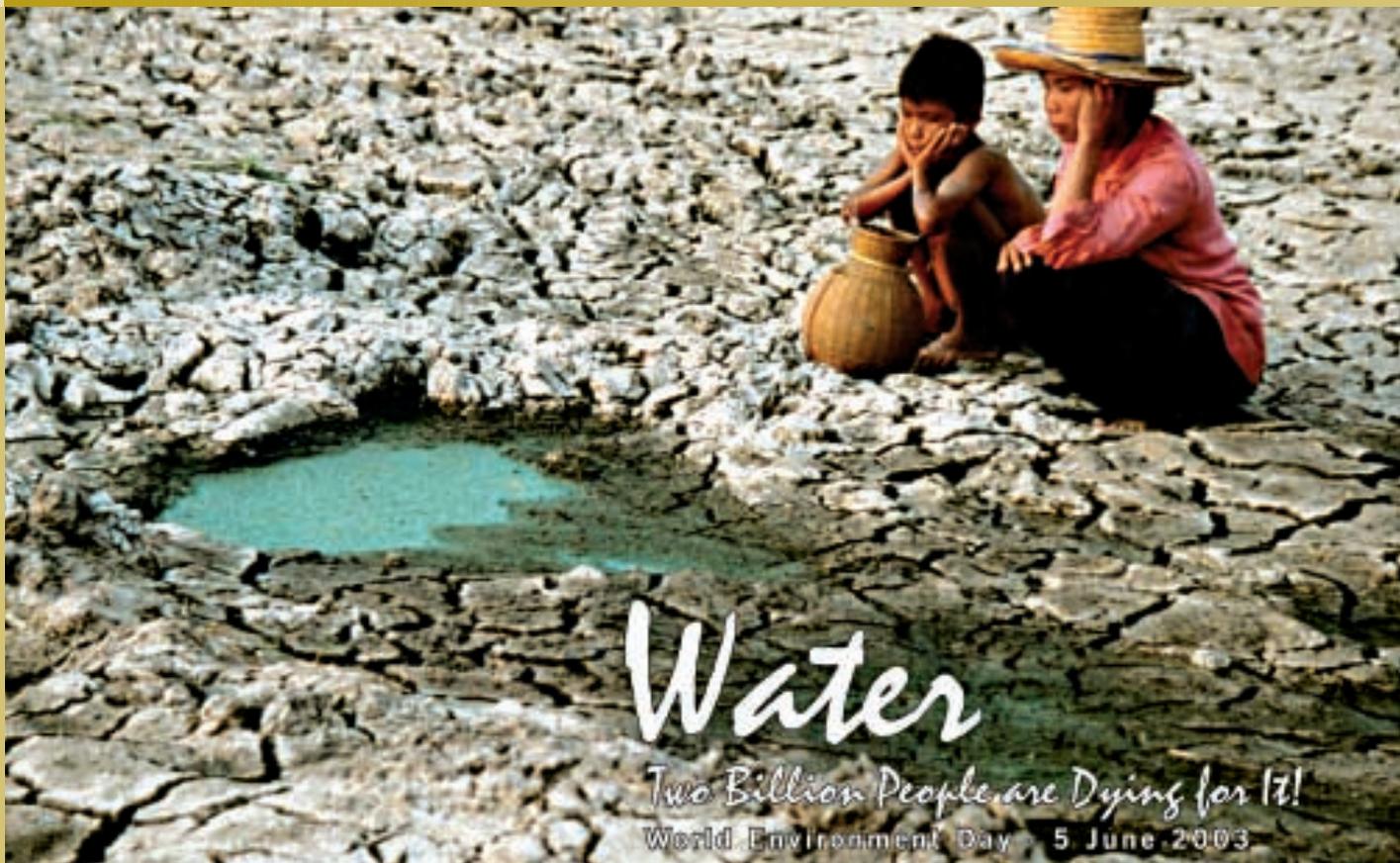
The majority of the Packaging Technology Division's customers are in the foodstuffs and pharmaceuticals sectors. The technology used for packaging milk and chocolate or tablets and capsules must first and foremost guarantee the quality and preservation of the contents. As well as protecting the product, however, packaging technology also needs to minimize the material and energy consumed. On grounds of cost alone, the optimizing of packaging material is a key aspect in the design of cartoning or sealing machinery, for instance. We already fully exploit most of the available potential here, so that innovations can achieve only marginal improvements.

The new version of our tried and tested Type SVE 2510 bag form, fill, and seal machine is an exception to this rule, however, as it allows us to save relatively high levels of packaging material. Thanks to stronger crimps, the bags produced are stable

enough to stand on shelving, rendering any further card packaging redundant. They are employed primarily in the foodstuffs and confectionery sector.

### Metal products from recycled scrap

Our Metals Technology Division produces most of its special steel and cast metal components from recycled material. The special steel products are almost entirely made from recycled scrap, while cast products, such as the metal material for brake disk manufacturing, mainly consist of steel scrap, return scrap, and casting swarf from our own mechanical processing operations. Among other areas, special steel and cast products are employed in the construction of power-generating plant (turbine housings and shafts). Drinking water supply systems and wastewater disposal are other applications in which our cast iron pipe products are employed.



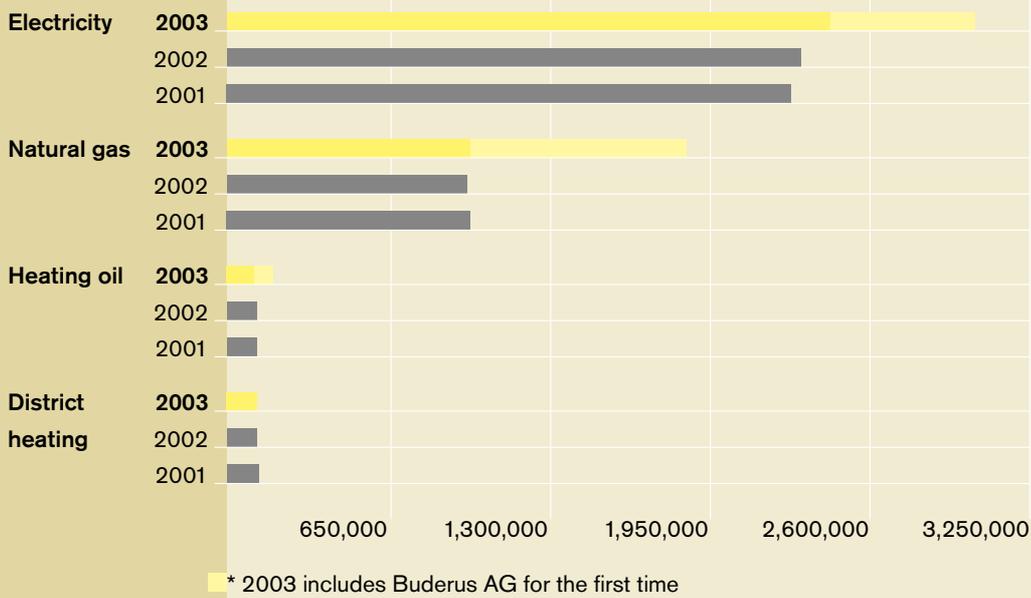
## Global environmentally-compatible manufacturing

