



People, Environment, Products

2001/2002



*The Bosch Environmental Protection logo symbolizes clean water, healthy air, and a functioning natural environment. The closed circular shape is synonymous of the cycles of both nature and industrial production – encompassing product development, manufacture, and disposal at the end of product life. The logo’s Q-shaped appearance provides a visual association with the corporate Bosch-proprietary “quality” symbol, serving as an identifying mark for the pursuit of environmental protection at Bosch.*

## The Bosch Group Environmental Policy

### 1. Environmental protection as a corporate principle

Regard for environmental protection is one of our basic corporate principles. We consider product quality, economic efficiency and environmental protection to be objectives of equal importance.

### 2. Reduction of environmental impact

Environmental protection concerns all processes and modes of behaviour in the corporation. Moreover, this includes the economical consumption of resources as well as the accident prevention and the minimization of their effects.

### 3. Sense of responsibility of employees

Environmental protection is the concern of every employee. Creating and promoting among all employees a sense of responsibility for the environment is part of the managerial responsibility.

### 4. Continuous improvement

By way of a continuous improvement process, we are attempting to control and minimize the potential impact of our overall company activities on the environment.

### 5. Legality

Laws and regulations on environmental protection are being strictly observed.

### 6. Environmental technology

We are applying the best possible technology to protect the environment, taking into account economic aspects.

### 7. Environmental management

We have an environmental management system in place which we are subjecting to continuous development. The system includes an organization with clearly assigned responsibilities and defined delegation of tasks.

### 8. Contractors

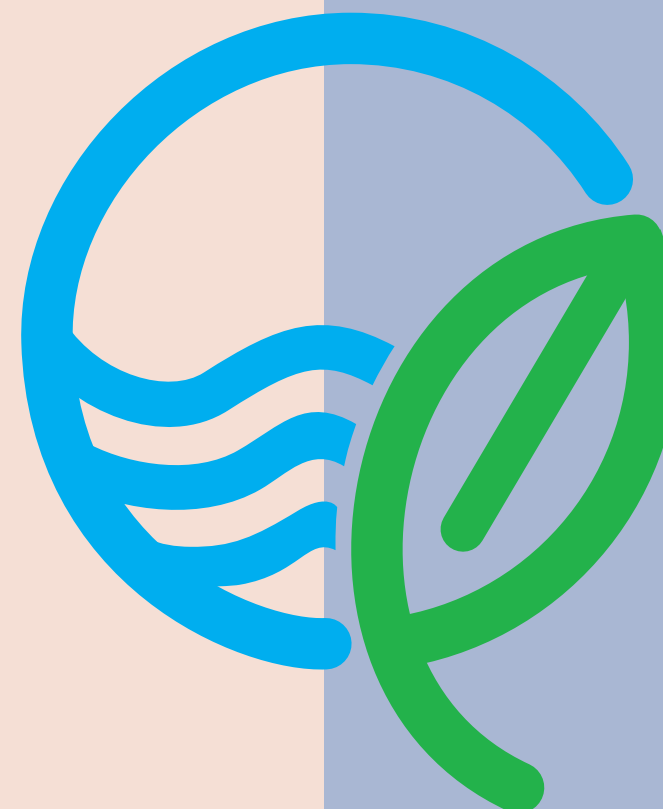
We involve contractors and suppliers in our environmental protection measures.

### 9. Public relations

We cultivate a co-operative relationship with authorities and an open dialogue with employees and the public.

### 10. Environmental control

We regularly review the compliance with these principles to ensure the effectiveness of our environmental management system. The results of the review are subject to evaluation. If required, corrective measures will be implemented in a timely manner.



**BOSCH**

## Overview of Bosch Group in Europe

Country	Int'l plate	Companies (Manufacture)	Contact/Information Robert Bosch GmbH	Contact/Information Bosch Rexroth AG	Sales by country EUR millions
Austria	A	Robert Bosch AG	www.bosch.at	www.boschrexroth.at	649
Belgium	B	Robert Bosch Produktie NV	www.bosch.be	www.boschrexroth.com	513
Switzerland	CH	Scintilla AG	www.bosch.ch	www.boschrexroth.ch	269
Czech Republic	CZ	Robert Bosch spol. s r.o.	www.bosch.cz	www.boschrexroth.cz	217
	CZ	Bosch Diesel spol. s r.o.			
Germany	D	Robert Bosch GmbH including subsidiaries	www.bosch.com	www.boschrexroth.com	9,404
Spain	E	Robert Bosch España SA	www.robert-bosch-espana.es	www.boschrexroth.es	1,417
	E	Bosch Sistemas de Frenado SL			
France	F	Robert Bosch (France) SA	www.bosch.fr	www.boschrexroth.fr	3,183
	F	Bosch Systèmes de Freinage SAS			
	F	e.l.m. leblanc SA			
	F	Geminox SA			
	F	Robert Bosch Electronique SA			
United Kingdom	GB	Atco-Qualcast Ltd	www.bosch.co.uk	www.boschrexroth.co.uk	1,760
	GB	Robert Bosch Ltd			
	GB	Worcester Heat Systems Ltd			
Hungary	H	Digital Disc Drives Kft	www.bosch.hu	www.boschrexroth.hu	91
	H	Robert Bosch Elektronika Gyártó Kft			
Italy	I	Robert Bosch Sistemi Frenanti SpA	www.bosch.it	www.boschrexroth.it	1,749
	I	Tecnologie Diesel Italia SpA			
	I	VHIT SpA			
Netherlands	NL	Robert Bosch Verpakkingsmachines BV	www.bosch.nl	www.boschrexroth.nl	489
	NL	Skil Europe BV			
	NL	Van Doorne's Transmissie BV			
Portugal	P	Blaupunkt Auto-Rádio Portugal Lda	www.bosch.pt	www.gustavocudell.pt	256
	P	Bomoro Portuguesa Lda			
	P	Robert Bosch Travoos Lda			
	P	Vulcano Termo-Domésticos SA			
Poland	PL	Bosch Układy Hamulcowe Sp. z o.o.	www.bosch.pl	www.boschrexroth.pl	410
Russian Federation	RUS	Bosch Saratov GmbH	www.bosch.ru	www.rexroth.ru	148
Turkey	TR	Bosch Fren Sistemleri Sanayi ve Ticaret AS	www.bosch.com.tr	www.rexroth.com.tr	248
	TR	Bosch Isitma Ürünleri Sanayi ve Ticaret AS			
	TR	Bosch Sanayi ve Ticaret AS			

Dedicated sales locations of Robert Bosch GmbH and its subsidiaries are located also in Bulgaria, Denmark, Greece, Croatia, Romania, Slovakia, Slovenia, Finland, and Norway.

The jointly operated BSH Bosch und Siemens Hausgeräte GmbH has locations also in France, Spain, Greece, Slovakia, Slovenia and Turkey. The ZF Lenksysteme GmbH is a 50% owned Bosch subsidiary.

Information and contact options may be accessed on the Internet at [www.bsh-group.com](http://www.bsh-group.com), [www.zf-lenksysteme.com](http://www.zf-lenksysteme.com), and [www.boschrexroth.com](http://www.boschrexroth.com)

Coporations of Bosch Rexroth AG, a wholly owned Bosch subsidiary since 2002, operate locations also in Bosnia and Herzegovina, Bulgaria, Denmark, Estonia, Finland, Greece, Ireland, Iceland, Croatia, Latvia, Lithuania, Luxembourg, Malta, Northern Ireland, Norway, Romania, Sweden, Slovakia, Slovenia, Ukraine, and Belarus.

Corporate indicators Bosch Group worldwide	2001 EUR billions	2000 EUR billions
<b>Sales</b>	<b>34.0</b>	<b>31.6</b>
<b>Europe</b>	<b>22.2</b>	<b>20.7</b>
<b>in Business Sectors:</b>		
- Automotive Technology	23.2	22.5
- Industrial Technology	3.2	1.2
- Consumer Goods/Building Technology	7.6	7.5
<b>Research and development expenses</b>	<b>2.3</b>	<b>2.0</b>
<b>Fixed-assets investments</b>	<b>2.4</b>	<b>2.1</b>
<b>Depreciation of fixed assets</b>	<b>1.9</b>	<b>1.8</b>
<b>Employees, annual average (Thsd.)</b>	<b>218</b>	<b>197</b>
including domestic	99	91
including foreign	119	106
<b>Personnel costs</b>	<b>10.0</b>	<b>9.0</b>
<b>Total assets</b>	<b>27.8</b>	<b>24.5</b>
<b>Fixed assets</b>	<b>9.3</b>	<b>8.4</b>
<b>Equity capital</b>	<b>9.0</b>	<b>8.3</b>
<b>Cash flow</b>	<b>3.7</b>	<b>3.7</b>
<b>Net income for the year</b>	<b>0.7</b>	<b>1.4*</b>
<b>Unappropriated earnings (Dividends of Robert Bosch GmbH)</b>	<b>0.05</b>	<b>2.6*</b>

\* Special dividend due to "pay-out-and-reinvest procedure" at Robert Bosch GmbH

## Preface

Dear Reader,

"The products, the services, and beyond these the entire entrepreneurial approach must provide a benefit to society."

As documented by this quotation from company founder Robert Bosch, the assumption of responsibility vis à vis society and future generations is a venerable tradition that pervades our entire enterprise. Ever since the time that Robert Bosch was farsighted enough to introduce social programs for his employees and their relatives, the marriage between economic objectives and social and ecological aspects has continued to make good sense. This attitude also gave rise to the establishment of the Robert Bosch Foundation as a charitable organization.

For almost 30 years, our "3-S Program" has defined the guidelines for the development of future automotive technology within the Bosch organization under the motto "Safe, Clean, Economical". The result are thousands of products that pave the way to increased safety, consistent decreases in energy consumption and reduced emissions. As we move forward, we shall continue to increase safety, while at the same time reducing fuel

consumption and exhaust emissions, and bringing to market competitive products and attractive innovations for our customers. For example, we were there when automakers were turning the three-litre and one-litre automobile into a reality.

The nineties saw the introduction of the Continuous Improvement Process (CIP), and its adoption across all corporate borders within the Bosch Group. In the year 2000, proven and innovative objectives were formulated into the "BeQIK" guidelines, supporting each employee in his activities aimed at securing quality (Q), consistent innovation (I), and improved customer relations (K). This orientation provides firm footing for decision-making at all levels.

On the following pages, we would like to introduce to you some of the activities carried out, results achieved, and objectives defined by Bosch personnel with regard to environmental protection, economic viability, and social commitment right across European Bosch Group companies.

And we also invite your responses, your contribution to the discussion, and your complementary questions.



Hermann Scholl



Bernd Bohr

*Hermann Scholl (at left), Chairman, Board of Management of Robert Bosch GmbH, and Bernd Bohr (at right), Member, Board of Management of Robert Bosch GmbH (Environmental Protection portfolio).*



## Review and Outlook

*Robert Bosch GmbH published its first Environmental Report in 1999. The response was so great that, of the print run of 20,000 German and 10,000 English-language copies, not a single copy remains today. The current Environmental Report, Annual Report, and additional brochures may be downloaded on the Internet or Intranet as a PDF file from [www.bosch.com](http://www.bosch.com). They may also be ordered in printed form.*

### European location profiles

“Bosch is obviously a very forward thinking firm with regards to environmental management”. That is one of the assessments of the first Bosch Group Environmental Report dedicated to German locations. The quotation comes from one of the 29 students at the University of California at Berkeley ([www.ce.berkeley.edu/~horvath](http://www.ce.berkeley.edu/~horvath)) who evaluated the report within the framework of a semester assignment.

We were encouraged to continue the dialog with you, our reader, by hundreds of replies, queries and suggestions received from the public, from customers and our own employees.

Published by the worldwide Bosch Group, the brochure you are holding also reflects your earlier feedback suggesting that we accompany the first Environmental Report with information depicting our initiatives for man and environment as a reflection of our products and locations in Europe.

In this context, basic statements apply to the worldwide Bosch Group. The next report, to be published two years from now, will furnish you with greater detail about Bosch locations all over the world.

To keep this report well-organized and readable, we have limited the data material to essentials. Those examples that we use to present to you the kaleidoscope of various aspects at our locations shall stand as cases in point for the Bosch Group in Europe. For the better understanding for readers unfamiliar with the inner workings of our organization, we have divided the business sectors by product.



Detailed information is available on the Internet. It should be stated however, that we are not merely printing data related to environmental protection, augmented by improvements made since 1999. Instead, we have enlisted the cooperation of Bosch people across Europe in gathering information related to the social facets of our company's operation.

On the one hand, it is our intent to inform environmental protection leagues, schools, authorities and scientific institutions, and to keep our customers and partners, among them retailers, major customers and OEMs, informed of our progress. On the other hand, we wish to address our employees, both domestic and foreign, and provide their respective neighbors and municipal authorities with insight into our activities.

All of our readers will agree: We are justifiably proud of much that has been achieved so far. We also know that our common efforts shall have to continue for quite a while.

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*Social commitment, as contemplated by Robert Bosch*

*Whenever the sponsored competition "Young Ways In Europe" initiates youth partnerships between Germany and Central and/or Eastern Europe, the Robert Bosch Foundation is a major sponsor. Since its formation in 1964, the foundation has disbursed roughly 540 million euros for charitable causes. In the years 2000 and 2001 alone, donations amounted to 37.3 million euros and 40.1 million euros, respectively. A large part of these funds went to activities promoting understanding among nations. At the time, the original goal of company founder Robert Bosch had been the reconciliation between France and Germany. Today, the funds are used mainly to promote contact with the peoples of Central and Eastern Europe. Additional points of focus are the promotion of science in society, of health and humanitarian assistance, youth, education and civic organizations.*

[www.bosch-stiftung.de](http://www.bosch-stiftung.de)

## Worldwide Bosch Group Locations

Effective in 2001, the Bosch Group consists of three business sectors instead of the previous four:

- Automotive Technology
- Industrial Technology
- Consumer Goods and Building Technology

A few years after Robert Bosch opened his "Workshop for Precision Mechanics and Electrical Engineering" in Stuttgart, a first representation opened in London, followed a little while later by a second in Paris. Today the Bosch Group, one of the largest industrial enterprises in Germany, is characterized by its international orientation. With its subsidiaries and joint venture companies, Bosch is represented on every continent and in more than 50 countries. The company manufactures at 227 locations, 171 of which are outside of Germany. About 92% of the capital stock of Robert Bosch GmbH is held by the Robert Bosch Stiftung GmbH, a foundation which carries on the charitable efforts of the company founder. Of the total 34 billion euros in sales generated by the Bosch Group in 2001, 72% was earned in foreign markets. In 2001, 54% of the total workforce of 218,000 were working outside of Germany, compared with 35% in 1990.

