



## 1998 Environmental Report



**BOSCH**



### The Bosch Environmental Protection logo

Symbolizing clean water, healthy air and a functioning natural environment, the circular shape of the logo also signifies the completeness of unbroken circulation systems in both nature and industrial production cycles, from the development of products to their manufacture and the final treatment at the end of their life cycle.

The logo's Q-shaped appearance provides a visual association with the Bosch corporate "quality" symbol, serving as an identifying mark for the continuing pursuit of environmental protection objectives that is inseparable from the attainment and maintenance of product quality.

## 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.

## Preface



We are proud to introduce our first-ever corporate environmental report. Covering all product areas and corporate divisions, it outlines relevant activities throughout German locations, based upon information and data that is current up to the end of 1998.

At Bosch, environmental protection has been a major subject for a number of years – for all corporate employees from top managers to the workers on the shop floor.

At German Bosch locations alone, more than 250 employees are working in full-time positions related to environmental protection.

In this brochure, the reader will gain detailed knowledge not only of results but also of the efforts applied to the continuous improvement of an established standard, as contemplated by the Bosch "Continuous Improvement Process" (CIP).

Special emphasis must be given to the commitment of our employees, which emanates at every turn from between the lines of this report. It is proof of the fact that environmental protection within our company is not merely perceived as "a necessary evil", nor as a catchword of political correctness that one likes to enunciate without backing it up with appropriate action. Instead, environmental protection has become a natural part of our lifestyle to which we have committed ourselves. As you will see, environmental protection goes well beyond keeping the plastic yogurt cups out of the domestic waste!

Hubert Zimmerer,  
Member of the  
Board of Management  
of Robert Bosch GmbH,  
responsible for  
environmental  
protection



## Introduction

The 1998 Environmental Report is the first of its kind, and we have structured it as a kind of general overview. On the one hand, it provides information about the variety of our environmental protection activities and their major aspects within our enterprise. On the other hand, it goes beyond corporate divisions, providing a detailed view of selected products in the individual Bosch business areas. Although our attention is focused on domestic factories, the central aspects discussed here equally apply to our foreign manufacturing locations.

In total, our Environmental Report attempts to provide the answers to two key questions:

- *What measures does Bosch employ to meet the various requirements of environmental protection at manufacturing locations?*
- *On the side of the end user, what are the effects that are created through the million-fold sales of appropriately optimized products, and through the application of these products in the daily lives of our customers?*

In this context, it is worthy of note that this report, rather than describing an attained static condition, discusses an ongoing process comprised of environmental protection activities that are undergoing a constant process of evolution.

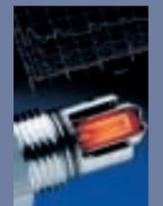
In a sense, the Bosch 1998 Environmental Report represents a snapshot of our company that is made available to an external observer. At the same time however, these pages also address all of our employees. First and foremost, the report conveys to them a message of appreciation that recognizes their tireless and successful efforts toward improving environmental protection. Second, the information contained herein provides our personnel with information about their own workplace and beyond. And, last but not least, this report may also be perceived as a special incentive for all of us.

To provide the reader with a range of subjects of general interest to a broad audience, excessive detail was deliberately omitted from this brochure. It is also hoped that as a result, you will find our report more readable. And possibly even encourage you to join in a dialog with us.

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*A brief introduction to the Bosch Group and the manifold aspects of environmental protection which we pursue within our corporation*