A steering committee coordinates the worldwide implementation of environmental policy at all Bosch's manufacturing sites. Some topical examples from the regions will serve to illustrate the broad span of production and site-related environmental protection involved. They typify our high standards in the fields of energy and waste management, wastewater treatment, and the utilization of rainwater, site contamination and emission protection, hazardous substance management, and distribution. Awards for achievements in environmental protection and our participation in World Environment Day are evidence of the great commitment demonstrated "on the ground."



■ UNEP's World Environment Day 2003 prompted the plants belonging to the Indian regional company MICO to organize a wide range of environmental protection activities.

**Energy consumption of Bosch manufacturing sites in Europe 2001–2003\***  
(in megawatt hours)



Smelting iron in the new medium frequency furnaces at Bosch Rexroth ▣



## Europe

### Rainwater utilization in Ansbach

Our new development center in Abstatt, Germany, is not the only one of our facilities to protect valuable water resources by utilizing rainwater. At another German plant in Ansbach, for example, we use it to cool the power generation and manufacturing plants. This is why rainwater collection plant was installed while expanding the heat exchanger system in 2002, allowing the use of around 8,000 cubic meters of precipitation annually. The investment will pay for itself in five years, bringing annual savings on water costs totaling nearly € 18,000.

### Energy requirements in Lohr

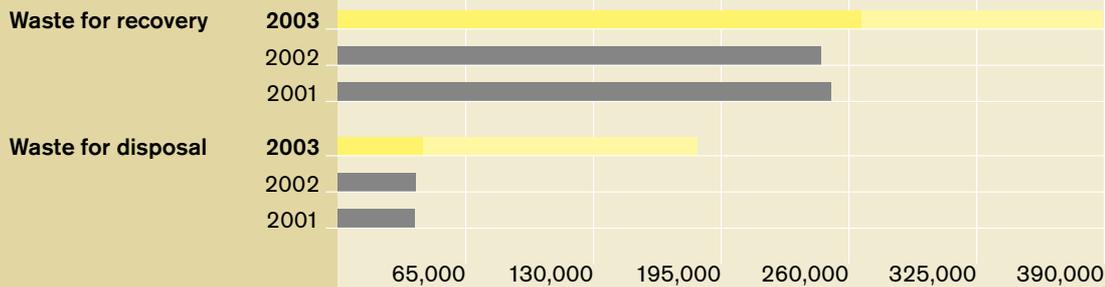
Some 20 percent of Bosch Rexroth's entire global energy needs are attributable to a single site, with iron-smelting operations at the foundry of the facility in Lohr, Germany, consuming 90 gigawatt hours of energy a year. New medium frequency furnaces have been in operation there since mid-2003, bringing to an end the 200-year era of coke-fired cupola fur-

naces. Instead of coke, electricity now provides the power needs of the new furnaces, significantly reducing not just dust emissions, but also the levels of fumes and noise produced at Lohr. The site has a dedicated project group to investigate energy-saving and CO<sub>2</sub> reduction. It has drawn up optimization measures aimed at improving heat insulation for the buildings, utilizing waste heat in the production of compressed air, as well as introducing energy-saving lamps for lighting systems.

### Dry machining in Bamberg

Bosch has already successfully switched to dry machining at a number of its sites. The benefits are obvious, since drilling, milling and turning can all be performed without the need for cooling lubricants. This also does away with the laborious preparation of these lubricants, and the large plants required. Several automatic lathes at the Bamberg plant in Germany have been converted in the course of ongoing upgrading.

**Waste volumes from Bosch manufacturing sites in Europe, 2001–2003\***  
(in metric tons)



\* 2003 includes Buderus AG for the first time

Biological soil clean-up at the Engels site ▶



### Turkey

With a workforce of around 6,600 at four manufacturing sites in Turkey, Bosch is one of the country's largest non-indigenous employers. The year 2001 saw the inauguration of a center of competence for diesel fuel injection and a new manufacturing plant for unit injectors at the Bursa facility. Bursa is a fast-growing site, currently providing employment for some 3,000 people.

### Waste and hazardous substance management in Bursa

The three plants which manufacture components for the automotive industry in Bursa, Turkey, operate according to Bosch's integrated management system, and in 2003, their local management systems were certified to ISO 14001. Waste and hazardous substance management attained the same high standard. The year 2003 saw the installation of a new surface gas container and storage tank at the diesel systems plant, while a new waste storage facility went into operation at the chassis systems facility. In the latter, soil and groundwater are protected by the special floor lining, enclosed leakage channels, and the separate collection of oil.

### Substitution of CHCs in Tienen

By 2005, all sites around the world must have completed the replacement of chlorinated hydrocarbons (CHCs), which damage the ozone layer. The Belgian facility in Tienen is one example, having completed the switch to solvent-free alternatives in January 2003, enabling the closure of its last CHC plant. Until then, rubber pads in

the local windshield wiper manufacturing shop had had to be pretreated with solvents, using some 50 metric tons of CHCs every year.

### Pollution remediation at Engels

The removal of residual contamination at our sites is a continuous process. Ninety percent of the manufacturing sites in Europe have already been investigated for residual pollution. Where necessary, remediation measures have been initiated. The most frequent contaminants identified by the analyses included oils, CHCs, and heavy metals. This was true, for example, of our spark plug factory in Engels (Russia), where soil contaminated with oil was recultivated biologically using bacteria and mineral supplements. In its modernization of the plant itself, Bosch has set benchmarks in Russia, for example, a new neutralization system featuring a closed water purification loop has allowed the previously high water consumption to be cut by nearly 90 percent.