A list of Bosch locations in Europe is available on the Internet at [www.bosch.com](http://www.bosch.com)

### Automotive Technology

With 143,400 employees and sales of 23.2 billion euros (approx. 68% of total sales), this business sector is the mainstay of the Bosch Group. In the worldwide marketplace, Bosch is one of the largest independent manufacturers of automotive technology. Bosch-produced injection technology for internal combustion engines (diesel and gasoline), such as common rail (CR) and unit injector systems (UIS) or gasoline direct injection, assist in the reduction of automotive fuel consumption.



*Diesel fuel direct-injection systems are the prerequisite for economical, low-emission engines.*

Another major business area produces systems for active and passive automotive safety, among them the antilock braking system (ABS), electronic stabilization program (ESP), adaptive cruise control (ACC) and, since 2001, the electrohydraulic braking system (SBC).

The product range also encompasses electrical machines such as starters, alternators and small motors. There are also the mobile communication products, i.e., car radios, navigation and driver-information systems, produced by our Blaupunkt subsidiary.

### Industrial Technology

Effective May 2001, the Industrial Technology business sector completed a structural reorganization. The integration of Mannesmann Rexroth AG with our Automation Technology sector added the enterprise named Bosch Rexroth AG to the Bosch Group. The firm perceives itself as "The Drive & Control Company". The total workforce of 29,300 in this business sector has generated sales of 3.2 billion euros in 2001.

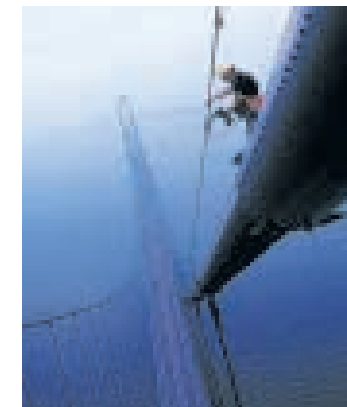
The various divisions of Bosch Rexroth AG are involved in the fields of industrial hydraulics, pneumatics, assembly and linear-motion technology, electric drives and controls, plus mobile hydraulics and service. The products of the Mobile Hydraulics unit are designed for applications in agriculture, conveyor technology, and construction machinery. As a world-first in the field of industrial hydraulics, the digital one and two-axis controller HNC 100 is the first-ever interconnection between fluid power and the SERCOS open controller-to-intelligent digital drive interface.



*Drive motors, controls, and the anchoring and stabilization system of giant ferris wheel "London Eye" are Rexroth products.*

One of the responsibilities of the Bosch Packaging Technology business sector is to put fresh and well-packaged yoghurt on the breakfast table. Bosch supplies packaging technology to customers in the food and tobacco, confectionery, pharmaceutical, chemical and cosmetics industries.

A world-first is a filling and sealing machine for cylindrical ampoules used by the pharmaceutical industry. A laser beam seals in the medicine, clearly reducing the risk of contamination.



*Bosch power tools are put to work in the most unusual places – here it is the bridge spanning the Great Belt.*

### Consumer Goods and Building Technology

Bosch is one of the leading manufacturers of power tools. Worldwide, power tools, extensive accessories and motor-driven garden tools are produced at 27 locations and sold in 94 countries. Roughly 87% of sales are generated in foreign markets.

In the Thermotechnology business sector, Bosch is one of the world's foremost manufacturers of gas-fired hot-water heating systems; in Europe, Bosch is among the major makers of gas-fired hot-water appliances. Key focus in engineering and manufacture remains environmentally compatible operation. In 2000, the business sector introduced a world-first with a hot-water appliance that works independently of mains power and batteries.

The Home Appliances business sector has been operated jointly and with equal participation by Bosch and Siemens AG since 1967. The product spectrum ranges from refrigeration and freezer appliances to cookers, ovens, automatic washing machines and dishwashers, right down to air-conditioning and floor-care appliances. Manufacturing involves a workforce of roughly 36,500 at 40 locations. Total sales approximate 6.1 billion euros.

Through its Security Technology division, the Bosch Group develops and produces alarm systems and system components, and provides associated services.

The Bosch Group is also active in the area of broadband communications.



## People, Environment, Products: Future Compatibility in the Bosch Group



*It is safe to say that the subject of "social responsibility" has already been in fashion at Bosch for over 100 years.*

*Company founder Robert Bosch stands as the example of a man given to an all-embracing approach, and as one who saw the importance of introducing social aspects to his enterprise.*

*Therefore, social responsibility toward our employees, our fellow human beings at home and abroad and, most of all, our future generations, is a philosophy whose tradition continues to be nurtured at all Bosch Group locations.*

*With this report, we would like to take the opportunity to introduce to you some highlights and little-known facets of our social commitment.*

If we intend to pass on today's living standards to the generations to come at the same level or better, focusing on environmental protection is simply not enough. In this context, the term "sustainability" has been a much-discussed catchword for several years. If you are unable to find this term in our report, the reason is that we do not wish to use this word because it has been used excessively in a variety of very different contexts. Instead, we see more value in speaking of future-compatible behavior, that is, responsible long-term action on behalf of man and the environment, without losing sight of the relevant economic aspects.

As we idealize a society capable of living and acting responsibly and economically in the long term – a society that sees as its goal the vision of "living off the interest" of its social and economic systems, while preserving the "capital" as a basis for the life of future generations, we know we still have a lot of road to cover. Yet Bosch is contributing its share to the vision in several ways:

On the one hand, by developing more effective products and efficient technologies, such as modern gas-fired hot-water heating systems with the highest efficiency ratings, closed materials circulation in the life

cycle of power tools, or automotive technology facilitating increasing safety in conjunction with decreasing energy consumption. Add to this the maximum preservation of resources by washing machines, dishwashers and refrigerators.

On the other hand, we get involved in making our company a place where people enjoy working. Besides interesting job profiles, we also provide opportunities for continued education, worldwide exchange programs and numerous cultural and sports activities.

In addition, we place great emphasis on responsible cooperation with the society in which we live.

This includes a number of activities promoting physical health, science and culture, opportunities for interns, diploma students and doctoral candidates of a variety of disciplines. Also, we engage in concrete aid programs, from tree-planting drives to assistance in the rescue and accommodation of earthquake victims.

While all of these activities contribute to our strength, they are essential prerequisites for a successful economic future.



*First aid for earthquake victims in Yalova, Turkey*

*After the August 1999 Bursa earthquake in Turkey, personnel from the local Bosch plant provided first aid, using company vehicles to organize rescue and ambulance services. Funding came from Bosch, augmented by worldwide employee donations. The "Earthquake Auxiliary" distributed children's clothing, and provided the logistics for supplies brought in from German Bosch locations.*

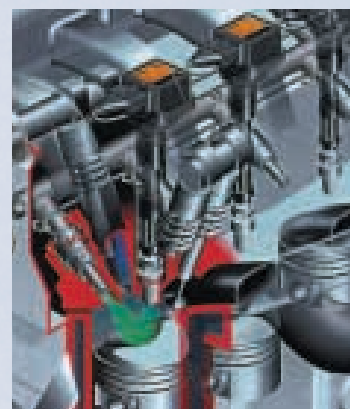


## The "3-S Program": Safe, Clean, Economical

CIP and BeQIK guidelines for improvement

In 1991, the start of the Continuous Improvement Process (CIP) gave rise to projects aimed at improving procedures, structures and corporate culture. Employees are involved in every phase. Following the BeQIK guidelines, they agree with their managers on goals and actions for the implementation of improved quality, innovation, and customer orientation. Within the framework of the subproject named "Time To Market", we were able to accelerate procedures and improve process quality. The subproject "Customer Focus" has yielded significant improvements. Aside from quality and delivery performance, here we are concentrating on so-called "soft factors" that play a vital role in the way we perceive a customer's needs.

Our development efforts on automotive components and systems are aimed at reducing fuel consumption and emissions of automobiles. Beyond that, we are making major contributions to the development of new systems that provide the motorist with more safety.



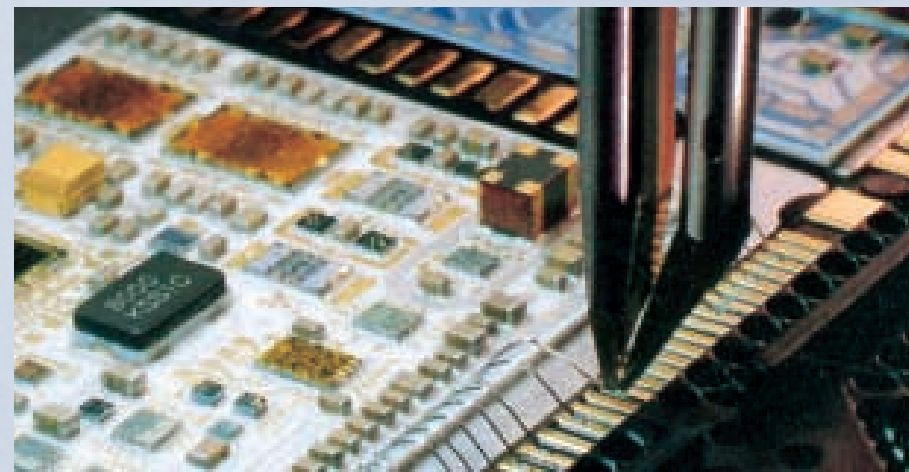
Gasoline fuel direct injection (Motronic MED7) facilitates higher performance with lower fuel consumption and reduced emissions.

This guideline applies to all of our products. It was formulated in 1974 under the auspices of the "Safe, Clean, Economical" campaign as the so-called "3-S program".

### Electromechanical drivetrain

Modern diesel engines, direct injection and additional exhaust treatment systems reduce fuel consumption and emissions. It is also our objective to continue the optimization of transmission ratio and/or energy conveyance in accordance with the driver's torque demand and attendant fuel consumption. To this end, we are continuing the development on electronically controlled transmissions and the electromechanical drivetrain.

The CVT automatic transmission adapts the transmission ratio on a continuous basis. When combined with the appropriate operational strategies, it reduces fuel consumption.



### Safe behind the wheel

Again and again, our development work aimed at improving active and passive vehicle safety produces innovations such as the antilock braking system (ABS) or the electronic stabilization program (ESP).

The latest advance in brake technology engineering is the electrohydraulic braking system (SBC), which Bosch developed jointly with a vehicle manufacturer.

In the manufacture of the electrohydraulic brake, the connection between control unit and plug connector contacts uses aluminum wiring with a thickness of a mere 200 micron.

This brought the world's first "brake-by-wire" system to series production. Facilitating the transmission of braking commands to the wheel brakes via a combination of electronics and hydraulics, it is yet another step toward faster brake response and greater braking comfort.

### Best cruising speed – at a distance

Wherever possible, the adaptive cruise control (ACC) maintains the speed set by the driver while automatically accelerating and braking to maintain the safety distance from the vehicles ahead.

### Full-circle electronic safety

One of our business units, whose work might be aptly described as "Electronic 360-degree Vision", develops systems that enclose any vehicle in a "virtual safety belt".



Juggling brakes and accelerator, the ACC Automatic Cruise Control maintains a safe distance, automatically



Capturing both the exterior and interior of a vehicle, the cameras of the "Video Sensor Project" are able to detect that a seat is unoccupied, and that, in case of a mishap, triggering the associated airbag will not be required.

The sensor systems also monitor road surface motion, alerting the driver when he is inadvertently straying from his lane. The video systems are also capable of recognizing traffic signs, on the basis of which they issue recommendations to the driver; they may also impose preconditions upon detection of a safety hazard.

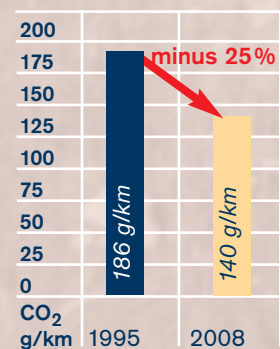
The new CARTRONIC® organizational concept for the on-board electronics facilitates the networking and optimization of subsystems such as engine management, braking and steering systems, energy management and driver assistance systems, also with respect to fuel consumption and emissions.

When filling up with sulfur-free fuel, Hermann Scholl, Chairman of the Board of Management, sets an example.

At Bosch in Germany, all drivers of leased company vehicles are requested to use sulfur-free gasoline. This improves the efficiency of the electronically controlled catalytic converter, reducing exhaust emissions by 15%. As a result, over seven metric tons of carbon monoxides and 1.4 tons of hydrocarbons are prevented from being expelled into the air we breathe.

The automotive industry is committed to reducing fuel consumption and CO<sub>2</sub> emissions by 25% from 1995 values by 2008.