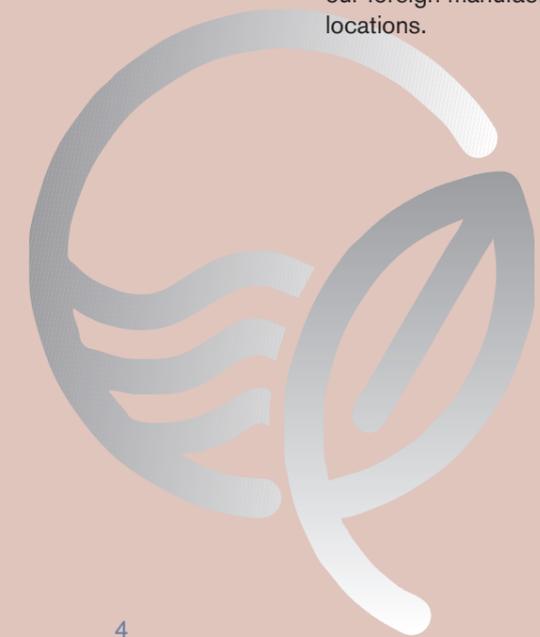
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*We have focused on these key environmental issues within the production flow in particular*



*A dash of statistics, plus advice on how to find the right answers to questions you may have*



*Examples of how environment-related improvements have already been incorporated in our products*



## The Bosch Group

*Robert Bosch stands as an example of a man who thought and acted with the whole picture in mind. As an entrepreneur, he adhered to the maxim of applying great energy to addressing specific issues, even though they extended beyond the immediate sphere of responsibility of a manufacturing company. In this sense, companies and their employees have been actively considering ecological requirements for a long time – starting with the design, development and manufacture of a product, and concluding at the end of the product's cycle of use.*

The name of Robert Bosch is closely associated with the automobile. However, Bosch is not only a byword for automotive equipment, such as ABS, brakes, fuel injection technology and driver information systems but also stands for a number of other product sectors, such as communications technology as well as power tools, household appliances, thermotechnology, automation technology and packaging machinery.

The Bosch Group is organized into four Business Sectors:

- Automotive Equipment
- Communications Technology
- Consumer Goods
- Capital Goods

Automotive Equipment is the largest Business Sector of the Bosch Group. In 1998, 123,000 workers achieved sales of 31.8 billion DM, representing more than 63% of total corporate sales. Bosch is the largest independent manufacturer of automotive equipment worldwide.



*Bosch develops gasoline direct injection systems for almost all European car makers – to further reduce fuel consumption*



*Headquarters of the Bosch Group at Gerlingen near Stuttgart*

The *Automotive Equipment* Business Sector is subdivided into 10 business divisions. Nine of these divisions manufacture products for the automobile industry worldwide, and are again divided into four large business fields: Fuel injection technology for gasoline and diesel engines; electrical machines (starters, alternators, small-power electric motors); systems for passive and active safety (ABS, ESP, brakes, lighting technology) and mobile communications products (car radios, display and navigation systems, driver information systems).

The *Automotive Aftermarket* Division is responsible for selling automotive equipment to the aftermarket trade, and for supplying service parts. An important prerequisite for the success of this division is a marketing and customer service organization that includes about 10,000 legally independent but contractually bound Bosch Service agents with about 100,000 employees in 132 countries.

In 1998, the *Communications Technology* Business Sector achieved sales of 5.0 billion DM with about 18,700 employees. Its share in total sales was 10%.

In this Business Sector, Bosch is concentrating on the public and private networks, broadband networks business and on the manufacture and distribution of terminal devices (cordless phones conforming to the DECT standard, telephone systems and mobile phones in GSM technology), as well as security and aerospace technologies.



*Cutting-edge radio relay technology by Bosch for wide-area applications in digital transport networks is proving a reliable alternative to transmission via physical paths*

To take advantage of new business opportunities, the key focus of work in network technology has shifted to the areas of transport technology and connectivity. Special mention should be given here to the Bosch Access Network for optical data transmission, and the radio based Digital Multipoint System (DMS) transmission system.



*In 1998, Bosch introduced a world first: A precision power saw for commercial applications*

With its 30,800 employees, the *Consumer Goods* Business Sector tallied about 11.3 billion DM in sales in 1998, amounting to 22% of total corporate sales.

Bosch maintains a strong position in the global markets for power tools and accessories. In thermotechnology, Bosch focuses on gas as the energy source that is particularly environmentally compatible for heating and hot-water generation. Among the relevant business division brand names are Junkers, e.l.m. leblanc, Radson, Worcester, Vulcano and Geminox.