Wastewater treatment reduces fresh water requirements at many sites. At the Technical Center in Shanghai, the water collection reservoir forms part of the garden layout.



## Asia, Africa, Australia

### Distribution optimized

Over recent years, truck-based transportation in Germany has been reduced with the aid of the regional shipping companies. In Japan too, Bosch is pursuing the goal of minimizing traffic-related CO<sub>2</sub> emissions. Our aim for 2002 was to cut fuel consumption by 10 percent compared with the previous year. By optimizing transport routes, both to customer locations and between the plants, Bosch actually managed to exceed its CO reduction targets by an impressive 30 percent. Thanks to the reuse of the wooden pallets used for freight purposes, transport-related waste fell by half.

### Soil vapor remediation in Higashi Matsuyama

Investigation of the groundwater at the two Japanese facilities in Higashi Matsuyama revealed contamination with volatile chlorinated organic compounds such as trichloroethylene. Remediation measures were immediately set in motion, using a procedure whereby the groundwater and

soil vapor are first extracted by suction, and then cleaned by means of activated-charcoal filters (stripping).

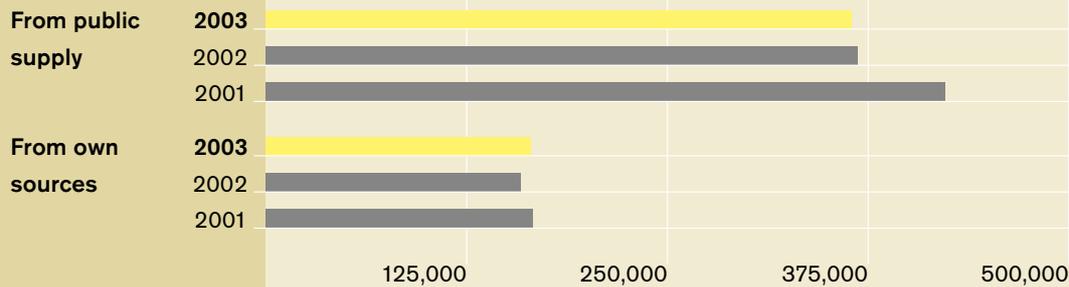
### Water treatment in Shanghai

The technology center of our joint venture United Automotive Electronic Systems Co. Ltd. in Shanghai leads the field in China in exhaust emission tests, which are carried out on behalf of automobile manufacturers. The site also plays a pioneering role on the water conservation front, collecting recycled water in a reservoir and using it to irrigate the site's grassed areas. In 2003, this initiative saved more than 7,500 cubic meters of water, around two-thirds of the fresh water required for the planted areas. The Shanghai site was first certified to ISO 14001 as long ago as 1998.

### Japan

In its third-largest overseas market, Bosch operates 25 sites employing some 12,000 people. In Japan, we were the first supplier to provide indigenous automobile manufacturers with second-generation common rail systems. Yokohama is the site of the Bosch Group's largest overseas research and development center for diesel and gasoline systems.

**Water consumption at MICO manufacturing sites in India, 2001–2003**  
(in cubic meters)



Each day, wastewater treatment plants at all the plants belonging to our Indian regional company MICO process more than 600 cubic meters of wastewater for reuse. As here in Bangalore, they contribute to substantial savings in fresh water requirements.

#### Australia and South Africa

Bosch operates just one facility in Australia and South Africa respectively. As in Germany, climate protection is an important objective here too: accordingly, the Australian body electronics plant in Clayton is taking part in “Greenhouse Challenge”, the government’s CO<sub>2</sub> reduction program. The South African plant at Brits, which produces electronic control units, starters, and ignition coils, gained ISO 14001 certification in 2002.

#### World Environment Day in India

Every year, some regions of India are confronted with serious water supply problems, and so the economical and efficient use of water is a vital issue for our Indian regional company Motor Industries Co. Ltd. (MICO), which operates four manufacturing facilities. For MICO, the United Nations’ World Environment Day, held under the banner “Water – Two billion people are dying for it” on June 5, 2003, was the ideal opportunity to launch an information campaign at all its plants.

#### “Water – every drop counts” – the campaign

To accompany the campaign, the company printed around 10,000 copies of the information booklet “Water – every drop counts,” and distributed them to all associates. Posters were put up in offices, manufacturing shops, and staff restaurants as part of a month-long awareness-raising initiative. The plants used World Environment Day and the accompanying campaign as the framework for a whole range of activities. Plant management in Bangalore received its ISO 14001 certificate at a high-profile official ceremony, and the facility in Nashik organized a tree-

planting drive. Banners over the entrances to the Jaipur plant also reminded the local population about the activities surrounding World Environment Day, while in Naganathapura, the occasion gave rise to a photo and “good ideas” competition centering on water conservation. During lunch breaks at the latter facility there were street theater performances aimed at raising associates’ awareness of the need to conserve precious water, and activities culminated in the distribution of cotton bags bearing the slogan of World Environment Day to the plant’s workers.

#### Saving water in Bangalore

Despite the growth in its sales during the period, the plant in Bangalore succeeded in cutting its consumption of fresh water by a third between 1998 and 2003, from 855 to just 570 cubic meters a day. The site makes use of many advanced wastewater treatment techniques. For example, the conditioning of wastewater from manufacturing and sanitation allows it to be recirculated for reuse many times over.



The multinational corporations in Brazil are a very important fraction of the local industry and are treated like Brazilian companies. What we do expect from them is that the technology they develop and use in their mother countries would be transferred through a process of building up the quality of local companies – with local engineers and local people. What we do expect as well is that multinational companies will also bring their environmental standards. My impression is that nowadays many multinationals have already decided that this is a good policy for them to follow.



Prof. Dr. José Goldemberg, Secretary for the Environment, São Paulo State (Brazil)

## The Americas

### “Zero waste” in Brazil

The complete recovery of all waste is the aim of “Descarga Zero,” or “zero waste”, the environmental program conducted by four sites in Brazil and one in Argentina. Since 2000, we have been implementing a wide-ranging raft of measures. These include both organizational controlling measures and cost-center-related waste documentation. We record all waste flows and stringently separate waste. Liquid waste such as emulsions or chemical bath agents are processed, and mineralbearing waste is reused for road construction.