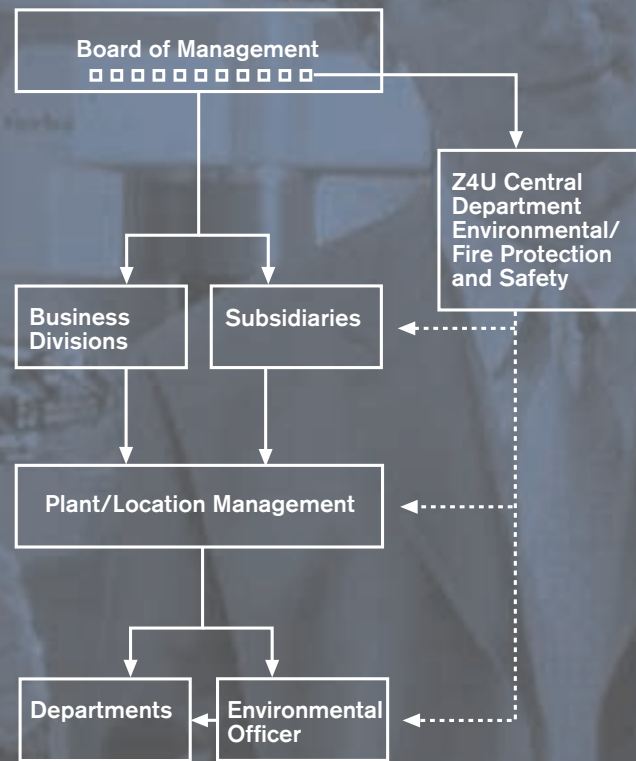
■ Average CO<sub>2</sub> emissions in Europe  
■ ACEA assent for 2008





Within the Bosch Group, environmental protection represents a corporate principle, ranking equally with product quality and corporate profitability.

## The Bosch Group and Environmental Protection



## Quality, Occupational Safety, and Environmental Management

The introduction of environmental management systems (EMS) at all locations was ratified in 1995. Since the introduction of the integrated management system in 2001, all of our locations worldwide have been working in adherence to a standardized manual governing quality, environmental and fire protection, as well as occupational safety. Its basic process-oriented approach facilitates the utilization of synergies between these areas. The manual covers appropriate certifications in accordance with international standards, among them the EMAS, ISO 9000/14001, ISO/TS 16949, QS 9000, and VDA 6.1. Certifications based on these standards shall be completed by the end of 2003.



Certification of environmental management system at the Bari, Italy location

As early as 1973, the company defined the first binding guideline dedicated to environmental protection. While it has undergone several revisions and expansions in the interim, all employees are obliged to implement every facet of this policy within their functional sphere, and to their best ability. To this end, we provide our people with information explaining their responsibilities as well as the effect their work has on the environment.

We have never moved our production to another manufacturing location with the objective to get around the requirements for environmental protection imposed by individual countries. On the contrary: In each country, we manufacture our products using the same technology and the same environmental protection requirements, as well as all attendant expenditures for environmental protection facilities, measures and target objectives. The environmental protection standards set by our corporation not only meet the stringent requirements imposed in Europe but are also observed worldwide.

In all countries, we place great emphasis on adherence to national directives and statutes. In the event that there are no legal requirements, we search

for solutions that rule out the occurrence of environmental hazards.

At our location in Abrantes, Portugal, we established two waste disposal sites for asbestos-bearing waste in 1995 and 1999. These landfills are also being used by the municipality.

In Breda and Tilburg, Netherlands, we have decommissioned subterranean tanks for substances harmful to water, although these comply with national law. The facility was replaced by above-ground tanks.

### Environmental protection is top priority

The responsibility for environmental protection is an explicit task being handled by

the Board of Management in Stuttgart, which is also the location of the Central Environmental Protection department. Each plant/location manager is charged with enforcing the applicable corporate policy in his own plant. He is assisted by the environmental officer. In some countries, conservation coordinators have been appointed.

Environmental management means that all charge personnel know their obligations concerning environmental protection. Environment-related procedures and targets are clearly defined, and contribute to the continuous improvement of environmental protection. Individual locations outline and document their processes, facilities, procedures, and their influence on the environment.

### International pool of auditors

At all locations, the EMS is subjected to an internal environmental audit in a 3-year rotation. To-date, we have trained 187 of our own personnel in Europe to perform eco-audits, which they now carry out on a regular basis. Internal auditing has its advantages: Instead of performing audits in "their own" plant, they work independently and objectively at other locations.

The resulting transfer of knowledge and skills inures to the benefit of the entire Bosch Group. External audits have confirmed the high competence level of the internal variety.

On each location, auditors—with increasing recruitment from the quality control area

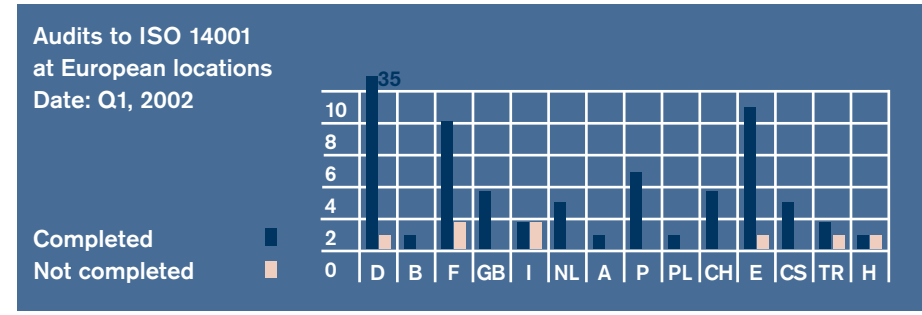
anticipated in the near future—check and evaluate actions taken and the behavior of management and employees. Suggestions for improvement are then released as part of the audit report.

### Exchanging views and networking

Conservation officers and eco-auditors maintain a lively exchange of views and ideas through study groups and personal contacts. Networking activities of this kind facilitates the communication of excellent solutions found at specific locations, and their availability to all—indeed an excellent basis for the continuous improvement of our EMS.

### Information and sensitization

In England, its name is "World of Bosch", in Castellet, Spain, it is "RBEC Informa", and in France, it is called "Contact". In numerous company and location newsletters across Europe, we are reporting on the introduction of the EMS and offer suggestions for increased environment-consciousness in daily life. Anyone wishing to deepen his knowledge of this subject matter will find detailed information about internal and external environmental care requirements at [www.intranet.bosch.com/Z4U](http://www.intranet.bosch.com/Z4U).





Less packaging, more environmental protection

We shall continue to minimize packaging also in the future. In Alcalá de Henares, Spain, the proportion of reusable packaging rose from 24% to 49% in 2000, and to 60% in 2001. Target for 2002 is set at 65%.

## Bosch Group Global Environmental Protection Objectives

Objective	Status	Explanations on status	Deadline
<b>Environmental management system</b>			
Worldwide introduction of environmental management system	+	Environmental management with worldwide applicability is implemented at all locations. These are certified in accordance with a defined schedule.	2000
External certification of all Bosch locations, as per ISO 14001	▲	Refer to page 12 for current certification status in Europe. On a worldwide basis, more than 120 Bosch Group locations have been certified to-date, one-third of these were carried out by external experts.	Late 2003
Worldwide: location-specific variety of integrated management system (occupational safety, fire and environmental protection, quality)	▲	Refer to page 13 for comments about the integrated management system.	2002
<b>Product-specific environmental protection</b>			
Increase of product recyclability	+	"Design for Environment" (DfE) project teams define appropriate product design already during research and predevelopment (refer to pages 34/35).	Continuous process
Substitution of hazardous substances in new products (lead, cadmium, chromium, mercury)	▲	Procedure is embedded in DfE (Design for Environment) process (refer to pages 34/35)	2003
Contribution to reduction of average CO <sub>2</sub> emissions of passenger cars by 25%	▲	Depiction of commitment by European Automobile Manufacturers Association (ACEA) and fuel-saving product developments (refer to pages 10 and 38/39).	2008
<b>Manufacturing-specific environmental protection</b>			
Reduction of specific energy consumption	+	Implementation of measures is location-specific (refer example on page 17).	Continuous process
Continued reduction of waste volumes	-	Progress has been largely stagnant during review period. Waste volumes in Germany remained almost flat in the period between 1998 and 2001, also in relation to sales.	Continuous process
Increase in proportion of reusable and multiple-packaging	+	At almost all locations we successfully utilize grid boxes for transport, and deploy reusable freight platforms such as the Europallet.	Continuous process
Complete substitution of CFCs in Germany; similar substitution goal in overseas locations	▲	During the 1998–2001 review period, the use of CFCs was curbed decisively from 1,100 to 471 metric tons. Its use continues only in a few plants in which the necessary actions for full substitution have already been defined.	2005
Completion of pending remediation of inherited burdens at locations	+	The tally so far includes European locations. The 1998 figure was approx. 70% (refer to page 29).	Continuous process

Target reached + Target shortfall - In progress or targets added during review period ▲

Robert Bosch was among the first members of the "Association for Bird Protection" (BFV), the organization that gave rise to today's NABU nature protection association.

## Environmental Protection Initiatives

scroll saw blades made of recycled cardboard.

In Germany, prizes are awarded for suggestions put forth on the occasion of annual Environment Day.

Part of the donations collected on Environment Day at the Leinfelden location goes to the NABU (Conservation federation Germany e.V.), and is earmarked for the protection of local birds ([www.nabu.de](http://www.nabu.de)).

Acacias, olives, cypresses – all are tree species planted by Bosch in Bursa, Turkey jointly with the local municipality, with the objective to combat the effects of soil erosion. Most of the trees found a home in parks and on children's playgrounds. In a similar effort, 18,000 oaks were planted in the course of the largest tree-planting campaign in cooperation with TEMA (Turkish Foundation for Combatting Soil Erosion, for Reforestation and the Protection of Nature).

[www.tema.org.tr](http://www.tema.org.tr)

Up to now, innovative ideas related to recycling or environmentally compatible packaging were implemented by the power tools division within the framework of the Environmental Action Campaign for the Nineties (AUF90). Out of 1000 suggestions submitted by employees, 650 were implemented over a 10-year period.

Effective in 2000, this initiative was renamed SUN21 (Safety for Us and Nature in the 21st Century); besides our employees, it also involves customers, suppliers, and regulatory bodies in environmental protection activities.

Employees in St. Niklaus, Switzerland initiated the expansion of roof-borne green growth, and also developed a single-piece package for

Donations are collected not only for earthquake victims and similar emergencies but also for environmental programs and aid projects in Third-World countries.



Primavera helps

More than 1,000 children and young people in Brazil and India are receiving aid and medical care – a feat unthinkable without the dedicated effort by the Primavera Third-World Aid association. Founded in 1990 by Bosch employees, the association has organized charity concerts and fund-raising drives ever since. By the end of 2000, total revenues had grown to 917,095 euros. The funds are used to set up day-care centers and support orphanages.

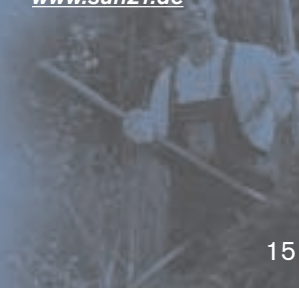
[www.intranet.bosch.com/primavera](http://www.intranet.bosch.com/primavera)



Early in 2000, SUN21 started with its web site on the Internet.

Information about environmental protection in English and German is provided, along with an ecoportal providing links to a variety of web sites with subjects covering science, environmental associations, and government authorities. There is even a special Children's and Teen site.

[www.sun21.de](http://www.sun21.de)







The Bosch Group adheres to the principle of strict legality formulated in a corporate policy. Compliance is mandatory for all employees, explicitly includes the private sphere, and also encompasses – beyond environmental laws – all statutory requirements.

## Environmental Controlling – Planning, Steering, Optimizing

How much water was used at a given location, as compared to the previous year? How much energy was used in the manufacturing of each product? How effective were environmental protection measures? The tasks of finding the right answers to these questions, and of planning and steering improvements, are the domain of environmental controlling.

Within the framework of the environmental management system, the locations determine their environmental protection data as a fixed component of annual environmental reporting.

We maintain indexes on energy, material streams, land registration, and hazardous substances. Each location establishes its own specific catalog of objectives on a regular basis.

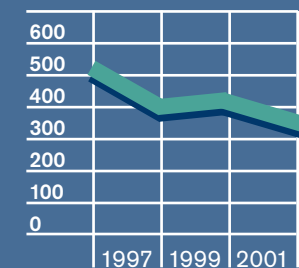
At this point, because a summary tabulation of all plants and business sectors would be of negligible value, we are using the Bursa, Turkey location as an example.

The environmental burden at the Bursa location is determined mainly by energy consumption.

A close analysis of energy usage indicates that the drop in consumption of natural gas, as referenced to added value, has been greater than that of electrical energy consumption. Overall, about 96% of environmental burdens stem from the consumption of power and natural gas. A disproportionate rise in recyclable waste is evident.

As a target for 2002 at the Bursa location, we intend to reduce not only the use of electrical energy but also the consumption of water and natural gas by 5%, referenced to value-added production.

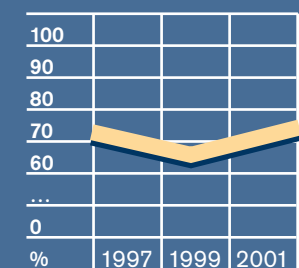
Energy indicator  
Energy use/Added value  
MWh/Million EUR



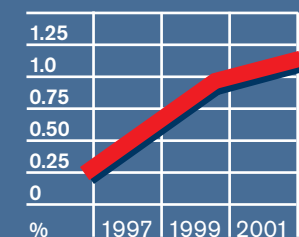
Water indicator  
Water usage/Added value  
m<sup>3</sup>/Million EUR



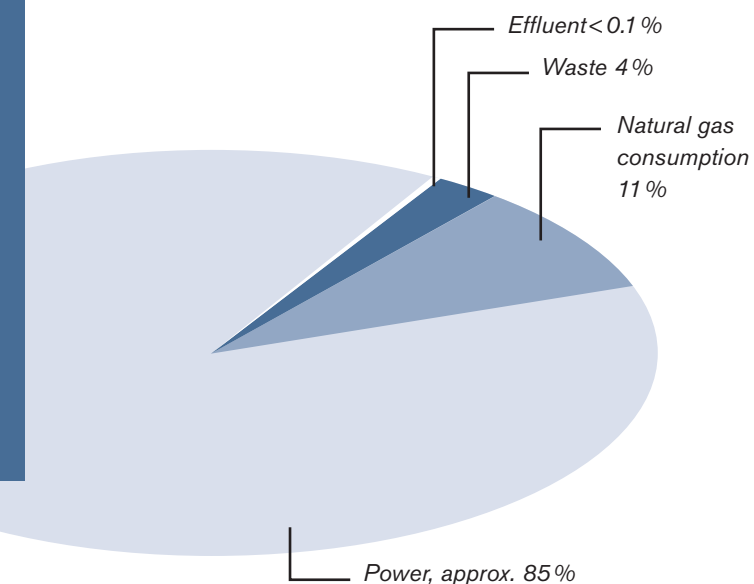
Waste indicator  
Recyclable waste  
Total waste



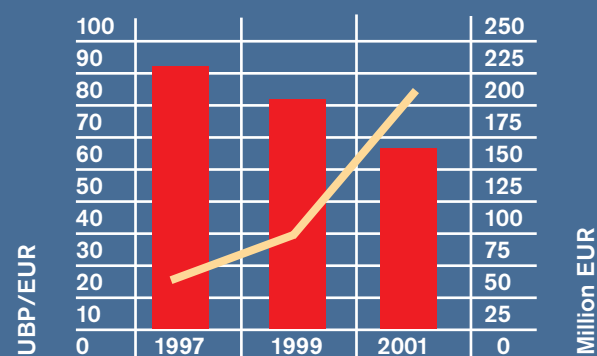
Environment indicator  
Proportion of conservation costs in plant operation



Emissions at Bursa plant, evaluated via SAEFL method. Graph shows originating areas as a proportion of the total of so-called environmental burden points.