The parity-managed Bosch und Siemens Hausgeräte GmbH (BSH) is a manufacturer of household appliances.

The *Capital Goods* Business Sector totaled sales of 2.1 billion DM in 1998, amounting to 4% of total Bosch sales. The number of employees was 6,900.

The *Automation Technology* Division is a provider of integrated system solutions for automated manufacturing.

The *Packaging Machinery* Division supplies packaging machines plus filling systems for liquid media to customers in the food processing, semi-luxury foods and tobacco industries, to candy manufacturers as well as to the pharmaceutical and chemical industry.



*Tubular bag packaging machine*

### The Robert Bosch Foundation

“Products, services, and indeed the entire entrepreneurial philosophy must inure to the benefit of the general public.” In this sense, the Robert Bosch Foundation GmbH is the embodiment of the social commitment of our company founder. Having held 92% of the Robert Bosch GmbH since 1964, the foundation uses its share of dividends exclusively for the direct benefit of the public. By the end of 1998, it had provided approximately 825 million DM for domestic and international public causes. The most significant areas of support are health care, international understanding, public welfare as well as culture and education.



## Bosch Group environmental protection priority ranking

*Within the Bosch Group, environmental protection represents a corporate principle, ranking equally with product quality and corporate profitability. As early as 1973, the Bosch Board of Management defined this in a guideline, adherence to which is mandatory for all employees. In fact, Bosch has been striving for a long time to minimize environmental impact by assuming proactive responsibility.*

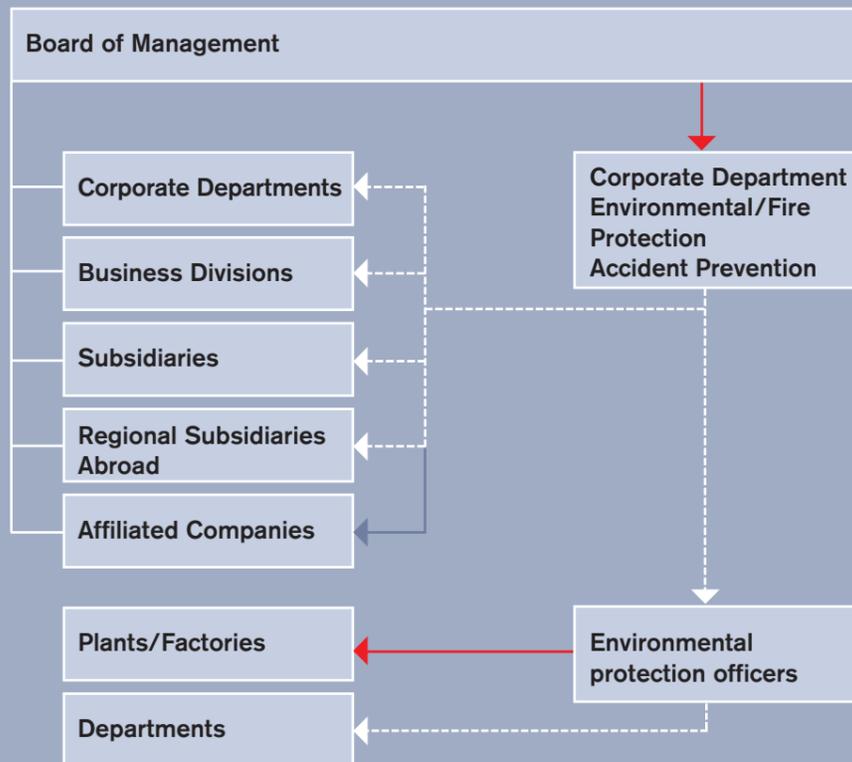
Under the stewardship of a member of the Bosch Board of Management, a corporate department within the Bosch Group is charged with the responsibility for worldwide coordination, consultation and monitoring of environmental protection issues. This ensures rapid implementation of new findings related to environmental protection in the form of decisive corporate action.