We channel metallic raw materials into recovery processes, while wood waste is recycled or thermally reprocessed. Interim figures for the period from 2000 to 2002 reveal a 57 percent reduction in waste volumes passed on for landfill, and plans call for a further 50 percent cut by 2005. In recognition of its waste management achievements, the Curitiba plant has several times won the environmental prize awarded by a trade journal.

### Environmental prize for San Luis Potosí

In 2002, the Mexican environmental authority PROFEPA awarded the country’s San Luis Potosí site its Clean Industry Award. The body particularly lauded the comprehensive environmental program drawn up following an environmental audit, while the sanitary wastewater plant and the remediation of oil-contaminated soil earned praise too. The site is also evidence that improved environmental protection can have a positive effect on occupational safety as well: the plant has been accident-free for three-and-a-half years.

### Occupational safety prize for Albion

In 2003, the Albion site became Bosch’s first U.S. plant to receive the OSHA Star Award, a prestigious award recognizing occupational safety measures. The Occupational Safety and Health Administration (OSHA) makes the award to companies exceeding its standards on their own initiative. The effectiveness of these standards is borne out by the fact that companies participating in the OSHA occupational safety program record up to 80 percent less downtime.

### Brazil

After the U.S., the Bosch Group’s second largest overseas market is Brazil, where it is one of the leading suppliers of vehicle equipment. The largest facility in Brazil, Robert Bosch Ltda, is headquartered in Campinas and there are further manufacturing facilities in Aratú, São Paulo, and Curitiba, providing employment for some 10,200 people.



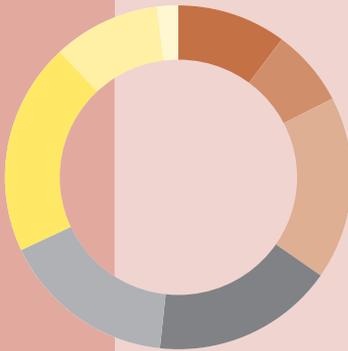
## Corporate citizenship

Bosch acknowledges its obligation to play an active role in society – an obligation stemming from its founder, its corporate constitution, and its values. Our commercial success directly benefits the community: the annual dividend of the Bosch Group funds the Robert Bosch Foundation, whose charitable projects help to overcome social challenges. We place great importance on harmony between our entrepreneurial actions and the interests of society as a whole. Bosch and its associates involve themselves actively in social and cultural projects at many sites across the world.

The Robert Bosch Foundation translates its founder's will into modern projects. It encourages young people to assume responsibility. ▶



**Aid granted by the Robert Bosch Foundation by program area**  
(grants for 2003)



■ Science in modern society, research at the foundation institutes	€ 4.98 m
■ Health, humanitarian aid	€ 3.54 m
■ International understanding I	€ 8.39 m
■ International understanding II	€ 8.26 m
■ Youth, education, civil society	€ 7.94 m
■ Investment in the Robert Bosch Hospital	€ 9.73 m
■ Promotion of research at the Robert Bosch Hospital and the institutes	€ 4.90 m
■ Non-autonomous foundations	€ 0.96 m
	<b>€ 48.70 m</b>

## Projects supported by the Robert Bosch Foundation

The Robert Bosch Foundation seeks to develop new approaches to the issues and problems confronting society by devising progressive concepts that are put into effect in model development projects in five program areas. Apart from the resources channeled into the foundation's own Robert Bosch Hospital and healthcare projects, the majority of the funds made available in 2003 went to projects to promote international understanding and initiatives focusing on youth, education, and citizenship.

### International understanding

The Foundation focuses on a number of objectives, including fostering relations between people in Germany, the U.S., Turkey, France, and the nations of central and eastern Europe. In 2003, the Foundation sought to strengthen fellowship between German towns and communities and their counterparts in the Czech Republic and Poland, setting up a competition focusing on partnerships between communities and their citizens. This gave rise to cross-border projects involving en-

vironmental groups, youth clubs, and educational institutions, which the foundation supported with grants of € 265,000 last year. In 2003, it hosted its first event in the new representative office of Robert Bosch GmbH in Berlin, devoted to the relationship between Europe and the U.S.. More than 200 guests gathered to discuss "Tomorrow's Europe in the transatlantic context" with former German President Richard von Weizsäcker and Robert Bosch Foundation scholars.

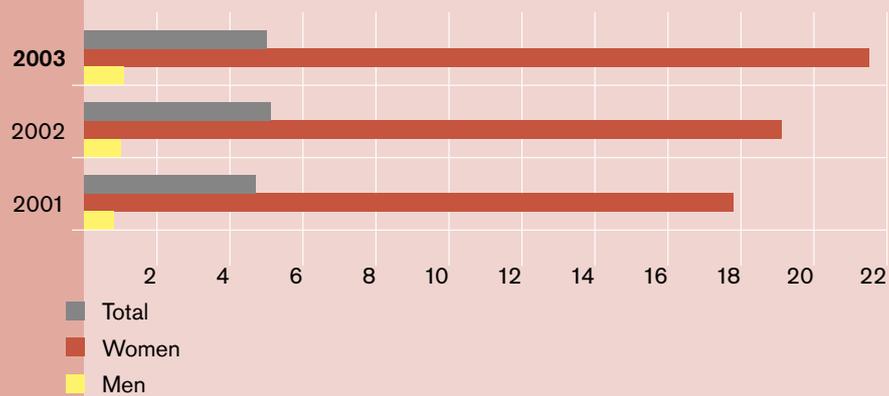
### Citizenship for young people

The Robert Bosch Foundation deliberately targets young people by setting up scholarship programs and competitions, such as the "Youth debates" contest. As an important prerequisite for genuine participation in civic society, students nationwide hone their skills in public speaking and debating. At a nationwide final in Berlin in May 2004, a jury then selected the winners. Students were also invited to a series of debates on social issues at the Robert Bosch Foundation's headquarters in Stuttgart.

### Report of the Robert Bosch Foundation

The Robert Bosch Foundation issues an annual report reflecting its charitable work and the focus of its support activities and programs, and setting out how its funds are used. In 2003, the Foundation granted a total of € 49 m to 802 projects. 70 percent of the projects supported were international in nature, with 55 percent of the funds going to recipients outside Germany.

**Part-time associates at Bosch Germany 2001–2003**  
(in percent)



Primavera's commitment also extends to supporting the "Tia Ieide" children's center in Campinas (Brazil).