Ecological effects at the Bursa, Turkey location



Total of environmental burden points (UBP) from emission evaluations via SAEFL method, referenced to added value. Added value (in million EUR)

*In 2001, the Bosch Group invested roughly 320 million euros into the training and continued education of its employees worldwide. The educational spectrum ranges from training aimed at professional advancement to environment-relevant workshops to events under the heading of "Intercultural Competence".*

## Opportunities, Training, Advancement

**No matter whether new employees start work at Tilburg in the Netherlands, at Lliçà in Spain or at another Bosch location – during their first days at work, their experiences will be quite similar. Becoming personally acquainted with the environmental officer at their location, they receive information about separating and sorting waste materials, handling hazardous substances, and about accident prevention. Environmental protection is the concern of each employee – at all locations, all levels, and in all divisions. To support our employees, we provide individualized training and qualification schedules.**

### Auditor training

Far from being the domain of environmental engineers, opportunities to be trained as an environmental auditor are also open to production planners, procurement specialists and plant physicians. On the one hand, the training program encompasses the detailed examination of all aspects and elements of the environmental management system. On the other hand, auditor candidates are being trained in interview and presentation techniques.

### Regular training

Among the workshops focusing on environmental protection are seminars with titles such as "Environmentally Compatible Engineering" or "Environmentally-friendly Surface Cleaning". We also furnish all employees with information on internal environmental protection standards on a regular basis, and sensitize management personnel whose sphere of responsibility includes environmentally relevant facilities, processes and materials.

### Working and training – internationally

Within the framework of employee development, more and more of our people are gathering professional experiences at a foreign location. The business area handling the relevant internationalization processes ensures the proper and cultural linguistic preparation and debriefing. "Living and Working Abroad" is the name of one seminar for employees who have accepted a foreign posting. Some 1,680 employees were working outside of their homeland early in 2002 – an increase of 30% over the year before, which is 80% more than five years ago.

International exchange programs are available in apprenticeship training also. Most recently, the locations at Budweis in the Czech Republic and Bursa, Turkey have started their own industrial vocational training. Budweis currently provides 26 apprentices with theory classes and practical instructions.

### From skilled worker to salaried employee

In 1999/2000, we launched the pilot phase of the "Skilled-worker Advancement" project providing advancement to the level of salaried technical employee. The first-year class was successful: Of the 89 attendees taking the course, most were transferred to salaried employment. Meanwhile, the same project is underway in Bari, Italy, and Bursa, Turkey.



*Employee team meets at the Hatvan, Hungary location*

### Education workshops: First steps on the way up

At all locations, essential instruments for employees whose development potential for technical, project or management responsibilities has been found to be above average, are the education workshops. In this pool of high-caliber future leaders, about 20% of our single-contract employees are currently preparing to advance to the next management level.

### Continued education in any specialization

By providing courses and programs both during and outside of working hours, we respond to the growing demand for continued education, which in itself comes as a consequence of increased international activities. At work or at home, employees can avail themselves of the self-teaching programs of "Computer Based Training".

### Networking and knowledge transfer

For over twenty years, the Robert Bosch college in Stuttgart has been open to Bosch personnel from all over the world as an in-house university. To-date, about 22,000 students have made use of the programs offered. Lectures are mostly presented by visiting professors from Germany and abroad.

Both as a forum and as a communication platform, the college promotes knowledge transfer, the exchange of ideas, and the establishment of networks.

The Carnegie Bosch Institute (CBI), an alliance between the Graduate School of Industrial Administration of Carnegie Mellon University at Pittsburgh, Pennsylvania and Bosch, offers advanced education seminars for management personnel.

Conceptualized from its very beginning as a place for meetings with managers from other international companies, the institute's purpose is to provide globally thinking managers with educational advancement.

### Open communication in secretariats

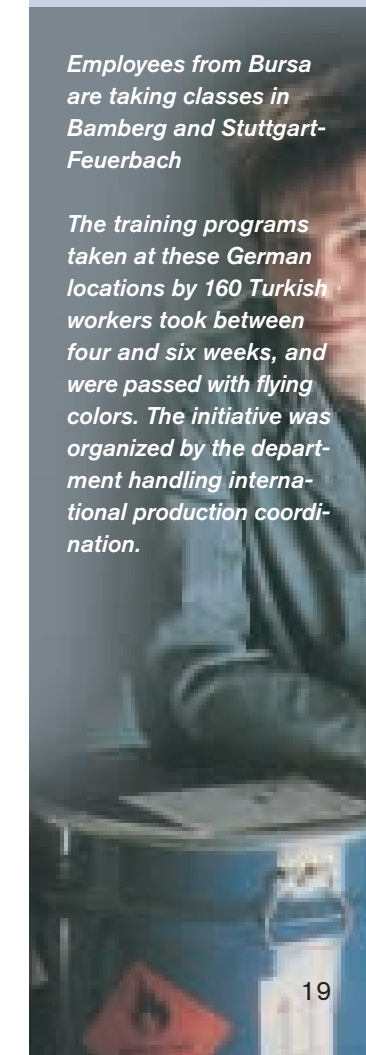
Secretaries' Day, or better "Secretariat Open" is the name given to the annual get-together at our Stuttgart Headquarters, held in 2001 for the first time. Ideal environment for the exchange of information, experiences, and programs, it transcends location borders.

*More than a drop in the bucket*

*Environmental protection is a popular subject among trainees of the Bosch Group. Project days, environmental competitions or lecture presentations bring the young people closer to the subject. At the location in Hallein, Austria, trainees were able to follow a drop of water on its way through the company by means of a poster show.*

*Employees from Bursa are taking classes in Bamberg and Stuttgart-Feuerbach*

*The training programs taken at these German locations by 160 Turkish workers took between four and six weeks, and were passed with flying colors. The initiative was organized by the department handling international production coordination.*





## Handling Hazardous Substances

### Avoidability and application check

Long before any substance enters the production facility, it is subjected to a strict avoidability and application check.

In their supply contracts, our vendors undertake unfailing observation of our standards dictating the exclusion of critical ingredients. The respective technical departments investigate possible ways in which a substance might affect the health of employees, and define the necessary protective measures. They also provide for proper disposal well in advance.

### Safety measures for handling hazardous substances

In the event that the use of a hazardous substance is unavoidable, we first reduce their quantity, use and release to a possible minimum. Our employees are informed of the risks associated with a hazardous substance, and given instructions on proper handling.

For in-house transport of hazardous substances, we use suitable transportation media, such as ecopallets equipped with spillage trays.

Though the objective has been clearly defined, there is still a bit of road to travel. To the extent possible, we want to dispense with the use of hazardous substances, replace them with harmless media or, at minimum, impose strict limitations on their use. Chlorinated hydrocarbons (CFC) used in product surface cleaning, for example, have largely been replaced by aqueous media in the meantime.

Wherever possible, we avoid materials such as chromium and cadmium. At all locations, we are substituting substances known to damage the ozone layer, such as refrigerants and solvents.

In testing, we have abandoned gasoline and diesel fuel and are now using environmentally safe media instead.

## Safety at the Workplace

At the Jihlava location in the Czech Republic, employees transferring the filtration agent known as kieselgur (diatomaceous earth) can breathe easier. Where they used to manually transfer the powdery health hazard from shipping bags, they raised the odd dust cloud here and there. Today, suction nozzles on the systems prevent any direct contact. Personal protective equipment, such as goggles and gloves, provides additional safety at the workplace.

The protection of our employees through adequate occupational safety measures is the responsibility of each plant manager. In organizing occupational protection throughout the plant, he delegates specific tasks to responsible officers on location.



*Transferring kieselgur in Jihlava, Czech Republic*

Each plant is equipped with a standardized occupational safety system. This means that, on the subject of responsibilities, the supervisor in Spain adheres to the same guidelines as his colleague in the United Kingdom or Hungary. This includes the ongoing inspection of all machines with regard to safety facilities, and the completion of hazard analyses. At the workplace, information and warning signs alert the worker to possible sources of hazards.

Each newly hired employee is given a special introductory lecture about proper workplace occupational safety measures. He can later familiarize himself with the same information contained in the printed brochure that is handed out to him. The foregoing notwithstanding, one major rule applies: Whilst we create the preconditions for safety; safe working habits are the responsibility of the employee.

### Reduced number of workplace accidents

*The number of accidents at our European manufacturing locations continues at a low level. The accident tally of 1,103 for the year 2001 corresponds to a ratio of 11.1 accidents per thousand employees. In Germany alone, the accident ratio in a comparable industrial sector stood at about 20.5 accidents for the observation period. Where mandatory accident reporting is concerned, 2001 was the best-ever year in our corporate history. All of this compares with a somewhat inconsistent development across European countries.*

*"Safetainer" instead of container*

*As their name implies, "safetainers" allow the safe handling and transport of hazardous substances, and of solvents in particular. An adapter on the vessel minimizes possible transportation and transfer hazards. The photo shows safetainer use in Solothurn, Switzerland.*

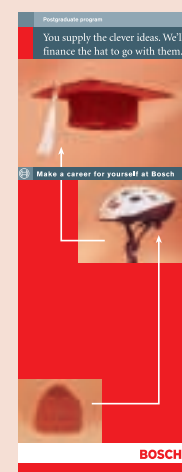




## Communication and Social Aspects

**“The right person at the right workplace” is a principle we take to heart – and not only when hiring new workers. Anyone who starts with us with us must enjoy working with us, and must be able to realize his full potential to the extent of his inclinations and abilities. As an essential provision of our human resources and social policy, no employee shall be disadvantaged on the basis of his nationality, language, religion or gender.**

In the Bosch Group, doctoral candidates establish valuable contacts with the working world. Upon their employment, our support goes well beyond financial aspects.



From the very beginning, candidates are assisted by a mentor, with concurrent involvement in research, development, and everyday operations.

Highly qualified university graduates have a choice of two opportunities: Direct entry in the organization, or a trainee program in a business or technical department.

As a Bosch-proprietary feature, such programs may be tailored to mesh with a candidate's prior education.



*Apprentices in the Bosch Group may also train abroad. With training completed, chances of permanent employment are excellent, and a variety of additional qualifications may be earned.*

At any rate, several months of working at a foreign Bosch location will be part of enhancing the candidate's competence.



### *“Daughters at the Plant” program*

*With programs such as “Girls’ Day” at several locations in Germany, we are also addressing the families of our employees. The objective of this program is to provide the daughters of our personnel with an opportunity to get to know their parents’ working environment, and to assist with their vocational orientation.*

Opportunities for advancement and continued vocational education are guaranteed at all of our locations. In Bursa, Turkey, Bosch is considered the employer of choice.

Our European Shop Council, with representations from 14 member and three guest countries, has been active since 1997.

Our corporate suggestion system is based on well-organized structures. At German locations, it operates under the motto “BIG”, this being the equivalent of “Bosch Ideas Win”. Since the restructuring of the system early in 2002, our employees receive a higher monetary award for good ideas. A total of 4.9 million euros was disbursed in 2001, compared with 4.7 million in 2000.

Social and professional networks, flexible working-hour models, and support and motivational activities – all of them are designed to make our employees feel comfortable working with us.

We would also be amiss in not mentioning the flexible working hours enjoyed by parents at an increasing rate.

### **Health comes first**

Among our employees, we have the odd marathon runner, mountain biker or martial arts specialist. However, something among the broad range of available sports teams and interests will be sure to attract those who “only” want to stay fit.

At all locations, health care includes comprehensive nutritional consulting as well as workshops on healthy working practices. We encourage employees to participate in arranging their workplace by giving us their input.

Suggestions for improvement are always welcomed within the framework of the corporate suggestion system.

Our preventive care program is rounded out by “LearnShop” programs and action days on health-related subjects.

### **Assistance and advice**

People suffering from job-related problems or stress due to personal or family reasons are given assistance through our social counseling service.

Our social counselors also offer advice and action in difficult situations which may be accompanied by economical problems. This assistance is not only available to members of minorities, but to anyone in need.

### **Scholarships and loans**

Employees and their children may apply to Bosch for interest-free loans, scholarships or student loans for school or college. In Germany, for example, assistance to youth is rendered by the Bosch Jugendhilfe (youth aid association).

### **Handicap is not a hindrance**

At our locations in Germany, 4.5% of workplaces were occupied by handicapped people in 2001, vs. 4.3% in 1999.

