The Bosch Environmental Protection logo symbolizes clean water, healthy air, and a functioning natural environment. The closed circular shape is synonymous with 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.
### Overview of Bosch Group in Europe

<table>
<thead>
<tr>
<th>Country</th>
<th>Plate</th>
<th>Companies (Manufacturer)</th>
<th>Contact/Information</th>
<th>Contact/Information</th>
<th>Sales by country EUR millions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>A</td>
<td>Robert Bosch AG</td>
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<tr>
<td>Belgium</td>
<td>B</td>
<td>Robert Bosch Producit NV</td>
<td><a href="http://www.bosch.be">www.bosch.be</a></td>
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<td>Switzerland</td>
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<td><a href="http://www.bosch.ch">www.bosch.ch</a></td>
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<td>Czech Republic</td>
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<td><a href="http://www.bosch.cz">www.bosch.cz</a></td>
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<tr>
<td>Italy</td>
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<td>Netherlands</td>
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<td>Portugal</td>
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<td>148</td>
<td></td>
</tr>
</tbody>
</table>

### Corporate indicators

<table>
<thead>
<tr>
<th>Bosch Group worldwide</th>
<th>2001</th>
<th>2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>EUR billions</td>
<td>EUR billions</td>
<td></td>
</tr>
<tr>
<td>Sales</td>
<td>34.0</td>
<td>31.6</td>
</tr>
<tr>
<td>Europe</td>
<td>22.9</td>
<td>20.7</td>
</tr>
<tr>
<td>In Business Sectors:</td>
<td></td>
<td></td>
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<tr>
<td>- Automotive Technology</td>
<td>23.2</td>
<td>22.5</td>
</tr>
<tr>
<td>- Industrial Technology</td>
<td>3.2</td>
<td>3.1</td>
</tr>
<tr>
<td>- Consumer Goods/Building Technology</td>
<td>1.8</td>
<td>1.7</td>
</tr>
</tbody>
</table>

Research and development expenses: 3.2 EUR billions

Fixed assets investments: 3.4 EUR billions

Depreciation of fixed assets: 1.2 EUR billions

Employees’ annual average (Thsd): 218,851

Including domestic: 218,851

Including foreign: 118,106

Personnel costs: 10,6 EUR billions

Total assets: 278,094 EUR billions

Fixed assets: 9,3 EUR billions

Equity capital: 9,0 EUR billions

Cash flow: 3,7 EUR billions

Net income for the year: 0.7 EUR billions

Unappropriated earnings (Dividends of Robert Bosch GmbH): 0.05 EUR billions

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Dear Reader,

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

As documented by this quotation, the company founder, Robert Bosch, the assumption of responsibility for a society and future generations is a venerable tradition that pervades our entire enterprise. Ever since the time that Robert Bosch was brought up 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 organisation.

For almost 30 years, our “5 S Program” has defined the guidelines by the development of future automotive technology within the Bosch organisation under the motto “Safe, Clean, Efficient.” 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 branches within the Bosch Group. In the year 2000, environmental and social objectives were formulated in the so-called “BOSQIC” guideline, supporting each employee in his active aim at securing quality, environmental protection, economic and customer relationship (K). This orientation provides firm footing for decision-making at all levels.

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

And we also invite you recipients your contribution to the discussion, and your complementary questions.
Review and Outlook

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 (http://www.berkeley.edu/~vat/h/hothall/) 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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Opportunities, Training, Advancement Page 18
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5
Worldwide Bosch Group Locations

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 60 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.

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 (UHS) or gasoline direct injection, assist in the reduction of automotive fuel consumption.

Industrial Technology

Effective May 2001, the Industrial Technology business sector completed a structural reorganization. The integration of Mannesmann Rexroth AG into 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, electronic 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.

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.

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.
Objectives

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.

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

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 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.

Visions

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

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 motorists with more safety.

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 electromechanical 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 aluminium wiring with a thickness of a mere 200 micron.

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”.

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.
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 commissioined 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.

Environmental management systems (EMS) at all locations were 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/A4001, 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

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 a number of companies 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/24U.
Bosch Group
Global Environmental Protection Objectives