## The company and society

### Principles of Social Responsibility

At the start of 2004, the Board of Management of Robert Bosch GmbH and the associate representatives signed a set of joint principles of social responsibility. The ten principles, which are based on the core labor standards of the International Labor Organization (ILO), address issues including human rights, equality of opportunity, the rights of children, and fair employment conditions. The principles continue our long tradition of assuming our responsibilities toward society, and are to be implemented worldwide throughout the company.

► [www.bosch-environment.com](http://www.bosch-environment.com)

> responsibility

It is important for the future that women – and not only mothers – enjoy improved opportunities to pursue their professional goals. Increasingly, too, men want to play a more active role in family life.

### Combining family and career

Programs that make it easier to combine career and family life are a vital element of Bosch's personnel policy. They include flexible working models such as part-time work, teleworking, or job-sharing, which are regulated by means of company agreements. Around five percent of the workforce in Germany currently practice some form of part-time working, and the trend is an upward one. There are internal and cross-company mentoring programs for women in particular, and a women's network has been active since 1995.

Further education is offered to new parents, continuing after they return to work. Bosch helps to organize childcare facilities, working with independent family service facilities. We have also set up an intranet-based childcare exchange.

### Bosch as a partner in the community

Bosch endeavors to maintain good relations with its neighbors and the surrounding community, as evidenced by Farmington Hills in the U.S., where we have operated a technical center since 1983. With some 1,340 associates, Bosch is one of the largest local employers, and an important partner in other respects within the region: the recent expansion of the buildings alone generated orders worth some 79 m dollars for the local economy. Bosch gets involved in the community by fostering charitable projects, especially in the field of education. On the occasion of the facility's 20th anniversary in January 2003, the local chamber of commerce honored our commitment with a "Good Partnership" award.



Some of the challenges faced in fostering greater community development include the need for companies to show complete commitment, especially the large scale companies which have greater impact in their activities. This implies greater collaboration and coordination from business, civil society and the public sector. All leaders need to recognize that there is a real business case for corporate responsibility, increased expectations of their customers, pressure groups, business partners, government and shareholders. Businesses could achieve their financial targets whilst still having a positive impact on the social and natural environments of which they are a part.



Deepak Sood, Head of the State Office of the Confederation of Indian Industry in Karnataka (India)

8,000 people took part in the "Nashik Run," raising around € 100,000 for charity. ▼



## Social involvement

Given its tradition, Bosch welcomes the active participation of its associates in welfare activities. Not only does this demonstrate an awareness of genuine values, and personal initiative, but it also contributes to society's acceptance of the company.

### Associates aid children in need

Back in 1990, Bosch associates in Germany set up an initiative known as Primavera, to help needy children at Bosch Group locations around the world. Individual associates, departments, and many clubs within the company get involved on a voluntary basis by collecting money or organizing benefit events. Such activities raised € 213,971 in 2003, money which benefited 18 projects, supporting child daycare centers, children's homes, orphanages, and schools for the disabled, primarily in Brazil and India.

The Primavera project Centro Promotional "Tia lleide", for example, aims to offer new hope and better educational opportunities for youngsters from a shanty town in Campinas, Brazil. What was initially a

simple crèche in a shack has developed over the years into a children's center surrounded by grassed areas, where trained staff offer their charges a wide range of educational opportunities. The staff looks after an average of 500 children and youngsters between three and 18 years of age, providing tuition in sport, music, and computing.

### Social initiatives in India

In India, the Bosch company MICO has been arranging its own fund-raising campaigns and aid projects for some years now. In 2004, the plant at Nashik organized its second Nashik Run, a benefit event that attracted 8,000 participants. Together with donations from other companies, a total of € 100,000 was raised for good causes in the community. In light of its great success, the Nashik Run will take place every year from now on. For MICO, the reason for this commitment is simple: "We do what we can to alleviate need, and in doing so we live up to the company's newly formulated values".

### Memberships

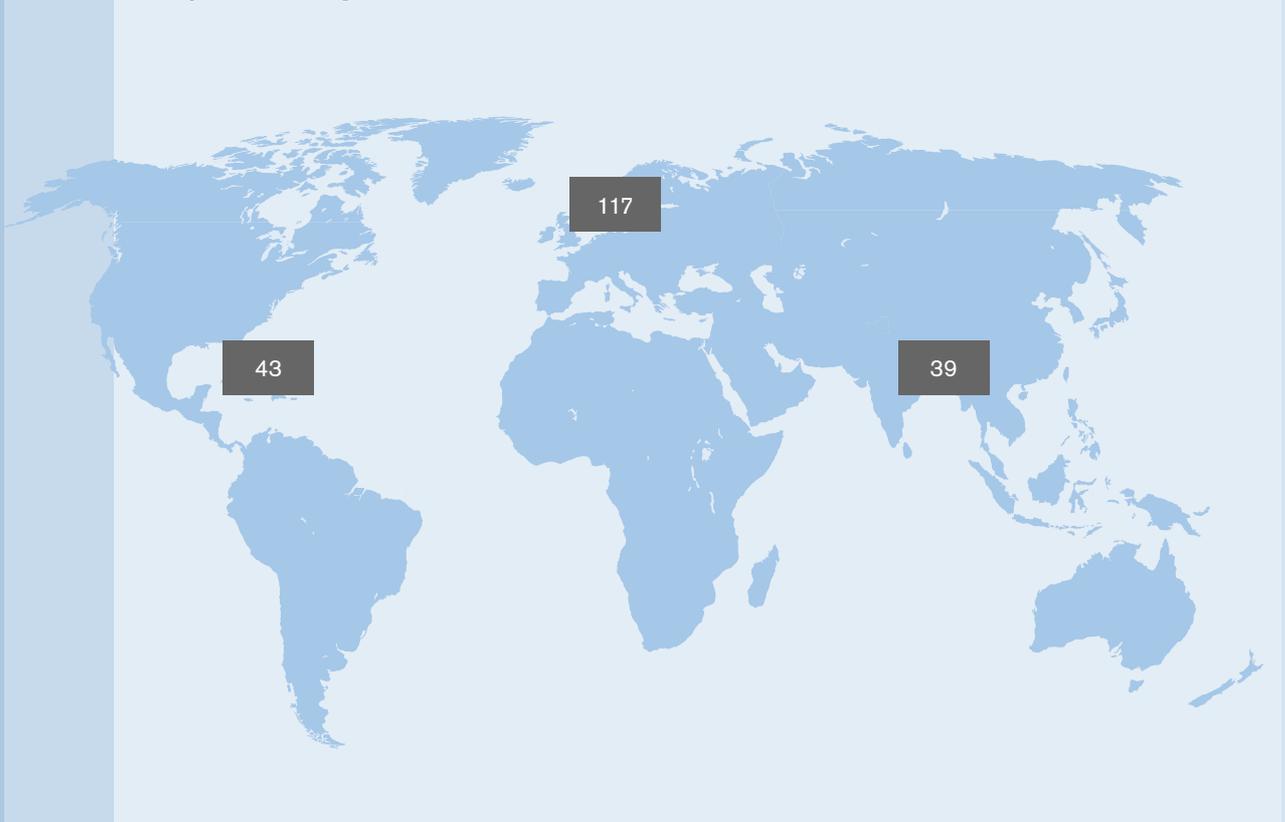
Robert Bosch GmbH has been a member of the German Business Ethic Network (DNWE), the national arm of the European Business Ethics Network (EBEN), since 1995. Since its inception in the year 2000, Bosch has belonged to econsense, a forum for sustainable development, which currently comprises 24 leading German companies.