### **Support for women**

*Throughout the Bosch Group, the proportion of qualified women in all professions reveals an upward tendency. In France, the proportion of women at Bosch locations has increased by 12.4% since 1998. In Germany, 50% of university graduates employed in the mercantile professions are women. It is our intent to increase the share of women.*



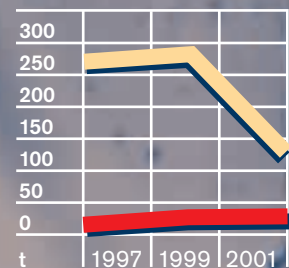
## Environmental Protection within the Plant

*At all of our locations, we are making great efforts to prevent or minimize environmental impact.*

*In Rodez, the consumption of cleaning agents was systematically reduced by replacing centralized cleaning processes with washing systems integrated in the production line. As the contamination type varies with the product, decentralized washing systems facilitate improved regeneration of the washing medium.*

Consumption of cleaning media in Rodez, France

Non-halogenated hydrocarbons ■  
Aqueous cleaning systems ■



### Careful use of resources

A large potential for energy savings hides in the thermal insulation of our production buildings. By introducing appropriate heat insulation, we save energy, i. e., cold cash.

Modern standard installations also include heat exchangers, which reclaim thermal energy from the air being exhausted, returning heat to the building interior.

A particularly energy-intensive service is the pressurized shop air used in manufacture. We shall continue our efforts toward a further reduction in the use of shop air at all locations.

Water usage too, is subject to special control. To reduce fresh-water consumption, we are installing cascade systems for the washing/rinsing processes.



*Chip shredder at the Bonneville, France location*

Chips are falling and heat is generated wherever drilling and turning takes place. Cooling lubricants keep tools and workpiece from overheating.

Because the lubricant adheres to the chips, it is reclaimed through centrifugation so that it can be used again. Through the use of new technologies, the use of lubricants can be omitted. Eight of our locations are already using dry-machining processes, and there are more to come.

### Keeping the air clean

Our goal is to convert, to the extent possible, the heating plants at our European locations to environmentally friendly natural gas operation.



*At the Leinfelden plant near Stuttgart, a dry-lathe process is used to produce power tool components.*

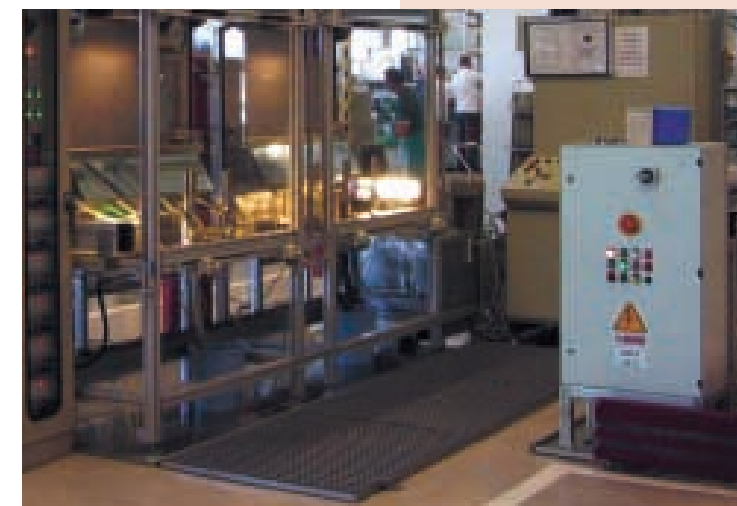
Clean air is also the goal behind oil aerosol filters that trap oil droplets from the air exhausted by tool machines.

Wherever possible, we dispense with the use of solvents. As part of an AUF90 project in St. Niklaus, Switzerland, three saw blade painting systems have been converted from solvent-based to aqueous paints.

In Aveiro, Portugal, the housings of gas-fired hot-water heaters were finished with powder mold coating, which produces virtually zero waste. Also weighing in on the positive side is the prevention of emissions through the use of powder instead of solvent-based enamel.

*Power and heat from gasoline used for testing*

*Conservation of resources, waste control, and multiple use of a consumable medium – at the Budweis plant, three environmental measures are implemented with a single process. Gasoline that can no longer be used for testing becomes fuel for the generation of power and heat.*



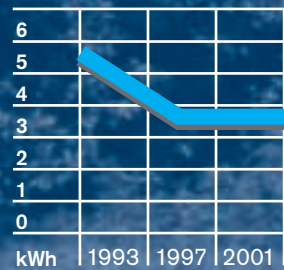
*Pump test bench at Jihlava, Czech Republic. Once tests have concluded, the fuel used here is destined for additional usage.*



## Environmental Protection around the Plant

Energy consumption in Treto, Spain

KWh per alternator produced



The background photo shows the green foliage in the inner courtyard of the Immenstadt plant in Germany. The greenery allows the plant to blend with the landscape so well that it is barely visible from the road. The planned biotope surrounding the plant serves as a flooding spillway for the Iller river.

### Clear water and clean soil

To prevent the contamination of soil or ground water through oil leakage and the like, we provide spillage troughs for all relevant facilities or apply special protective coatings to floor areas.



Tube-in-tube arrangement prevents soil contamination in Tilburg, Netherlands.



In Alcalá de Henares, Spain, we have decommissioned subterranean oil tanks, replacing them with above-ground tanks for better control.

In addition, larger tank farms are protected by leakage alarm sensors. An operational malfunction will alert the fire department.

To ensure strict compliance with established limit values for the discharge into public sewage systems or bodies of water, industrial effluent is cleaned in our own wastewater treatment facilities.

To this end, we employ ultra-filtration technology and other kinds of chemical and physical processes and water treatment techniques.

In Vénissieux, France, water treatment is effected with the use of a vaporizer.

Wastewater evaporator in Vénissieux, France



### Conservation and landscape protection

At our Denham location in the UK, the plant premises are turning green. A new landscaping program also entailed the planting of trees and shrubs in close cooperation with local authorities.

Today, an area of 5.6 hectares boasts hundreds of domestic trees, many of which are protected species planted by Bosch as early as in 1983, plus rare grasses and wildflowers.



Photo 1: At Blaichach in Germany, our own hydroelectric plant supplies about 60% of our electric energy.



Photo 2: Trees and foliage adorn the grounds at our Denham location in the UK.

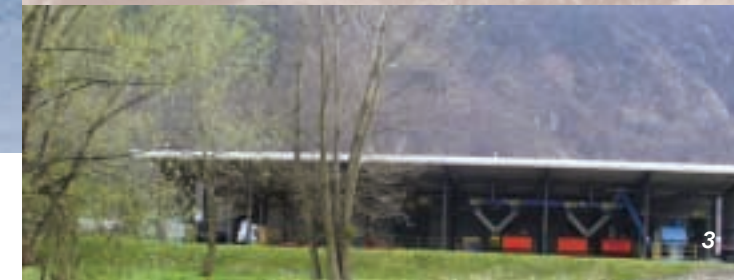


Photo 3: A new stand-alone facility in Bonneville, France, built for the sole purpose of waste separation and handling.



Photo 4: Our plant at the Treto, Spain location.

On some occasions we also do pioneering work. In Bursa, Turkey, a provisioning facility for environmentally hazardous substances, complete with a waste-water treatment plant, went on stream in 1998. At the official opening ceremony, a representative of the Turkish government lauded the plant by expressing "the greatest recognition of this successful contribution to the protection of our environment".

The bottom line is improved air quality and a more attractive landscape, not only for our employees but to be enjoyed also by the entire neighborhood.

Because rare bird species such as grebes and herons are breeding in the coastal area, we observe strict noise abatement guidelines.

One of the Bosch plants in Spain is located in Treto, which is also the site of one of the most important ecosystems on the Iberian peninsula.

We also contribute our share to the reforestation of coastal forests.



## Emergency Control



*Learning to fight fire – at Stuttgart-Feuerbach*

*They learn their training lessons at locations all over the world. However, the final test of fire for many members of the plant fire departments comes at the central training facility operated by the largest in-plant fire department of the Bosch Group at our Stuttgart-Feuerbach location.*

*Over the past 30 years, this facility has put about 2,000 employees through basic training. Advanced fire-fighting courses are also provided here.*

Whenever there is a fire, they are the first to arrive – and, thanks to being nearby, they are always faster than the local fire brigades. At more than 35 locations across Europe, we maintain our own in-plant fire departments as a first-line defense in emergency control.

However, due to the fact that the occurrence of damages within the Bosch Group in domestic and foreign locations has been at an all-time low for many years, there is seldom any real need for serious action. To keep it that way, fire protection and conservation will mean prevention, planning, and organization also in the future.

### Plant fire brigade

More than 1,500 full and part-time fire-fighting men and women are on the job – sometimes around the clock – working closely with municipal fire fighters. In cases of emergency, additional Bosch volunteers provide medical first-aid and building evacuation services.

### Emergency control

Already during the planning phase of buildings, systems and processes, our environmental protection engineers and emergency control specialists analyze possible hazard sources, produce risk analyses, and investigate the risk potential of processes and facilities.

The protection of personnel and manufacturing safety is safeguarded by the deployment of comprehensive fire-protection technologies; extensive sprinkler systems and fire alarm monitoring are but two examples.



*Transport pallets with integrated spillage tray.*

When installing and servicing technical safety systems, technical guidelines are strictly observed, and all completed inspections are minutely documented.

### Training

No matter whether in Beauvais, Weert or Twardógora – if an emergency arises, each employee must know exactly what to do. For this reason, regularly scheduled training is an absolute must. The responsibilities and tasks required in the case of fire and environment-related events are precisely documented in the form of guidelines, operating instructions and safety directives. These are equally implemented at all of our locations worldwide.



*Plant fire brigade equals municipal fire brigade*

*When an avalanche strikes, they become part of the crisis team. Any catastrophic event occurring inside or outside their plant has the firefighters of the plant fire department in St. Niklaus, Switzerland rushing to the front lines.*

## Remediation of Contaminated Sites

In the investigation of contaminated sites and the subsequent remediation, our experts take a systematic approach. This includes preventive activities and joint teamwork with specialists. Wherever required, we also cooperate with local authorities and jointly establish exploration and remediation concepts for soil, soil vapor and groundwater contamination.

### Remediation methods

We employ all commonly accepted remediation methods. For example, groundwater decontamination may be effected through stripping based on separation systems. Soil vapor is drawn off, and cleaned with the aid of activated-charcoal filters. For special types of contamination, such as PCB-bearing oils, we also utilize new biological methods or even chemo-physical processes.

To decontaminate groundwater containing chlorinated hydrocarbons, we apply a catalytic process with a palladium-zeolite reactor.

### Successful remediation – from Budweis to Lliçà

At the Budweis location in the Czech Republic, the plant site was cleared of soil contamination left over from previous use.

Because the local Budweiser Brewery's water reserve had been a major consideration in removing the oil and chlorinated-hydrocarbon contamination from soil and groundwater, this action did not affect the quality of the famous Budweiser Beer for which it is renowned.

In Bonneville, France, soil sections contaminated with PCB-bearing oils were decontaminated.

Oil-bearing soil was also found in Denham, UK, and in Engels in the Russian Federation. At both locations, we have undertaken biological soil remediation. Remediation action also took place at the Buelna and Lliçà locations in Spain.

At our locations in Spain, we are conducting historical research related to groundwater and soil contaminations.

As a means of controlling groundwater quality, we maintain permanent groundwater monitoring facilities at many locations.



*Drilling for soil samples at the Drancy location in France*

*All Bosch locations in Europe are being successively admitted to the company's in-house "Risk Potential of Residual Pollution" investigation program, which was begun in 1990.*

*Depending on the prevailing urgency, all relevant manufacturing locations were investigated, and remediation activities carried out as required.*



## Shipping and Logistics

### Cutting down on empty trips

Road transport ensuring the highest possible measure in environmental compatibility – it's a principle that has been implemented in Germany since 1996. The concept behind the so-called Regional Shipping Companies (RSC) is simple: Accurate planning – avoiding partial shipments and dispatching our products only as complete packaging units – ensures optimum utilization of the capacity of each truck or trailer.

Therefore, instead of dispatching two partially loaded trucks in the same region, only one that is fully loaded takes to the road. Transportation across large distances can be optimized in this way.

We also ensure that our transportation partners utilize advanced information technologies contributing to the streamlining of planning and logistics.

### Packaging saves kilometers

In Worcester, United Kingdom, efforts to save on the packaging of gas-fired water heaters have met with success. Ever since the packaging was switched from non-recyclable polystyrene to cardboard with costs remaining the same, more products fit on the pallets and in trucks. In this way, road trips were reduced by 30%.

### Optimized transport via road, rail and boat

In the movement of goods between European plants, increased use is made of environment-friendly transportation.

As a basic prerequisite of their service contract, shippers must commit to the use of eco-friendly engines, asbestos-free brake linings, and low-sulfur fuels.

From "railway country" Switzerland, our products ride the rail to France and Germany.

The Power Tools division also uses rail transport to ship approx. 25% of its goods from plants to distribution centers.

For container transport to seaports, i.e., Rotterdam, we also use inland waterway vessels and coastal shipping.

### Bus instead of car

For many Bosch employees, environmental protection begins on the way to their workplace, and not only in the Netherlands, where many of our people ride a bicycle.

As an incentive to leave the car in the garage and to use public transportation instead, we offer subsidies and rebates especially in large population centers to make the switch more attractive.

In Solothurn, Switzerland, employees receive an 18-percent rebate when using bus and railway. Subsidies are also being paid in Spain, in Roznov in the Czech Republic, and in Kecskemét, Hungary.

In the Greater Paris area, Bosch assumes the entire cost of using urban public transportation systems.

At some locations, we also hire private service enterprises to take our employees to the workplace free of charge.



Free bus service

*Photo 1: Good deal for Bosch employees: In Manisa, Turkey, bus service is provided at the start and end of working shifts.*

*In Alcalá de Henares, Spain, Bosch provides a private transport service. Buses collect workers along 12 routes, and deliver them to the plant free of charge.*



2



3

*Photo 2: In Derendingen, Switzerland, the railway goes right into the plant building.*

*Photo 3: Product transportation between locations in Italy, Greece, and Turkey, is increasingly handled by boat and by roll-on-roll-off ships.*

*Today, the concept of using regional shipping companies is in use at several Bosch locations in Europe, e.g., in Switzerland and Belgium. Introduction to Spain is anticipated.*





## Dialog with Suppliers

Good Bosch products are unthinkable without good suppliers. In 2001 alone, the Bosch Group purchased production materials, services, commodities and tangible assets worth 18 billion euros (in 2000, the figure was 16.6 billion euros). Fully 61 % of the above were purchased outside of Germany.