<table>
<thead>
<tr>
<th>Objective</th>
<th>Status</th>
<th>Explanations on status</th>
<th>Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worldwide introduction of environmental management system</td>
<td>+</td>
<td>Environmental management with worldwide applicability is implemented at all locations. These are certified in accordance with a defined schedule.</td>
<td>2000</td>
</tr>
<tr>
<td>External certification of all Bosch locations, as per ISO 14001</td>
<td>▲</td>
<td>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.</td>
<td>Late 2003</td>
</tr>
<tr>
<td>Worldwide: location-specific variety of integrated management system (occupational safety, fire and environmental protection, quality)</td>
<td>▲</td>
<td>Refer to page 13 for comments about the integrated management system.</td>
<td>2002</td>
</tr>
<tr>
<td>Increase in proportion of reusable packaging</td>
<td>+</td>
<td>“Design for Environment” (DIE) project teams define appropriate product design already during research and predvelopment (refer to pages 34/35).</td>
<td>Continuous process</td>
</tr>
<tr>
<td>Contribution to reduction of average CO₂ emissions of passenger cars by 25%</td>
<td>▲</td>
<td>Procedure is embedded in DIE (Design for Environment) process (refer to pages 34/35).</td>
<td>2003</td>
</tr>
<tr>
<td>Substitution of hazardous substances in new products (lead, cadmium, chromium, mercury)</td>
<td>▲</td>
<td>Depiction of commitment by European Automobile Manufacturers Association (ACEA) and fuel-saving product developments (refer to pages 10 and 38/39).</td>
<td>2008</td>
</tr>
<tr>
<td>Contribution to remediation of inherited burdens at locations</td>
<td>+</td>
<td>Implementation of measures is location-specific (refer example on page 17). 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.</td>
<td>Continuous process</td>
</tr>
<tr>
<td>Reduction of specific energy consumption</td>
<td>+</td>
<td>At almost all locations we successfully utilize grid boxes for transport, and deploy reusable freight platforms such as the Europallet.</td>
<td>Continuous process</td>
</tr>
<tr>
<td>Completed substitution of CFCs in Germany; similar substitution goal in overseas locations</td>
<td>▲</td>
<td>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.</td>
<td>2005</td>
</tr>
<tr>
<td>Continuous reduction of waste volumes</td>
<td>+</td>
<td>The tally so far includes European locations. The 1998 figure was approx. 70% (refer to page 29).</td>
<td>Continuous process</td>
</tr>
<tr>
<td>Increase in proportion of reusable and multiple-packaging</td>
<td>+</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Environmental Protection Initiatives

Up to now, innovative ideas related to recycling or environmentally compatible packaging were implemented by the power tools division within the framework of the Environment 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 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).

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 Combating Soil Erosion, for Reforestation and the Protection of Nature).

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

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 within the Company

Less packaging, more environmental protection

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

2002 is set at 65%.
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.

The indicator system—Bursa as a case in point

At each location, we use a standardized system of variables—or indicators—to depict improvements in environmental services. In this way, objectives can be defined and the effectiveness of remedial actions evaluated.

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 of this location, in relation to its added-value contribution, is on a continuous decline. The evaluation of emissions is carried out in accordance with the Method of Ecological Scarcity of the Swiss Agency for the Environment, Forests and Landscape (SAEFL).

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.
Training and Continued Education

Opportunities, Training, Advancement

No matter whether new employees start work at Tilburg in the Netherlands, at Liça 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 or 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 1,880 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 advanced education seminars both during and outside working hours, which 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.

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.

Network 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

Secretariats’ Day, or better “Secretarial 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.

No employee is idle. The training programs 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.

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

The training programs 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.

Employees
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.

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.

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 procedures. 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.

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.
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.

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 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.

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.

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.

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.

Employees
Environmental Protection within the Plant

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

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.

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.

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.

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.

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

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

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.

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 waste-water treatment facilities.

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.

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.

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.

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

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

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.

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.”

Energy consumption in Treto, Spain
KWh per alternator produced

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 Bonnville, France, built for the sole purpose of waste separation and handling.

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

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

Wastewater evaporator in Vénissieux, France

Manufacture
Emergency Control

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.

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.

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 Twardogora—it’s 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.

Clean groundwater and soil that is free of pollution—in the Bosch Group, this objective plays an important role.

To ensure an existence devoid of contamination hazards for future generations, we research all locations for possible residual pollution in soil or groundwater. More often than not, the major contaminants are CFC, oil, and heavy metals.

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 Lilča
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 Bier for which it is renowned.

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-per-cent 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.

In Solothurn, Switzerland, the railway goes right into the plant building.

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.

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

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 compete$ 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.

Transparency and optimization via Internet

In Purchasing, we implement process improvements via the Internet-based Web-EDI platform, which we founded together with other automobile industry suppliers. The goal is to create a comprehensive communication 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 increases the transparency of processes and requirements, and as such also helps reduce the number of empty trips.
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.

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 substances 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.

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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.

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?

Lifestyle 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 development phases.

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

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

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.

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.

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 Wilfershausen (photo 2) dismantles and recycles power tools from Germany, Belgium, and the Netherlands.

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

In the manufacture of windshield 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.