## Global environmental data

The present report is the first time we have published consolidated environmental data for all Bosch manufacturing sites worldwide, broken down for the three large business regions of Europe, the Americas, and Asia-Pacific. Here, the reporting and the environmental program encompasses some 200 sites belonging to Robert Bosch GmbH, its subsidiaries, and the consoli-

dated affiliates. Buderus AG is also included for the first time. A total of almost 50 manufacturing sites operated by BSH Bosch Siemens Hausgeräte GmbH and ZF Lenksysteme GmbH are not included, however, as they are dealt with in separate environmental reports. Details relating to companies in which we have a minority interest have likewise been excluded.

Sites by continent/region



## Material and energy flows

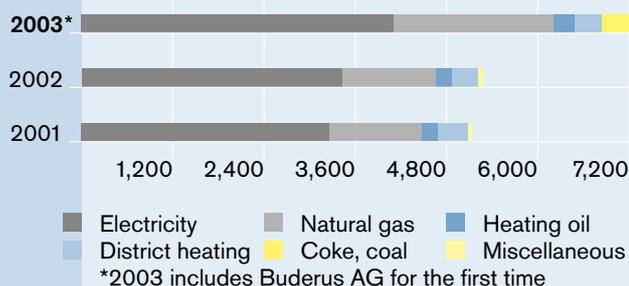
We have employed a new environmental information system to gather data relating to the material and energy flows of all the manufacturing sites of the Bosch Group worldwide. The year 2003 saw a marked increase in energy and water consumption as well as in the volumes of wastewater and other waste generated, a fact attributable almost entirely to the inclusion of Buderus

AG. However, increased production and sales also accounted for a small proportion of the rise. While wastewater volumes grew more or less in proportion to the increase in sales, sites were able to achieve modest improvements in efficiency with respect to energy and water consumption, emission levels and, in particular, waste volumes.

	Total	Total	of which	of which	of which
	Worldwide	Worldwide	Europe	America	Asia-Pacific
	2003*	2002	2003	2003	2003
Global sales, € m	36,357	34,977	67.5 %	18.1 %	14.4 %
Total associates	231,600	224,341	72 %	15 %	13 %
<b>Input</b>					
<b>Energy consumption (MWh)</b>	<b>7,307,817</b>	<b>5,283,577</b>	<b>77 %</b>	<b>11 %</b>	<b>12 %</b>
Electricity	4,084,583	3,398,288	74 %	16 %	10 %
Natural gas	2,102,726	1,227,378	88 %	9 %	3 %
Heating oil	281,579	215,488	65 %	1 %	34 %
District heat	348,358	346,458	35 %	0 %	65 %
Coke, coal	429,435	36,888	100 %	0 %	0 %
Miscellaneous	61,137	59,076	42 %	8 %	50 %
<b>Water consumption (m<sup>3</sup>)</b>	<b>22,194,575</b>	<b>18,046,091</b>	<b>79 %</b>	<b>9 %</b>	<b>12 %</b>
From public supply	8,931,400	8,559,268	61 %	15 %	24 %
From own sources	13,281,175	9,486,823	92 %	4 %	4 %
<b>Output</b>					
<b>Atmospheric emissions (t)</b>					
CO <sub>2</sub>	623,615	308,341	87 %	6 %	7 %
CO	89	56	82 %	7 %	11 %
NO <sub>x</sub> (as NO <sub>2</sub> )	727	445	84 %	8 %	8 %
SO <sub>2</sub>	91	68	67 %	1 %	32 %
<b>Wastewater (m<sup>3</sup>)</b>	<b>14,687,290</b>	<b>10,368,184</b>	<b>77 %</b>	<b>9 %</b>	<b>14 %</b>
Domestic wastewater	4,085,051	3,872,801	63 %	14 %	23 %
Untreated process wastewater	7,386,218	4,463,765	95 %	2 %	3 %
Treated process wastewater	3,216,021	2,031,619	52 %	18 %	30 %
<b>Waste (t)</b>	<b>916,840</b>	<b>723,824</b>	<b>67 %</b>	<b>29 %</b>	<b>4 %</b>
Waste for recovery	494,131	383,531	79 %	17 %	4 %
Waste for disposal	375,716	321,621	48 %	49 %	3 %
Demolition waste	46,994	18,672	82 %	3 %	15 %
*2003 includes Buderus AG for the first time					

### Energy consumption

(in gigawatt hours)

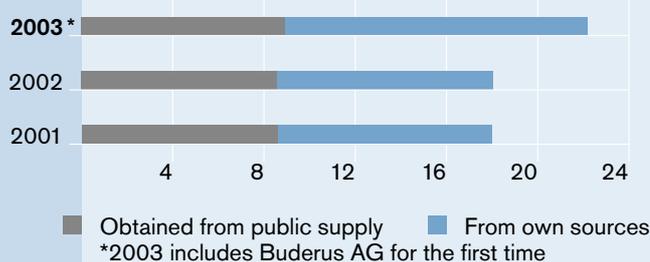


### Energy consumption

Overall energy consumption includes electricity, natural gas, heating oil, district heating, coke and other energy sources (miscellaneous). In 2003, the total figure rose – mainly due to the integration of Buderus – by 38 percent, to 7,308 GWh. The portion of total energy consumption accounted for by electricity fell by some 8 percent compared with 2002, while the figure for natural gas rose by around 6 percent to 29 percent.