It therefore stands to reason that we at the Bosch Group set great store by the cooperation with the most capable suppliers who also keep abreast in matters related to environmental protection.

We are of course acutely aware that environmental protection neither starts nor ends with Bosch. With this in mind, we approach our suppliers, increasingly integrating them in our environmental protection activities. We base our efforts on a detailed guide of environmental protection directives established by our central purchasing and environmental protection departments.

Within the framework of these directives, our suppliers agree to observe Bosch standards, and to use low-emission vehicles for transportation. Logistics partners transporting Bosch-owned goods in reduced-emission trucks are paid higher carriage compensation – as many as 40 % of all fleet vehicles are participating already. The same goes for the selection of the most eco-friendly packaging and optimized package density.

In this case, more available space is synonymous with higher transportation efficiency, i. e., fuel savings.

### Careful manufacture equals quality

Each order of goods or materials is preceded by an examination and supplier assessment by our quality assurance departments. Before we purchase materials or outsourced goods from a supplier, we request comprehensive information.

We also evaluate the condition of manufacture in terms of orderliness and cleanliness. The results bear us out: The definite interrelation between clean and well-organized manufacturing and product quality can be noted not only on our own premises.

### Putting it in writing: Environmental protection is key

The “Environmental Protection Survey” was sent out 192 times, and 103 completed forms were returned. We started this questionnaire-based poll in 2001 at the Alcalá de Henares location in Spain. On the one hand, the objective was to initiate a dialog with our suppliers; on the other, we aimed at gaining a better overview and identifying options for improvement.

Evaluating the returns, we found that 12% of all suppliers have introduced an environmental management system. Another 57% will follow suit in the next few years.

One future goal is to continue this discourse, and also to integrate our suppliers' know-how early on in the development of new products and production facilities.

In addition, we are offering assistance and expertise to those suppliers who used our questionnaire to request information about the implementation of an environmental management system.

The same survey had been held in Germany in 1999. Out of 487 questionnaires, 438 were returned. Over one-quarter of suppliers confirmed the existence on an environmental management system. Another 36% were planning its introduction.

### Workshops for Bosch suppliers

Ever since 1995, suppliers of the Bosch Group have been able to fall back on a comprehensive catalog of continued-education events. Effectiveness and success of the respective qualification measures are ascertained through preliminary interviews and follow-up discussions.

The topics for these events range from “Environmental management and Eco-Audit System” to “Manufacturing and Process Technology/Environment”.

More recently, the program was expanded through the addition of subjects such as “Quality Management” and “Cooperating in Team Settings”.

### competes

The corporate “Company Program for Economic and Technical Empowerment of Suppliers” was launched in 1999. Within the Bosch Group, this action program is used to restructure and optimize the cooperation with suppliers. Key objective is to focus on the most competitive suppliers, and to promote greater supplier involvement.

Within the framework of the competes program, a new electronic marketplace serves as a communication and knowledge platform. Online auctions are but one of the many options being used to facilitate accelerated process handling and improved market and pricing transparency for all participants.



### Transparence and optimization via Internet

In Purchasing, we implement process improvements via the Internet market termed SupplyOn, which we founded together with other automobile industry suppliers. The goal is to create a comprehensive communications and transaction platform for the supply industry in Europe.

Our shippers, suppliers, and other external service providers benefit from our use of the Internet-based Web-EDI platform. It increase the transparence of processes and requirements, and as such also helps reduce the number of empty trips.

**Erfassungsbogen Umweltschutz**

Musterfirma (Firma)  
 Hier Musterfirma (Ansprechpartner)  
 12345 67890 (Telefonnr.)

**Fragen zum betrieblichen Umweltschutz**

1. Haben Sie ein Umweltmanagementsystem eingeführt?  Ja  Nein  
 Falls ja, nach welchem Standard?  Das Audit-Verordnung (ENAS) 180/1801   
 ISO 14001  andere

2. Planen Sie innerhalb der nächsten 2 Jahre die Einführung eines Umweltmanagementsystems?  Ja  Nein  
 Falls ja nach welchem Standard?  Das Audit-Verordnung (ENAS)   
 ISO 14001  andere

3. Wie wird sich die Einrichtung des Umweltmanagementsystems realisieren?  Selbst  durch

3. Prüfen Sie die Einhaltung von Umweltschutzvorschriften und sonstiger umweltbezogener Bestimmungen regelmäßig und stellen Sie deren Einhaltung sicher?  Ja  Nein

4. Werden in Ihrem Unternehmen regelmäßig die Umweltschutzaspekte und die Auswirkungen auf die Umwelt (z.B. bei Umwelt-ISO) bewertet und daraus resultierende Verbesserungsmaßnahmen abgeleitet und durchgeführt?  Ja  Nein

5. Werden Ihre Mitarbeiter/innen regelmäßig zum Thema Umweltschutz informiert und geschult?  Ja  Nein

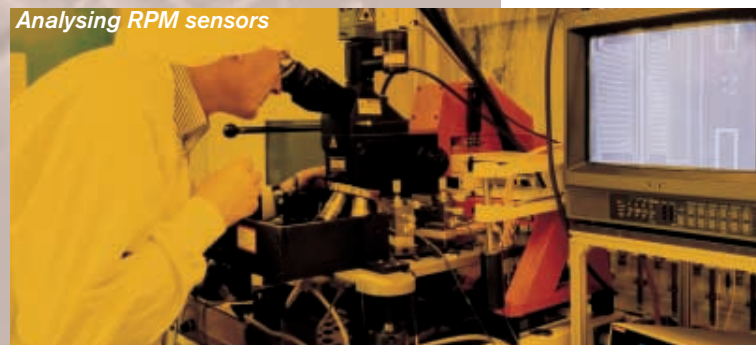
2.10.2009 (Datum)  (Unterschrift)



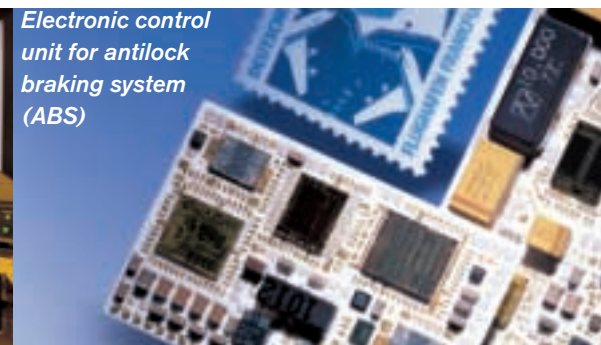
## Research & Development, and Design for Environment



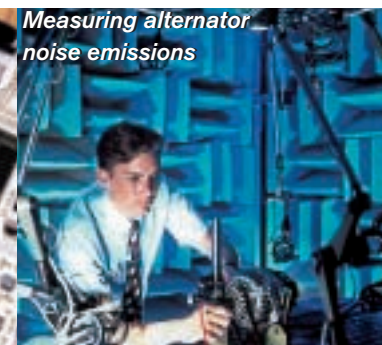
Lab facility



Analysing RPM sensors



Electronic control unit for antilock braking system (ABS)



Measuring alternator noise emissions



Developing packages to protect baby food

### Real-time testing

Singles household or extended family, old or new house, rain or shine – a push of the button pre-sets these and other basic conditions in the lab facility at Bernau, Germany. The special-purpose test bench of the Thermotechnology division facilitates the testing of heating appliances with a variable set of environmental conditions and timelines. The simulation even considers virtual inhabitants with a habit of opening a window every now and then.

Among other projects, we are working within the Automobile Manufacturers Association to develop a system for the exchange of information between supplier and manufacturer. Whenever required, our customers receive information regarding components of our products requiring declaration.

For each of the past years, Bosch has registered over 2,000 new inventions at the German patent office. This is an average of one invention per working hour. Mainly in the worldwide plants of the Automotive Technology division, some 18,850 scientists, engineers, and technicians are working on the development and optimization of new products, systems, and manufacturing methods. In the past year alone, we have invested approx. 2.4 billion euros in the expansion and modernization of production and development facilities. A component of 62% benefited our locations in Germany.

The challenge: Oil filters whose components are cemented together can no longer be separated. The solution found in Madrid, Spain, is as simple as it is efficient: For applications throughout Europe, a recyclable filter, assembled without the use of cementing compounds, was developed. It is easily disassembled into its eight components, and thus becomes fully recyclable.

Environmental protection starts with product development. From the first moment of product engineering, our development departments consider the aspects of recyclability, materials restrictions, as well as the reduction of in-house energy use, emissions, and weight. With the "Design for Environment" program, we intend to step up our contributions toward environment-friendly products.

As Design for Environment encompasses a complex field of tasks, no project is like another. One of the main objectives consists of the elimination of hazardous or harmful substances in our products. We make every effort to exclude the use of such sub-

stances already in the planning phase by accurately defining procedures and processes. To the extent possible, we avoid the use of environmentally harmful processes. Those processes that necessitate a follow-up with critical cleaning and treatment processes are investigated and substituted wherever possible.

When developing new products, we ask ourselves the following questions:

- Can products be broken down into their components without great expense?
- Can separated parts be recycled?
- Where and how may secondary raw materials be utilized in the production process?
- How can we reduce weight or noise emissions?
- How can the service life of a product be extended?

### Lifecycle and eco-balance

Eco-balances are used to evaluate environmental impacts caused by a product or process over its entire lifecycle. This method is used internally in several of our divisions. In the area of thermotechnology, eco-balances are used to establish a comprehensive balance of heating systems and buildings. In addition, eco-balances are used to investigate future heating systems already during the research and predevelopment phases.

Robert Bosch GmbH has been an active member of the Green Design Initiative of Carnegie Mellon University in Pittsburgh, Pennsylvania.

[www.gdi.ce.cmu.edu/](http://www.gdi.ce.cmu.edu/)

Research work on eco-balances, carried out by Robert Bosch GmbH, was awarded first prize for publications at the "IEEE International Symposium on Electronics and the Environment" in Denver, Colorado in May 2001.

### Lead-free soldering

In Germany, the Research & Development division is currently involved in the project named "Inno-Lot" (innovative solder) sponsored by the Federal Ministry for Education and Research. The objective: Development of lead-free alloys capable of replacing the lead-based solder used on circuit boards, for example. At Bosch, all types of lead-bearing solder are to be eliminated – starting with selected products and eventually extending across the entire product range.

### New impregnation resin

Significantly less emissions, improved thermal conductivity and pliability – a Bosch-developed impregnating resin is already available a laboratory sample, and may well replace styrene-based resin in production.



## Recycling at Bosch – Circulation instead of Cul-de-Sacs

### Happy ending – for tools

In Sweden, as part of AUF 90 initiatives, Bosch organized the action entitled "Happy End", aimed at power tool recycling.

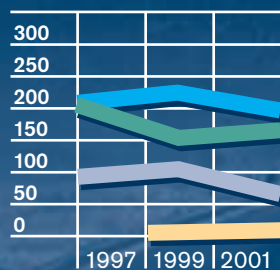
Budweis in the Czech Republic is one of our locations at which excess plastic material from injection molding, the so-called sprues, are recovered and returned to production. In Breda, Netherlands, the manufacture of Skil power tools utilizes recycled plastics.

In France, starters and alternators are collected and sent to Germany for factory rebuilding.

### Factory rebuilding in Göttingen

Units (thsd.)

Alternators ■  
 Car starters ■  
 Truck starters ■  
 Distributors ■



### Factory rebuilding: Old becomes new

When injectors for fuel injection pumps are reconditioned, for example, the before-and-after effect is impressive indeed. Worn-out components from all over Europe are collected for factory rebuilding (SIS), reconditioned, and prepared for a new start.

Starters and injectors are some of the items we rebuild at the Göttingen plant in Germany; electronic control units for engine management get a new lease on life in Madrid and Reutlingen. Unit injectors, unit pump systems (photo 1), and common rail injectors are rebuilt in Jihlava, Czech Republic and Bursa, Turkey. The unit count always depends on the market returns.



### End of a product life

Call it reincarnation – the end is a new beginning. When a power drill has reached retirement after many years of service, that's just a starting signal for the Bosch recycling service. A Bosch power tool consists of up to 200 parts. Iron, steel, aluminum and other materials such as polyamide are recycled 100%. Copper is extracted from wires and plug connectors, to be used again in the manufacture of new products. Our recycling service is at work in many plants across Europe. Our disassembly center in Willershausen (photo 2) dismantles and recycles power tools from Germany, Belgium, and the Netherlands.

The Bosch Group started recycling in 1993. At the Willershausen plant, more than 620 metric tons of materials – the equivalent of 210,000 power tools – were recycled in the year 2001 alone.

In this way, 90% of each kilogram of collected waste tools is currently recycled (photo 3). Since late 1989, the recycling project has also accommodated the return of used storage batteries.

In the meantime, 140,000 of these have been forwarded to certified recycling companies.



### Increased life expectancy

The longer the service life of an appliance, the better for our environment. The rebirth of old power tools in good-as-new condition is not limited to the Solothurn or Derendingen plants in Switzerland. We operate our repair service also at other locations in Europe, ranging from the Czech Republic to the United Kingdom.

Without exception, Bosch products offer a high degree of recyclability (photo 5).



### Materials recycling

Resource conservation, economy in new materials, and eco-friendly materials separation and recycling play an important role also in production.

In the manufacture of wind-shield wipers at the Tienen plant in Belgium (photo 4), the recycling of operating media has been optimized: The overspray, i.e., paint medium that fails to contact the workpiece during spray painting, must no longer be written off as a loss. The water-based paint is captured on a scrubber wall, concentrated via membrane technology, separated into water and paint material, and is then ready for reuse.



### Recycling produces jobs

The fact that recycling and social commitment can go hand in hand is evidenced by a case in point in France: Within the context of the action entitled "Handi Terre", Bosch collects empty toner cartridges of printers, fax machines and photocopiers, which are then recycled and refurbished for resale. Meanwhile, this action has generated approx. 120 jobs for the long-term unemployed and people with minor handicaps.