Materials recycling

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

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

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
www.ecovolt.org
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 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 produced and delivered over the years. Today, Bosch is the world’s leading manufacturer of spark plugs. The current figure is an astonishing 75% to 95%. This means that the majority of the company’s products already achieve compliance with the stipulations of the EU 2005 directive for 2010.

Reduced emissions for diesel-powered cars

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.

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 nitrogen oxide emissions by up to 90%.

And finally, the ISG (photo 2) offers the functions of both starter and alternator. It combines the start-stop capability of an ISG with the capability of the ISG system, or electric power steering (EPF). Hydroxides 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%.

Bosch is the world’s leading manufacturer of spark plugs. The current figure is an astonishing 75% to 95%. This means that the majority of the company’s products already achieve compliance with the stipulations of the EU 2005 directive. It requires that the recycling ratio for old cars must rise from the current 75% to 95%.
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”.

Products

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.
Power Tools, Thermotechnology, Household Appliances

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.

Bosch and Siemens household appliances
Over the life on 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. 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

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.

www.ranking.umweltberichte.de
Involvement in Associations and Institutions

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 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

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-technical competition entitled “Jugend forscht” (youth in research) for more than 16 years.

Our Belgian plant in Tenen 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.
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.
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


2001 Management systems for quality, occupational safety, fire and environmental protection are merged to form an integrated management system
### Bosch Group Europe – Overview of Manufacturing Locations

<table>
<thead>
<tr>
<th>Country</th>
<th>H1 Date</th>
<th>Manufacturing locations</th>
<th>Major products</th>
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<td>Sofia</td>
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<td>Kolín, Plzeň, Brno, Olomouc</td>
<td>Power systems, fuel pumps and in-tank units, heating, hot water boilers</td>
</tr>
<tr>
<td>Germany</td>
<td></td>
<td>Hanover</td>
<td>Electric drives, fuel pumps and in-tank units, heating, hot water boilers</td>
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<tr>
<td>Spain</td>
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<td>ALCATEL, Alicante, Bilbao, Castellón, La Coruña, Madrid, Pamplona, Toledo</td>
<td>Stoves and alternators, components for braking, as well as gasoline injection systems and ignition systems, electronic control units, small motors, water systems, fuel filters, valves, injection nozzles and metal castings, climate control systems, display systems, signaling devices, wiper systems, fuel filters, valves, injection moldings and metal castings</td>
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<td>Tychy, Gdańsk, Bydgoszcz</td>
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<td>Gent, Leuven, recipe of the Belgian Federation</td>
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<td>Turkey</td>
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<td>Antalya, Ankara, Istanbul</td>
<td>Components for diesel systems and braking systems, car fuel filters and hot water appliances</td>
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**Employees**

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**CO2 Emissions**

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**Employees per 100,000 hours worked**

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**Electricity**

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**Manufacturing locations in Europe, total**

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<tr>
<td>Poland</td>
<td>262,051</td>
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<tr>
<td>Belgian Federation</td>
<td>282,274</td>
<td>282,274</td>
</tr>
<tr>
<td>Turkey</td>
<td>308,656</td>
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**CO2 Emissions per 100,000h worked**

<table>
<thead>
<tr>
<th>Country</th>
<th>2023</th>
<th>2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>0.015</td>
<td>0.015</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>0.019</td>
<td>0.019</td>
</tr>
<tr>
<td>Switzerland</td>
<td>0.022</td>
<td>0.022</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>0.022</td>
<td>0.022</td>
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<tr>
<td>Germany</td>
<td>0.025</td>
<td>0.025</td>
</tr>
<tr>
<td>Spain</td>
<td>0.026</td>
<td>0.026</td>
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<tr>
<td>France</td>
<td>0.031</td>
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<tr>
<td>United Kingdom</td>
<td>0.036</td>
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<tr>
<td>Hungary</td>
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<tr>
<td>Italy</td>
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<td>0.042</td>
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<tr>
<td>Netherlands</td>
<td>0.044</td>
<td>0.044</td>
</tr>
<tr>
<td>Portugal</td>
<td>0.045</td>
<td>0.045</td>
</tr>
<tr>
<td>Poland</td>
<td>0.046</td>
<td>0.046</td>
</tr>
<tr>
<td>Belgian Federation</td>
<td>0.047</td>
<td>0.047</td>
</tr>
<tr>
<td>Turkey</td>
<td>0.048</td>
<td>0.048</td>
</tr>
</tbody>
</table>

*Due to prevailing variations in geographical or temporal aspects, the given data may not be fully comprehensive and may not fully reflect the current situation in all locations.*
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 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.