Reporting directly to their respective managements, corporate environmental protection officers monitor and verify compliance with statutes and regulations as well as international guidelines. They also advise individual locations about all issues related to corporate environmental protection.

### Environmental protection at Bosch locations abroad

At Bosch, environmental protection abroad has the same high priority as at home. This means that Bosch does not move production into another country in order to circumvent compliance with the environmental protection statutes applying in Germany. On the contrary, in foreign locations as well as at home, the company invests considerably in facilities suited to the prevention or control of environmental impact.

### Bosch environmental protection organizational structure



Reporting —————  
Advising/Monitoring - - - - -  
Advising \_\_\_\_\_

*Environmental protection officers are supported by a corporate department which is also charged with monitoring and coordination of the global introduction and implementation of the EMS*

## Environmental Management System

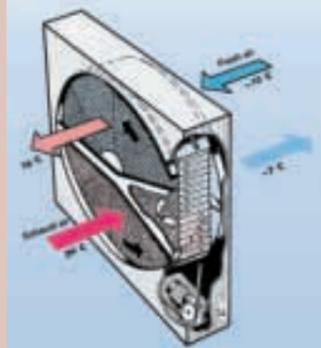
In 1995, subsequent to having conducted successful pilot projects in France, Spain and Germany, the Bosch Board of Management approved the introduction of the Environmental Management System (EMS). Its underlying principles and concrete guidelines have been published in a manual that today serves as a benchmark worldwide.

In Europe, the introduction of the EMS is organized in accordance with the EU Ecology Audit directive; other locations adhere to the ISO 14001 standard. The EMS provides for the systematic control of all activities affecting the environment. Describing the corporate organizational structure, responsibilities and processes, it assists in the ongoing improvement of environmental protection, encompassing environmentally friendly product design to the same extent as operation-specific environmental protection and vendor/supplier involvement.

As a prerequisite for successful environmental management, all charge personnel must be aware of their environmental protection obligations within clearly defined areas of responsibility. Processes, systems and sequences pertaining to the environment are recorded, documented and evaluated. For plant managers, this information becomes the basis upon which they formulate environmental objectives and a specific program for their respective locations.

Each location appoints an environmental management representative who advises the responsible departments and coordinates all activities in the area of environmental protection. Employees at all corporate levels are informed on a regular basis about the effects their actions have upon the environment. In this way, they are sensitized and motivated to continue acting in an environment-conscious manner.

*Our goal:  
Worldwide introduction by the end of the year 2000*



Rotary heat exchanger

## Resources

At Bosch, saving energy begins as early as during the planning phase for buildings and technical facilities. The uncompromising utilization of modern building technology and process control systems (since the beginning of the eighties) provides for the optimized operation of technical plant systems, enabling effective energy management with the purpose of protecting the environment and reducing operating costs.

### Our main energy sources

- Electricity (for lighting, drives, refrigeration plants and air compressors)
- Natural gas, long-distance heat supply, light heating oil (generation of heat required for processes and heating applications)

More than ten years ago, we have completed the ongoing conversion to natural gas as the more environmentally friendly energy source for heat generation. (Today, heating oil serves only as a stand-by energy source to cover peak consumption periods during the winter season.)

Since 1985, heat consumption per unit area has been reduced by 30%. The reason for this, besides a decisive improvement in thermal building insulation methods, is the utilization of heat recovery options:

- Rotary heat exchangers in room heating ventilation systems
- Utilization of waste-heat recovered from air compressors for warm-water generation
- Utilization of process heat recovery

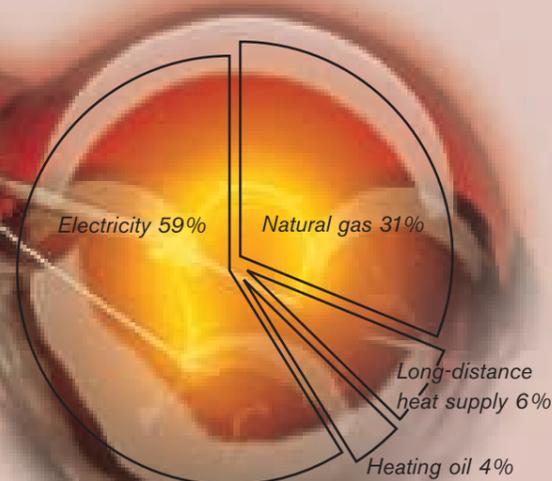
The highly efficient use of natural gas and light heating oil for the purpose of heat generation produces reduced emissions as an immediate consequence. In addition to the conservation of resources, the objective here is to reduce the emission of combustion gases, thus making a contribution to climate protection.