[www.handiterre.com](http://www.handiterre.com)

Within the framework of syndicates operating across industry borders, the return of storage batteries is possible also at our locations in France and Italy.

[www.eceolit.it](http://www.eceolit.it)  
[www.ecovolt.org](http://www.ecovolt.org)



Bosch is awarded Volkswagen's ecology prize for unit injector system (UIS)

## Automotive Technology

Environment-friendly solutions for the next generation – that is the objective behind the products of the Automotive Technology division. In Europe, our most important goals are to reduce fuel consumption and harmful emissions.

With our diesel and gasoline fuel direct-injection systems, we are making an essential contribution to the reduction of carbon dioxide emissions.

To reduce fuel consumption, we develop and produce high-pressure diesel fuel injection systems: Over the past decade, diesel engines equipped with our injection systems have contributed to a significant reduction in the fuel consumption of car fleets.

In addition, we continue to develop our components and systems with a view to reducing weight and noise emissions.

### Improved exhaust treatment methods

We are developing exhaust treatment concepts for both gasoline and diesel direct-injection systems.

One of our greatest achievements consists entirely of air – well, almost. Because, as a result of the specification for both gasoline and diesel fuel direct-injection under the Euro IV emission standard, emissions must often be cleaner than the air drawn in by the engine. The same standard is expected to cause a significant drop in the particulate emissions of diesel-powered vehicles.

Series production of the Bosch lambda sensor started in 1976 (photo 1). To facilitate compliance with the stringent exhaust emission standards anticipated at the time, we continued its development. The signal from the lambda sensor facilitates the precise adaptation of exhaust gas recirculation, charge-air pressure and injection timing to the respective operating situation

also in diesel engines. It can therefore contribute to the reduction of emissions by up to 20%.



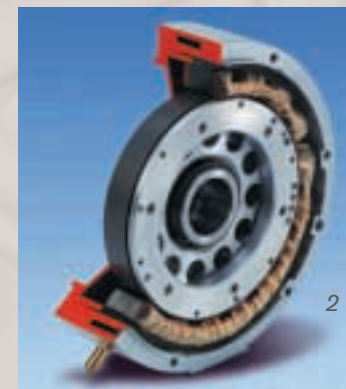
Beginning in 2003, reduction catalytic converters with selective catalytic reduction (SCR) are expected to enter the market. We have developed the reduction agent metering system required for these catalytic converters. Through the precisely measured addition of a urea-water solution, SCR-type catalytic converters reduce nitrous oxide emissions by up to 90%.

### The new gasoline fuel direct-injection system: Tomorrow's technology – today

In 1999, Bosch introduced the first gasoline fuel direct-injection system which, depending on the torque demand, alternates between a homogeneous and a stratified charge. This reduces fuel consumption, and facilitates effective and environment-friendly resource utilization. In 2000, the first passenger car featuring this technology entered series production. The first generation of this DI-Motronic (MED) for gasoline direct injection reduces fuel consumption by up to 15%, as compared with intake manifold injection. It also increases engine output by 5%. This means that we are already well ahead in meeting the emission standards to take effect in 2005.

### Comfortable starting and safe supply of energy

Innovation is also behind the development of the integrated starter-alternator (ISG): One single electrical machine provides the functions of both starter and alternator. The result is a system capable of converting energy in both directions. The ISG (photo 2) facilitates a smooth and quiet engine start. With its start-stop operation capabilities, it is ideally suited to low-emission



and low-consumption drive systems. It provides a reduction potential of 3 to 8%.

During vehicle braking, the ISG is capable of converting the kinetic energy to electrical energy, which in turn is fed into the vehicle electrical system. Sandwiched between engine and transmission, the attendant starter-alternator supports the vehicle's internal combustion engine. This arrangement is termed "minimal-hybrid concept". It achieves total fuel savings of up to 25%.

### The spark plug turns 100

In 1902, Bosch presented the first-ever spark plug with a high-voltage magneto. Since this "first spark", more than 7 billion spark plugs were pro-



duced. Today, Bosch spark plugs (photo 3) represent an essential system component, and contribute greatly not only to thrifty, clean and efficient combustion but also to the reliable functioning of engine and catalytic converter.

### Navigation for driving and finding

Navigation systems made by Blaupunkt provide driving comfort and make time-consuming wild-goose chases a thing of the past. The latest generation accesses and incorporates up-to-date traffic information in its destination-finding directions.

### Electrohydraulic Power Steering

The ZF Lenksysteme company employs approx. 600 people in product development. Main objectives are overall automotive safety, the reduction of weight and, of course, the realization of energy savings. An intelligent innovation, the electrohydraulic power steering (EHPS) requires power only when the vehicle needs to be steered. In this way, the system can produce energy savings of up to 75%, as compared to hydraulic power steering systems featuring a permanently driven pump.

The year 2002 will see the introduction of the servo-electric system or electric power steering (EPS). Hydraulics have been fully dispensed with. When compared with hydraulic steering systems, the fuel savings amount to 85%. Due to their high metal content which includes some 98% of steel and aluminum, almost all products can be recycled up to 95%. This means that the majority of the company's products already achieve compliance with the stipulations of the EU Auto Directive for 2015. It requires that the recycling ratio for old cars must rise from the current 75% to 95%.

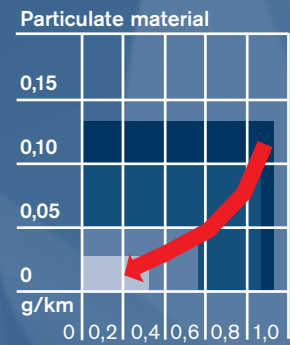
### Winter trials in Arjeplog

During the development of the ABS antilock brake system, Bosch was one of the first companies to start testing its products in Lapland, Sweden. Today, Arjeplog is the world's largest winter testing center. Systems like ABS or ESP in particular are tested on a dry-land track, a frozen lake, and several skid pads. According to a study by the German Institute for Vehicle Safety, 60% of all skidding accidents are caused by driver errors in the subcritical range, with the potential of being prevented with the aid of ESP. Current figures indicate that 17% of all vehicles produced in Europe are equipped with ESP. In Germany, the figure is an astonishing 46%.

[www.arjeplogtimes.com/html/main.html](http://www.arjeplogtimes.com/html/main.html)



### Reduced emissions for diesel-powered cars

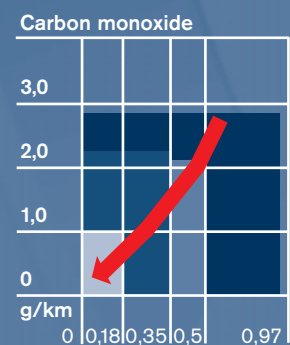


### Nitrous oxides and hydrocarbons

Legend for Euro standards:

- 1994 Euro I
- 1996 Euro II
- 2000 Euro III
- 2005 Euro IV

### Reduced emissions for gasoline powered cars



### Nitrous oxides and hydrocarbons

Legend for Euro standards:

- 1992 Euro I
- 1996 Euro II
- 2000 Euro III
- 2005 Euro IV



## Automation Technology and Packaging Technology

*High honors from the Federal Minister of the Environment*

*The Lohr plant of Bosch Rexroth AG was the 2000th enterprise to earn certification in accordance with the Eco-Audit Directive (EMAS). At a press conference held by the German Chamber of Industry and Trade, the Federal Minister of the Environment offered his congratulations.*

### **Bosch Rexroth AG**

In 80 countries around the world, the company is the only supplier providing all types of industrial motion and control devices for the automation of industry and manufacturing, and for mobile applications.

“Thinking in terms of circulation” best characterizes the approach taken in manufacturing and throughout the entire product lifecycle. Cast-iron components – most of them coming from the foundry in Lohr on the Main river – are machined and appropriately finished to assume their place in machines, facilities, or vehicles in the form of valves, pumps, and hydraulic cylinders. At the end of their product lifecycle, the composition of the majority of products made by Bosch Rexroth facilitates high-quality recycling. This approach is also evident when recycling production waste.

As an example, every year since 1996, several thousand tons of recycled casting sand from the foundry have been used in cement manufacture.

### **Fluid power assists in coastal protection**

The multipurpose motor vessel “Neuwerk” of the Federal Institute of Hydraulic Engineering is equipped with hydraulic systems made by Bosch Rexroth AG. Besides the typical applications such as powering and controlling crane and hatches, main applications for the fluid-power equipment are the control and operation of an oil separation system used to combat accidental oil spills.

### **Clean electrical energy with components made by Bosch Rexroth AG**

In 2003, the total output of all wind-powered generation systems is anticipated to be around 10,000 megawatts. The products by Bosch Rexroth AG employed in this field encompass transmissions, cylinders, and all hydraulics. Compact planetary gears provide the rotational speed required to drive the power generator. The efficiency of the systems is optimized through the control of gondola and rotor blades, positioning them at the best angle relative to prevailing winds.

The economical operation of solar collectors depends on the construction and quality of reflective panels. Bosch Rexroth AG supplies the digital linear-motion drives and guides used in the manufacture of these high-precision components. And finally, control units from Bosch Rexroth ensure that the solar collectors installed at solar farms always “show their good side”.

### **Environmental protection through Bosch packaging technology**

In the developing countries of the Third World, 25% of all foodstuffs are lost due to spoilage. The most common reasons are faulty packaging or poor logistics. Good packaging – implemented with only the necessary minimum of materials – protects the product against spoilage and low-quality wastage.

For reasons of economy and ecology, packaging expenses must be kept as low as possible.

Therefore, the Packaging Technology division is working on new technologies for packaging foodstuffs and pharmaceutical products with the least possible expense in terms of energy and materials, and without impeding quality and shelf life. As a case in point, thermoforming technology is used for packaging yoghurt products. Plunger and compressed air transform flat plastic films into cups that are then filled and sealed in sterile conditions.

To make cup production as eco-friendly as possible, thermoforming is subject to ongoing improvement. Employing innovative processes, we were able to reduce the thickness of plastic films by approx. 25% – and yet, the cup stability and degree of product protection remained the same as before.

The collaboration of the Packaging Technology division with several universities contributes to the development of additional methods that are environmentally acceptable. For example, one of the current projects concerns itself with the subject of “Integrated Environmental Protection in the Packaging Industry”.



*Wind turbine generator equipped by Bosch Rexroth AG*



*Product protection comprises the core competence in packaging technology. Foodstuffs lose quality through contact with oxygen. Inert-gas packaging or evacuation facilitates the reduction of residual oxygen to less than 2%. Packaged coffee is but one example.*



*In the development of power tools, we not only consider recyclability but also focus on designing products providing a long service life.*

## Power Tools, Thermotechnology, Household Appliances

*The Thermotechnology division collected several awards in 1999. In Poland, the Cerastar by Junkers was awarded the "Golden Plumber", while capturing the "Gold Medal" in the Czech Republic. In the United Kingdom, the Worcester plant won third place in the "Manufacturer of the Year" competition, and France presented the Egalis gas-fired boiler with the "Decibel d'Or" in recognition of its silent operation.*

[www.bosch.de/junkers](http://www.bosch.de/junkers)

*With a toaster and coffee maker, BSH participated in a German study aiming at recycling optimization sponsored by the Federal Ministry of Research and Education. The resulting products are the TAT12 series toaster and TKA30 coffee maker – for both products, the consequential cost at the end of their service life is a virtual zero.*

### Durability – It's the agenda

As described elsewhere in this Environmental Report, all locations of the Power Tools division contribute to making products and packaging even more environment-friendly under the auspices of the SUN21 program, which also includes optimization with respect to durability.

When it comes to packaging, we are always searching for alternatives providing more environmental compatibility, which we then test in the immediate proximity of the end user.

For example, we offered unpackaged impact power drills for sale in a German home improvement store as part of a test. To make up for the absence of packaging materials, we provided information about environmental protection, and referred would-be customers to cloth shopping bags that we provided at the counter. However, this offer was flatly rejected by browsing customers.

As a result, we shall continue selling our power tools in carry cases made of recycled plastic – at least for the near future. Tried-and-true practices notwithstanding, we strive for eco-friendly packaging that uses as little material as possible.

### "Green" heating

The new Hydro-Power gas-fired water heater is not an "always-on" appliance – and that's a good thing! This world-first in the division needs no pilot light and no additional sources of energy to ignite the burner.

Instead, the flow of water drives the turbine of a hydrodynamic generator. The electrical energy thus produced is used to ignite the burner. The Hydro-Power appliance consumes up to 25% less gas than a conventional gas-fired water heater.

With its Cerapur Kamin product, Bosch Thermotechnology introduced the first-ever calorific-value appliance for all types of chimneys, including those in older buildings. This innovation boasts minimum gas consumption and lowest emission readings. Calorific-value appliances, such as gas-fired burners and boilers, utilize the largest part of exhaust heat for heating purposes. Even more savings can be generated through the combined use of Junkers solar power systems and gas-fired water heaters like the Cerastar or Cerapur products. In this way, the generation of hot water consumes only up to 60% of the energy previously used for this purpose.

### BSH Bosch and Siemens household appliances

Over the life of a household appliance, more than 90% of environmental burdens are based on the use of water, energy, and laundry detergents. As early as 1996, Bosch Siemens Hausgeräte GmbH (BSH) was a signatory to the unilateral commitment to the reduction of energy consumption by washing machines, undertaken by the German household appliances industry. BSH-made washing machines utilize electronic control units and an automatic water level adjustment system to select the most economical wash program, reducing the number of rinse cycles wherever possible.

### No CFCs in refrigeration appliances

In 1988, BSH was the first manufacturer of household appliances to accomplish a 50% reduction of CFCs. Since 1993, BSH has fully converted to the use of eco-friendly hydrocarbons in refrigeration appliances. Instead of containing CFCs or HFCs, appliances feature insulation materials and refrigeration circuits containing pure hydrocarbons. They neither damage the ozone layer nor contribute to the greenhouse effect.