### Environmental Officers in Europe

<table>
<thead>
<tr>
<th>Country</th>
<th>Companies</th>
<th>Name/e-mail</th>
<th>Contact phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Hallein</td>
<td><a href="mailto:christian.alex@at.bosch.com">christian.alex@at.bosch.com</a></td>
<td>+43 (6245) 79 23 49</td>
</tr>
<tr>
<td>B</td>
<td>Tienen</td>
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<td>+32 (16) 80 08 30</td>
</tr>
<tr>
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<td>Solothurn, Derendingen</td>
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<td>+41 (32) 6 88 30 55</td>
</tr>
<tr>
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<td>+420 (66) 7 58 12 70</td>
</tr>
<tr>
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<td>Budweis</td>
<td><a href="mailto:antoniinfo@cz.bosch.com">antoniinfo@cz.bosch.com</a></td>
<td>+420 (38) 7 70 40 89</td>
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<tr>
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<td>+49 (981) 54 39 70</td>
</tr>
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<td><a href="mailto:heinz.bernhard@de.bosch.com">heinz.bernhard@de.bosch.com</a></td>
<td>+49 (8323) 20 27 77</td>
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<tr>
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<tr>
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</tr>
<tr>
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<td>+49 (7101) 14 23 93</td>
</tr>
<tr>
<td>D</td>
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<td>+49 (7153) 30 85 62</td>
</tr>
<tr>
<td>D</td>
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<td>+49 (202) 46 67 19 84</td>
</tr>
<tr>
<td>E</td>
<td>Treto</td>
<td><a href="mailto:adelita.diaz@es.bosch.com">adelita.diaz@es.bosch.com</a></td>
<td>+34 (942) 62 95 89</td>
</tr>
<tr>
<td>F</td>
<td>Rodez</td>
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<td>+33 (3) 56 75 72 69</td>
</tr>
<tr>
<td>GB</td>
<td>Cardiff</td>
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<td>+44 (1443) 22 12 95</td>
</tr>
<tr>
<td>GB</td>
<td>Worcester, Clay Cross</td>
<td><a href="mailto:caroline.stephens@uk.bosch.com">caroline.stephens@uk.bosch.com</a></td>
<td>+44 (1405) 75 46 34</td>
</tr>
<tr>
<td>H</td>
<td>Keckemét</td>
<td><a href="mailto:zsolt.szabo@hu.bosch.com">zsolt.szabo@hu.bosch.com</a></td>
<td>+36 (76) 51 18 42</td>
</tr>
<tr>
<td>H</td>
<td>Hatvan</td>
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<td>+36 (37) 54 91 16</td>
</tr>
<tr>
<td>I</td>
<td>Bari</td>
<td><a href="mailto:paolo.pardone@it.bosch.com">paolo.pardone@it.bosch.com</a></td>
<td>+39 (80) 5 26 93 03</td>
</tr>
<tr>
<td>NL</td>
<td>Tilburg</td>
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<td>+31 (13) 4 64 04 45</td>
</tr>
<tr>
<td>P</td>
<td>Braga, Vila Real</td>
<td><a href="mailto:carlos.moreira.carvalho@pt.bosch.com">carlos.moreira.carvalho@pt.bosch.com</a></td>
<td>+351 (253) 60 62 40</td>
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<tr>
<td>P</td>
<td>Aveiro</td>
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<td>+351 (234) 9153 68</td>
</tr>
<tr>
<td>PL</td>
<td>Twardogóra</td>
<td><a href="mailto:mieczyslaw.markow@de.bosch.com">mieczyslaw.markow@de.bosch.com</a></td>
<td>+48 (71) 3 99 90 95</td>
</tr>
<tr>
<td>RUS</td>
<td>Engels</td>
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<td>+7 (84511) 7 96 17</td>
</tr>
<tr>
<td>TR</td>
<td>Bursa</td>
<td><a href="mailto:sebnem.maier@tr.bosch.com">sebnem.maier@tr.bosch.com</a></td>
<td>+90 (224) 219 24 07</td>
</tr>
</tbody>
</table>

### Environmental coordinators at central points

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| D       | Blaupunkt GmbH | joachim.schmidt@de.bosch.com | +49 (5121) 49 46 23 |
| D       | Bosch Rexroth AG | leo.polotsky@boschrexroth.de | +49 (9302) 18 31 37 |
| D       | Bosch Siemens Hausgeräte GmbH | herbert.mrozek@bshg.com | +49 (89) 45 90 21 95 |
| D       | ZF Lenksysteme GmbH | bernhard.uhl@zf-lenksysteme.com | +49 (7171) 31 23 24 |
| F       | Locations in France | laurent.aietti@fr.bosch.com | +33 (1) 40 10 76 48 |
| F       | Locations producing brake system components | gerard.poirier@fr.bosch.com | +33 (1) 41 11 53 18 |