Despite the strong tendency toward automation since the mid-seventies and the increased specific electricity requirement (referenced to building area and year), we have been able to keep overall consumption constant for over ten years.

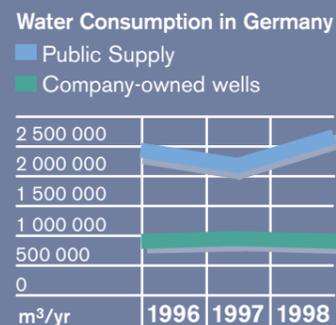
In 1996, the Blaichach plant received an award for optimizing heat recovery



Proportional share of energy sources



Hydro dam and turbine (at left) of the Blaichach plant, which covers approx. 60% of its electricity requirements



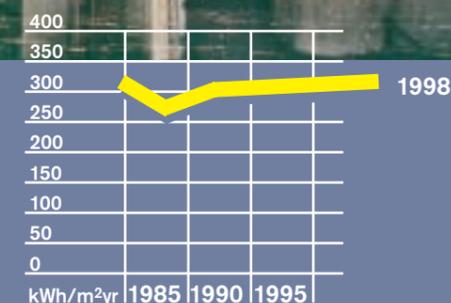
### The reasons for particularly low consumption of electricity include:

- The use of energy-saving drives with the requisite control technology for heating and ventilation systems, i.e., frequency inverter-based motor controls, linked to centralized instrumentation and control.

In many areas, cost savings can be achieved through resource conservation based on the prudent use of energy. However, Bosch also actively addresses the conservation of water, our basic resource. Although this "raw material" appears to be cheap, it is by no means available in unlimited quantities. With one-fourth of total water consumption coming from our own wells and three-fourths from the public supply, the sparing use of water and repeated recycling through careful water recovery and treatment have helped Bosch to reduce water consumption even further.

- The increased efficiency of compressed air utilization. Because compressed air is generated by means of electrically powered compressors, it ranks as the most cost-intensive form of energy. Through optimized operation and meticulous maintenance in conjunction with worker training on a regular schedule, specific losses were reduced. The leakage test for air line pipe systems is also supported by a centralized instrumentation and control system.

Power consumption in Germany per unit area



The objectives we have attained so far provide ample motivation to continue with our efforts.

Within the framework of adapting our buildings and technical facilities to the requirements imposed by the manufacture of new products, we are refitting these systems with regard to cost and energy savings. Working together, both our teams of experts from corporate headquarters and technical specialists on location synergize in producing energy efficiency studies that are bound to become the basis for the identification additional savings potentials.

Our goal:

Ongoing reduction of specific energy consumption



## Environmentally compatible product design

*In the development phase of a product, the course is set for the entire life cycle of a product – up to recycling or disposal.*

Our goal:

*Further increase of recyclability of Bosch products*

### Life Cycle Analysis

*The Life Cycle Analysis (LCA) quantifies the environmental effects of a product or process over its entire life cycle. For example, energy balance and emissions into the environment (air, water, soil) are documented and evaluated. Our central research and advanced development departments are currently testing various methods and tools to conduct LCA's in pilot studies with various business divisions. For several products (e.g., ABS, headlights, fuel injection systems for diesel-powered vehicles and angle grinders) LCA's have already been issued.*

As early as at the conceptualization stage of an environmentally compatible product, we consider the following principles:

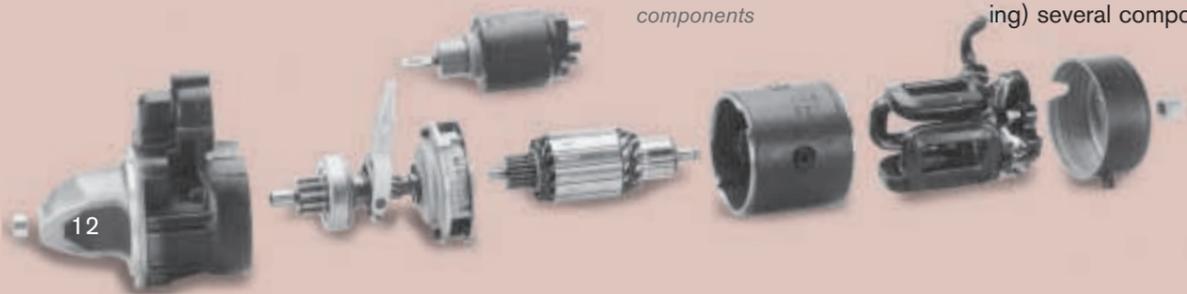
- *Resource conservation through sparing use of materials*
- *Selection of ecologically friendly materials*
- *Selection of ecologically friendly manufacturing processes*
- *Product utilization oriented toward environmental protection (low energy consumption, low product weight, maintenance friendliness)*
- *Repeatability of utilization*

Our business divisions employ advanced guidelines and checklists. These enable our development engineers to establish additional criteria and verification options for the consideration of environmental concerns in product development, which nonetheless are required to meet specific requirements in terms of quality and economics.

We use an ecology balance sheet; we test "Design for Environment" software tools, and we utilize experiences acquired with our own collection and recycling systems. We also maintain an ongoing dialog with our customers with regard to additional options for improvement.

In compliance with statutes governing recycling economy and waste disposal, we pursue higher rates of efficiency in materials recycling. For several decades, we have provided our support by remanufacturing (factory reconditioning) several components.

*Automotive starter components*



## Managing the recycling activities



In recycling centers, discarded power tools and storage batteries collected throughout Germany are dismantled, and the components recycled. The same is true for the special plastics from old telephone housings, which are recovered via a take-back system used by the Communications Technology Business Sector. Carrying cases for new electric tools are created from these materials. Since 1994, we also take back domestic appliances. In 1998 alone, 1,584 tonnes of metals and 242 tonnes of plastics have thus reentered the economic cycle.

As an important side effect, new knowledge acquired in the course of the referred dismantling and reprocessing activities also flows into the development of new products. This is a practice from which all business divisions profit in one way or another.

Preventing or reducing waste is also a major consideration in the planning for new products. In this context, minimizing the quantities of materials used, plus preventing the use of hazardous substances both in production and in the finished product, are important goals. Internal standards and procedures support the fulfillment of this goal.

Waste coordinators are active at all locations, advising design engineers and manufacturing planners.

Wherever waste is generated (which frequently cannot be avoided), reduction takes absolute precedence over recycling. The basis for this is provided by the possibility of separate collection and storage of the respective materials. While this concerns manufacturing in particular, it also applies in other areas.

*Easy identification means easy separation*

As an essential prerequisite for the successful operation of a collection system for separate materials all workers must be informed and motivated. To this end, all individuals are given the opportunity to acquire the necessary knowledge, and to share their own ideas and experiences. An in-house suggestion system enables all employees to make an active contribution to waste prevention.

*Bosch is actively involved in optimizing the recycling of old car parts in accordance with the "Voluntary Pledge" of German industry to the Federal Government. We are also contributing to ongoing work on new concepts for electronic scrap recycling*

Our goal:

*Ongoing reduction of waste volumes*



## Recycling Bosch products

When a product is "born", we already take into account the end of its life cycle will not include disposal in a landfill

Internal Bosch guidelines assure a recyclable product design. For this reason, we make sure already during the product development phase that the number of different materials is kept low. Wherever possible, we avoid the use of compound materials that are difficult to separate.