### Water consumption

(in millions of cubic meters)

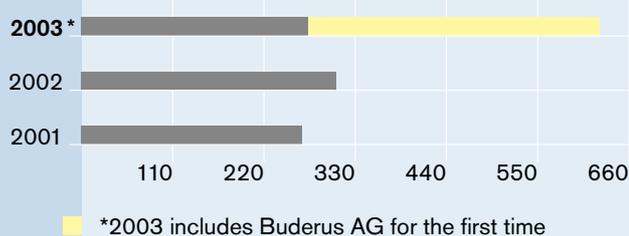


### Water consumption

The inclusion of Buderus AG was also reflected in the figures for water consumption, which increased by 23 percent to 22.2 million cubic meters. We take more than half our water needs from our own sources, and obtained less from the public supply network than in the previous year. Rainwater utilization, closed-loop circulation with water treatment, and other measures adopted by Bosch all contribute to water conservation.

### CO<sub>2</sub> emissions

(in thousands of metric tons)

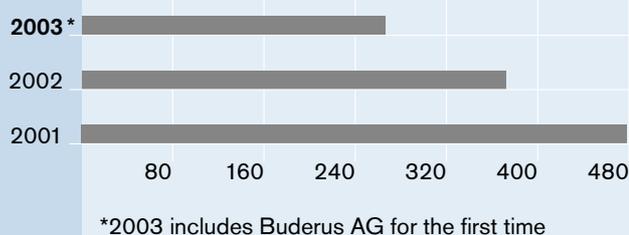


### CO<sub>2</sub> emissions (from heat use)

CO<sub>2</sub> emission levels are calculated from the figures for heat consumed. The heat used at Bosch is derived from natural gas (65%), coke/coal (13%), district heating (11%), and heating oil (9%). Emissions resulting from the generation of district heating are not taken into account when calculating CO<sub>2</sub> emission, as they do not arise on Bosch premises.

### Use of CHCs

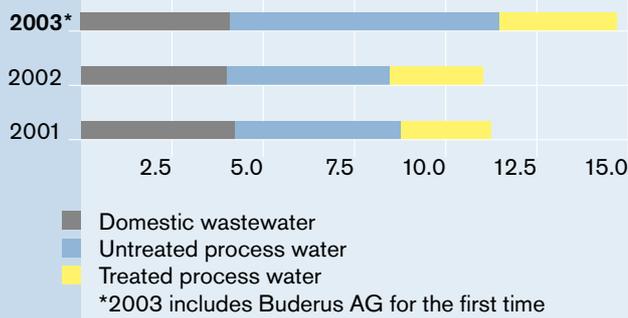
(in metric tons)



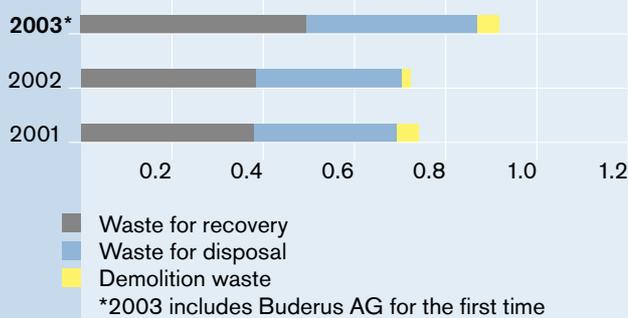
### Use of CHCs

The planned worldwide phasing-out of chlorinated hydrocarbons (CHCs) at Bosch provides for their gradual replacement by 2005. We have already succeeded in cutting CHC consumption, which fell from 1,100 to 372 metric tons between 1998 and 2002. Another eight sites ceased using CHCs during the period under review, reducing consumption further by approximately 28 percent to 266 metric tons. The largest remaining consumer (124.5 metric tons) is the Indian regional company MICO, whose plants are likewise set to discontinue CHC use by 2005.

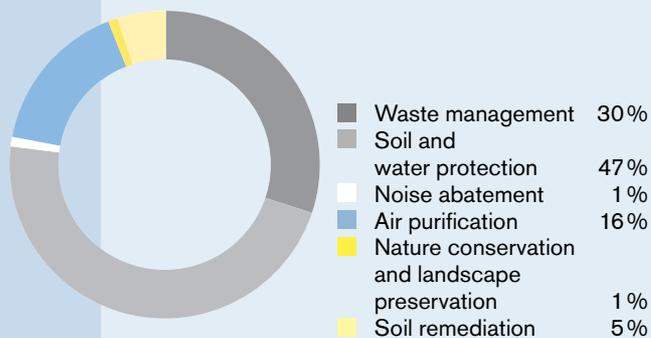
**Wastewater**  
(in millions of cubic meters)



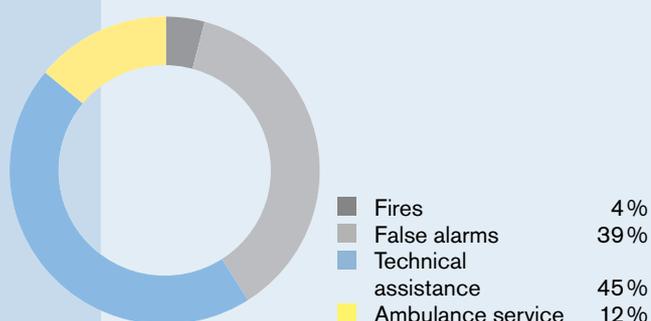
**Total volume of waste**  
(in millions of metric tons)



**Ongoing expenditure according to field of activity in Germany 2002 (total € 53 m)**



**Plant fire and rescue operations 2003 in Germany**



## Wastewater

Wastewater comprises domestic wastewater and treated or untreated process water. We were able to achieve a modest reduction in domestic wastewater volumes, while the increase in the amount of process wastewater is largely attributable to the consolidation of Buderus AG.

## Waste

A total of 916,840 metric tons of waste was generated during 2003, an increase accounted for by the inclusion of Buderus AG. Meanwhile, waste-cutting measures such as the “Zero Waste” program at the sites in Brazil and Argentina helped partially to offset this increase. The proportion of hazardous waste stands at around seven per cent.