### Recycling-compatible product design

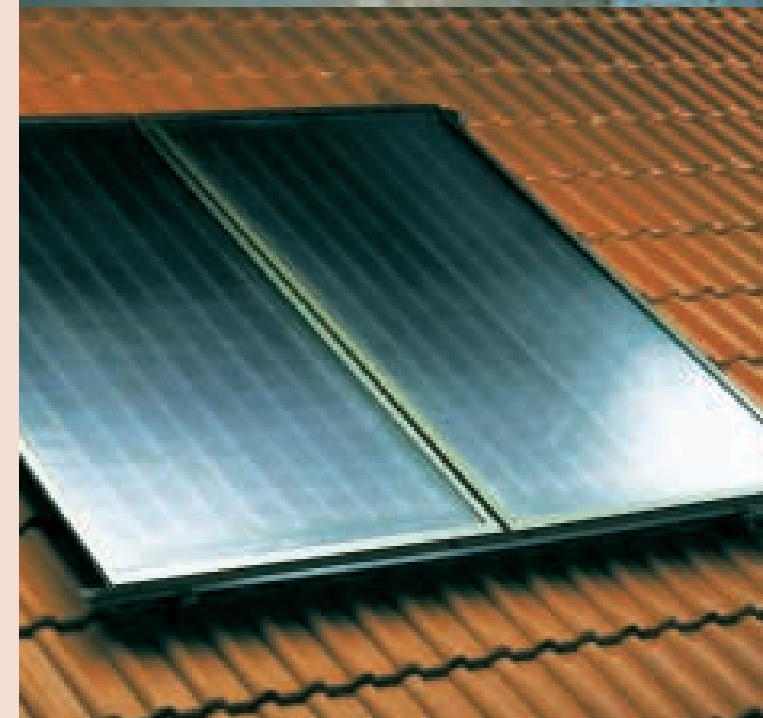
All household appliances feature low consumption, long service life, and maximum recyclability. Internal guidelines preclude the use of hazardous materials. We employ the tools of product-environment observation and correlation with environmental performance indicators to define energy and water use, noise emissions, recycling ratio, materials utilization, and targets for improvement. As a result, 98% of the materials used in our washing machines are recyclable. In 1998, the product-environment observation method used by BSH received an award at the competition of the Federal Association of German Industry.

In 2000, the environmental report published by BSH was judged to be the best in its industry.

[www.ranking-umweltberichte.de](http://www.ranking-umweltberichte.de)



*Durability in the best Bosch tradition is the hallmark of the SDS-plus S4 impact drill. Harder and sharper than ever before, a new tungsten-carbide tipped drill bit and new head geometry combine to provide longest service life even in granite and reinforced concrete.*



*Since 1999, the solar team has been working on Bosch solar systems. Solar-powered hot-water generation reduces the energy bill of a household by up to 60%. Some high-performance solar collectors feature environment-friendly and highly efficient "sunselect" coating. By its second year of operation, a system of this type will have saved more energy than went into its manufacture.*



*Our household appliances set new standards as far back as 1951, and the "Neuzeit I" ("modern age") food processor, featuring enameled mixing bowl and blender, was no exception. It will be available as a special edition on the occasion of the fiftieth anniversary.*



*A plant points the way*

*In September 2000, and with the motto "Diversity Instead of Simple-mindedness", residents of Eisenach, Germany participated in a demonstration against right-wing extremist violence. They were joined by 70 trainees and their plant manager from our Eisenach location. Also, actions such as discussions and poster displays denouncing hostility to foreigners were started inside the plant.*

## Involvement in Associations and Institutions



With an open mind for suggestions and impulses, we also nurture close contact with associations, authorities and the public.

"Are You Doing Your Bit?" is the core message of a campaign in the UK designed to sensitize the public on the

subject of environmental protection. In cooperation with the institution "Whitehall's Environment", our locations in the United Kingdom regularly organize events for motorists wanting to test the emissions of their vehicles. Bosch is providing the required equipment in all over the country.

The motto "Thinking, communicating, acting" is the catchphrase of our involvement with "econsense" in Germany.

[www.econsense.de](http://www.econsense.de)

With Bosch as one of the founding members, this forum was started in the summer of 2000. This "think tank" for German industry, based on an initiative by the Federal Association of German Industry in Berlin, is supported by 23 member companies.

Project groups have been working on issues like "Climatic Protection and Sustainability" since 2000.

However, our dialog partners in public debate are not limited to dignitaries of politics and society. In Stuttgart, for example, our training officers get together with teachers and officers of the education authorities to coordinate measures aimed at preparing grammar-school graduates for vocational training.

Also in Stuttgart, we have been the corporate sponsor of the Baden-Wuerttemberg branch of the scientific-technological competition entitled "Jugend forscht" (youth in research) for more than 16 years.

Our Belgian plant in Tienen is a member of the AGORIA multi-sector industrial federation. As a regular feature of this network, the companies of the metalworking industry meet several times each year with automakers from the Flemish part of Belgium. Among the variety of subjects discussed are current amendments to environmental legislation.

Clean air is the maxim for the Thermotechnology division at the Worcester plant in the UK. It started the "Environment 2000" initiative together with environmental foundation "National Trust", one of the largest charitable organizations in Europe.

Environmental prizes were awarded in the categories of

Installation, Specification, Innovation, and Artistic Execution. The competition also addressed gas fitters and heating engineers.

*Within the framework of the "econsense" forum, we aim to provide food for thought, facilitate the early recognition of trends, and participate in the design and implementation of options for solutions – at both the national and international level.*



*Supporting charitable projects by making music – true to its philosophy, the Bosch Orchestra from Stuttgart presents charitable concerts at Bosch locations. The funds collected on the occasion of a concert in Bari, Italy were donated to the association for the support of paraplegics founded by former Formula One racing driver Clay Regazzoni.*



## Epilog

### **Foundation "Remembrance, Responsibility and Future"**

*At our locations in Germany, our social responsibility also encompasses the issue of slave laborers and forced laborers in the National Socialist State. The Robert Bosch GmbH is one of the 17 founding members of the Foundation Initiative of German Industry. Within the scope of attendant obligations of conscience and solidarity, we have also urged our suppliers to render contributions.*

Over the years, we have always endeavored to lay the foundation for future-compatible development at all of our European locations.

The positive feedback we receive from our customers proves to us that we have succeeded in full or in part in many places.

One of these customers is Littlewoods, the British mail-order chain. As part of a social audit, representatives of that company inspected our Leinfelden plant in Germany. They not only found that our working conditions are excellent but also lauded our social engagement, our interest in employee wellness, and the high level of occupational safety we maintain. Welcome as they are, these findings encourage us to continue our relevant efforts at all locations.

Especially when it comes to environmental protection, we are aware of the problems associated with operating a large number of locations. Something that goes without saying in one country may well be perceived as unusual in another. In this context, our endeavor to accommodate our customers' legitimate demands for "just-in-time" delivery from local production imposes a special challenge on the work we do.

In the years that lie ahead, and in the spirit of our commitment to man and the environment, we shall continue to ensure that our thoughts and actions are guided by finding the required balance between economic, ecological, and social aspects—for the benefit of our own generation and that of future generations to come.

*Management speakers from various locations*





## Milestones

	1973	Within the scope of guidelines formulated by the Bosch Board of Management, Environmental Protection becomes a permanent component of corporate policy
	1974	The motto "Safe, Clean, Economical" is introduced as a corporate vision in the "3-S Program"
	1988	First-ever supply and disposal facility is commissioned in Stuttgart-Feuerbach
	1995	Introduction of environmental management system at all manufacturing locations is decided
	1997	Series-production start of Common Rail high-pressure direct-injection system for diesel engines, and of VP44 high-pressure diesel injection pump
	2000	Jointly with our customers we enter a new dimension of environment-compatible product engineering, initiated by EU Directive 2000/53/EC ("End-of life vehicles")
	2001	Management systems for quality, occupational safety, fire and environmental protection are merged to form an integrated management system

## People, Environment, Products



*If you require detailed information or reports on specific subjects, please fill out the enclosed card, and mail to the address below. You may also wish to send an e-mail to: [ralph.ruhrmann@de.bosch.com](mailto:ralph.ruhrmann@de.bosch.com)*

In the event that the reply card is missing please contact:

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Manufacturing locations in Germany of Robert Bosch GmbH, with subsidiaries and consolidated holding companies.

Corporate headquarters at Gerlingen near Stuttgart

Ansbach München  
 Augsburg Murrhardt  
 Bad Neustadt Nauen  
 Bamberg Nürnberg  
 Berlin Ottobrunn  
 Bietigheim Oberramstadt  
 Blaichach Plochingen  
 Bremen Ravensburg  
 Bretten Regensburg  
 Bühl Reutlingen  
 Crailsheim Rommelsbach  
 Dillingen Rutesheim  
 Eisenach Salzgitter  
 Elchingen Schwäbisch Gmünd  
 Erbach Schweinfurt  
 Fellbach Sebnitz  
 Giengen Stuttgart-Feuerbach  
 Göttingen Traunreut  
 Gronau Viersen  
 Hannover Volkach  
 Hildesheim Waiblingen  
 Homburg Wernau  
 Horb Witten  
 Immenstadt Wuppertal  
 Kusterdingen  
 Leinfelden-Echterdingen  
 Leonberg  
 Lohr  
 Metzingen

## Bosch Group Europe – Overview of Manufacturing Locations

Country	Int'l plate	Manufacturing locations	Major products	Employees*	Accident frequency* per 100,000 h worked	Electricity* MWh	Nat. gas + fuel oil + district heating* MWh	Water consumption* m <sup>3</sup>	Effluent discharge* m <sup>3</sup>	Waste* t	CO <sub>2</sub> Emissions* t
Austria	A	Hallein	Diesel injection systems	720	0.64	8,982	2,685	11,548	11,548	576	496
Belgium	B	Tienen	Wiper systems	1,550	0.80	29,077	30,977	80,823	61,924	1,963	5,728
Switzerland	CH	Derendingen, Solothurn, St. Niklaus, Steg	Power tools and accessories	1,630	0.85	36,188	9,655	843,300	844,263	6,707	1,273
Czech Republic	CZ	Budweis, Jihlava, Roznov	Diesel injection systems, fuel pumps and in-tank units, locking systems	6,350	1.29	69,918	21,566	119,155	145,404	7,247	1,366
Germany	D	see insert at left	Products of all business sectors	61,000	0.35	1,170,685	737,871	3,577,589	3,200,933	81,296	119,135
Spain	E	Alcalá de Henares, Aranjuez, Buelna, Castellet, La Carolina, Lliçá, Madrid, Pamplona, Treto	Starters and alternators, components for braking as well as gasoline injection and ignition systems, electronic control units, small motors, wiper systems, fuel filters, valves, injection moldings and metal castings, display systems, signaling devices	5,090	0.72	97,604	28,856	254,913	211,285	10,071	6,776
France	F	Angers, Beauvais, Drancy, Levier, Mondeville, Moulins, Pont de l'Arche, Rodez, Saint-Thégonnec, Vénissieux	Components for braking systems, diesel and gasoline injection systems, climate control systems, electronic control units, gas-fired boilers, heating/hot-water boilers	6,740	1.65	162,043	64,663	2,000,340	1,974,346	20,850	12,682
United Kingdom	GB	Cardiff, Clay Cross, Stowmarket, Worcester	Alternators, gardening tools and lawnmowers, gas-fired boilers and heating/hot-water boilers	2,580	0.68	32,166	14,488	104,369	99,201	4,512	2,679
Hungary	H	Hatvan, Kecskemét	Electronic control units, Compact Disc drives	1,240	0.47	4,768	4,170	14,477	12,505	402	771
Italy	I	Bari, Crema, Offanengo	Braking systems, diesel injection systems, vacuum pumps	2,400	1.26	45,821	9,699	169,294	166,977	11,693	1,869
Netherlands	NL	Breda, Tilburg, Weert	Power tools, packaging machines, variable automatic transmissions	1,030	0.52	22,081	10,789	116,466	91,951	2,399	1,506
Portugal	P	Abrantes, Aveiro, Braga, Tondela, Vila Real	Components for braking systems, car radios, Compact Disc drives, antennas, locking systems	3,500	1.53	29,111	12,892	220,726	215,424	7,054	2,384
Poland	PL	Twardogóra	Components for braking systems	540	0.10	6,732	3,416	9,660	9,660	2,716	632
Russian Federation	RUS	Engels	Spark plugs, components for gasoline injection systems	1,640	0.18	15,474	18,630	142,348	136,209	11,676	3,445
Turkey	TR	Bursa, Manisa	Components for diesel injection systems and braking systems, gas-fired boilers and hot-water appliances	3,440	0.44	62,064	28,756	613,268	611,586	6,650	6,410
Manufacturing locations in Europe, total				99,450		1,792,713	999,113	8,278,276	7,793,216	175,811	167,151

This table provides an overview of essential indicators for energy consumption and material streams of European manufacturing locations. Detailed data is available upon request. Carbon dioxide emissions were derived from the consumption of natural gas and fuel oil at individual locations.

Additional information on individual locations can be found on the Internet at [www.bosch.com](http://www.bosch.com), or may be taken from the pamphlet entitled "Bosch today", and from the Annual Report

In addition, our environmental officers in Europe will gladly assist you. They are listed by country and name on the next page.

\*Due to prevailing variations in geographical location, manufacturing depth/quantities, and product types, direct comparisons between locations are neither possible nor practical.

All indicators published in this report refer to the year 2001. They do not include information concerning Bosch Rexroth AG, BSH Bosch und Siemens Hausgeräte GmbH, and ZF Lenksysteme GmbH. At variance with the information provided in the 1998 Environmental Report, the domestic manufacturing plants at the Backnang, Brotterode, Frankfurt, Offenburg, and Radeberg locations no longer belong to the Bosch Group.



## Environmental Officers in Europe

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### Environmental coordinators at central points

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*The list contains the contacts at major manufacturing locations as well as environmental coordinators at central points of the organization.*

*Feel free to e-mail [ralph.ruhrmann@de.bosch.com](mailto:ralph.ruhrmann@de.bosch.com) for e-mail addresses or phone contacts of environmental officers at unlisted locations.*

*You will find additional Internet addresses on page U2 of the front foldout.*

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