### Reconditioned power tools



An important development objective of our anti-lock brake system (ABS 5.3) was the practical reusability of major components. The hydraulic unit contains valuable aluminum; it is easily removed and readily melted down. The attached control unit and pump motor can also be dismantled within 15 seconds and can be reused separately.

Starters and alternators are also components comprising high aluminum, iron and copper contents. At the end of their life cycle, they enter into professional remanufacturing at special Bosch reconditioning facilities. All components that are suitable for reconditioning are dismantled, thoroughly cleaned and checked with care. Worn parts are replaced with new original Bosch components.



Starter before (left) and after factory reconditioning (right)

### Reconditioned starters and alternators



These replacement components are then assembled in accordance with the same strict standards applied to new products, leaving the plant with a 100% performance and function guarantee that is equal to that of new products.

Bosch relieves the burden on the environment by reusing valuable raw materials. Compared to new components, the use of Bosch reconditioned starters and alternators produces annual savings of approx. 1,800 tonnes of iron and steel, 450 tonnes of aluminum and close to 100 tonnes of plastics. The annual consumption of electricity needed for manufacturing would amount to approx. 85,000 MWh.

The recycling capacity of modern control units has been significantly improved by new housing designs. The new micro-hybrid technology for control units also simplifies recycling. In addition, the miniaturization associated with this technology also provides for a significant reduction in the volume of waste.

## Environmentally friendly Bosch product packaging



Made from plastic regranulate, this attractive case is at the same time a sales display package, storage case and transport container

### Let's pack: As much as we need, as smartly as possible

Packaging is indispensable as a protective medium, information carrier, and as a "silent salesman" on the retail store shelf.

Basic components of the Bosch packaging concept are recyclable boxes with a high content of recycled paper.

The dictum of "multi-use before single use, and avoidance of packaging" is reflected in both in-house deliveries and shipments to Bosch customers. Two-way pallets or grid boxes are used for shipping between manufacturing divisions, sales centers

and Bosch contract wholesalers, including most of our foreign companies.

Also, the decision to phase out one-way pallets for shipments has drawn a positive response from many customers.

In shipping to the automobile industry, we are increasing the use of reusable packages, a measure that reduces packaging waste.

We use packages made from reusable raw materials that are environmentally friendly and compact also for shipping products destined for the end user.



Example of an all-cardboard packaging solution, developed in order to dispense with bubble wrap

Thanks to sophisticated folding and stamping patterns, the avoidance of exaggerated use of color and foil lining and the elimination of plastic filler materials, Bosch packages have also contributed to relieving the burden on the environment.

Our goal:

To increase the share of multi-use and repeat use for packages



Multiple safety devices attached during use and shipping

## Handling hazardous materials

*Gone are the days when the hazardous properties of some substances were not fully appreciated, were overlooked or were deliberately disregarded.*

*Bosch employees are characterized by a pronounced sense of responsibility when handling hazardous materials – in both their own interest and that of the company.*



Prior to procuring production materials or outsourced parts, Bosch technical departments evaluate both their technical properties and possible effects upon the environment and on worker health.

An important element for evaluating work materials and purchased parts is supplier information about parts that are environmentally relevant or related to safety. We have issued a standard that prohibits potentially critical ingredients. This standard identifies substances that may not be present in working media or outsourced parts, or the presence of which must be disclosed.

If the evaluation indicates a hazardous material, a check is made to determine whether or not its use can be prevented. If a substitution with a material featuring a higher degree of health and environmental compatibility does not appear feasible, the quantity, use and release of hazardous materials are reduced to the unavoidable minimum.

For the unavoidable use of hazardous materials, we define safe and ecologically compatible handling procedures which are also subject to documentation. For example, appropriate storage areas are designated in the plant, technology and capacity are adapted to the internal waste water treatment system or methods to reuse the generated waste are defined. Another important aspect is the selection of the appropriate technical protection equipment to prevent the contamination of the water supply, groundwater and soil.