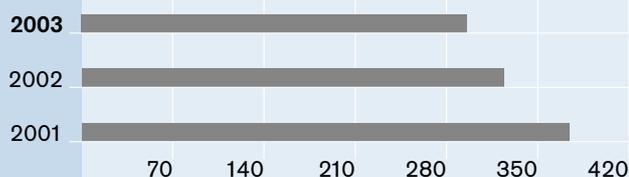
## Environmental protection costs and investment

We record current expenditure on environmental protection and investments related to environmental issues according to the provisions of the German law on statistics. Due to a change in official data collection procedures, collation of the figures for 2003 will take place later than usual. During 2002, ongoing expenses for environmental protection at all German sites amounted to some € 53 m. Most of the € 7 m investment spend went into the protection of soil and water.

## Fire protection and emergency control

With a total of 7,285 emergency deployments in 2003, Bosch’s plant fire and rescue services in Germany were called upon more often than in the previous year, an increase attributable to the data for Bosch Rexroth being incorporated for the first time. Requests for technical assistance were the most frequent reason for attendance, with 3,285 calls, while 2,828 false alarms were recorded during the period under review. The service extinguished 258 actual fires.

**Incidence of accidents at Robert Bosch GmbH in Germany** (number of occupational accidents)



### Occupational safety

Last year, the number of reportable accidents at work fell once more, from 324 to 296, none of which were fatal. Measured against the figures for occupational accidents per 1,000 employees of the comparable industrial sector, the Robert Bosch GmbH figures of 5.3 in 2002 and 4.6 in 2003 were far better than the 18.98 average incidence of accidents (2002). The comparative figure for 2003 was not available at the time this report went to press.



A new occupational safety logo was introduced in the course of the international harmonization of Bosch's safety standard in 2004. It symbolizes the associate, and the protection they are to be afforded during all their activities, and can be found on training material, signs, and other appropriate places.

## Environmental protection objectives of the Bosch Group

The company's environmental program sets out objectives, actions, and deadlines for the coming years. It is based on the principles for occupational safety and environmental protection drawn up by corporate management, and also documents

how well the objectives of previous years were attained. The manufacturing sites derive their own operational goals and actions from the management objectives that have been set out.

Objective	Date	Status	Actions and explanatory notes	Page
<b>Environmental management system</b>				
Complete uniformity of Bosch's internal environmental protection and occupational safety regulations (Bosch Standard).	2005	○	For historical reasons, there are many environmental protection and occupational safety regulations within the company. The Steering Committee is reformulating the individual rules.	11
Certification of all Bosch sites to ISO 14001	End of 2003	↑	To date, 132 Bosch sites, including all facilities belonging to the Automotive Technology Business Sector, have been certified, 111 of them by certification bodies.	16
	2005	○	Certification of the remaining sites according to a formalized plan. The plan for sites in Asia will be subject to further development in light of growth in the region.	
Increase in the proportion of integrated environmental, quality and occupational safety audits to 30 %	2006	○	Auditor training courses to comply with a new, modular concept	16
Site-specific adaptation of the integrated management system (occupational safety, fire and environmental protection, quality) worldwide	2002	↑	Adoption and augmentation of the company-wide management manual "Management System for Quality, Safety, Security and the Environment" by the business sectors and sites	15
Introduction of a uniform indicator system for site-specific implementation of Bosch's enterprise-wide environmental objectives	2004	→	Introduction of uniform environmental protection evaluation at all sites worldwide, according to site-specific indicators. Investigation of specific environmental indicators	16

Objective	Date	Status	Actions and explanatory notes	Page
Establishment of a combined internal reporting system at Bosch for occupational safety, fire and environmental protection	2004	○	Development of a web-based environmental information and reporting system for all manufacturing sites. Introduction of a new database developed on the basis of the existing energy and material flow register	16
Integration of environmental protection into supplier audits	2005	○	Similarly to the integration of environmental protection into the assessment of supplier potential, supplier audits are to include the systematic examination of environmental protection factors from 2005.	17
<b>Product-related environmental protection</b>				
Implementation of the EU's WEEE, RoHS, and ELV Directives	2004	○	Development of a disposal concept for the Thermo-technology Division. Intensification of the DfE program and the exchange of information within the DfE network	13 19
Improvements in recycling capability of Bosch products	Ongoing	→	Training in environmentally-oriented product design conducted according to a seminar concept revised in 2003	19
Substitution of hazardous substances in new products (chromium VI, lead, cadmium, mercury)	2003	↑	Implementation of restrictions on substances in the DfE Program. Bosch Standard N2580 imposes corresponding requirements on our suppliers.	19
Contribution to 25 % reduction in average automobile CO <sub>2</sub> emissions	2008	→	New product developments help meet the commitment by ACEA (European Automobile Manufacturers Association) to cut vehicle CO <sub>2</sub> emissions to an average of 140 g/km.	22, 25
Reduction in diesel vehicle exhaust emissions	2005	○	Further development, to series production, of the sintered metal particulate filter for diesel engines	21
<b>Production-related environmental protection</b>				
Preparation for EU-wide CO <sub>2</sub> emissions trading	2005	○	Determining of emission authorizations for the plants affected. Improvements in energy efficiency	14
Complete substitution of CHCs at all sites	2005	→	Between 1998 and 2003, Bosch reduced its use of CHCs worldwide from 1,100 to 266 metric tons. During the reporting period, eight sites ceased using CHCs. Measures aimed at the gradual replacement of CHCs have been defined at the remaining plants.	32, 42
Reduction of hazardous substances and risk potential	2004	○	Establishment of a cross-site hazardous substance management system, with a central archive for safety data sheets. Preparation of the Corporate Directive "Hazardous Substances"	32
Investigate and remediate contamination at the sites	Ongoing	→	Around 90% of the manufacturing sites in Europe have been investigated for contamination. The 1998 figure was approximately 70%.	32/33
Further development of waste management	2005	○	Integration of Bosch Rexroth into waste statistics and into waste disposal contractor audits. Reorganization of waste disposal contractor audits	35
Reduction in use of resources (energy consumption, water use, volumes of wastewater and waste)	Ongoing	○	Actions are carried out on a site-related basis.	31–35

↑ Objective achieved → Work in progress ↓ Objective not achieved ○ New objective

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The above publications and this Environmental Report are available both in English and German. They can be requested by e-mail from: [bosch@infoscan-sinsheim.de](mailto:bosch@infoscan-sinsheim.de)

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