Throughout the various business areas, all hazardous materials being used are recorded in a directory in order to analyze and identify the location and maximum quantities of use, and possible effects on humans and the environment. Appropriate measures are then derived from the information thus collected.

Using corporate directives, we educate our workers with regard to possible hazards and the correct handling procedures and modes of behavior. Information regarding the correct means of transport is also a part of the referred directives. Special identifying symbols and markings warn all workers of hazardous materials.

*Each worker is issued personal protective equipment for handling hazardous substances and materials*



*Structural building measures plus mechanical and electronic devices are used to store chemicals in a manner that eliminates environmental hazards*

## Guarding against dangers – also a measure of environmental protection



We apply comprehensive measures to prevent and restrict fire damages and protect the environment.

To us, the building protection ensured by extensive sprinkler and automatic fire alarm systems is as normal as are catch basins in plant systems handling ecologically hazardous substances. In addition, intelligent safety technology issues an early warning and helps limit the escape of hazardous substances.

**However, warding off danger also necessitates planning, preventive, and organizational measures**

Environmental protection engineers and safety experts conduct risk analyses of manufacturing processes and systems. Employees are trained on a regular schedule with regard to protecting against hazards and their own responses to possible events of damage. Alarm channels, meeting points and special measures for the occurrence of such events are tested by means of exercises. All of this is augmented by the respective company instructions and safety regulations.

Out of principle, installation and maintenance of safety systems adhere to accepted rules and technological standards. The dates for required inspections and maintenance are tracked by computer.

For example, to prevent hazardous situations, we maintain our own fire departments for deployment as a first line of defense at more than 30 locations in Germany. More than 1,000 full-time and part-time plant firemen provide short response times around the clock when there is an incident.

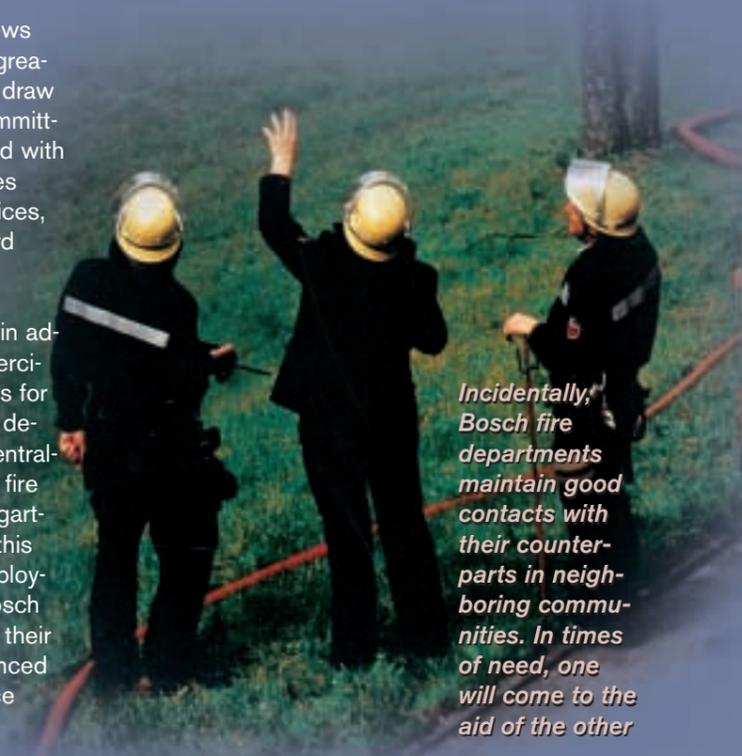
In the event that fire crews require assistance of a greater magnitude, they can draw upon the support of committed volunteers associated with special technical services (chemical clean-up services, medical and public guard services).

For over ten years, and in addition to the specific exercises and training services for each location, plant fire departments have been centrally trained by our largest fire department at the Stuttgart-Feuerbach location. At this facility, about 1,900 employees from the various Bosch locations have received their basic training and advanced firefighting courses since 1974.



*At Bosch, the plant fire departments look back on a proud tradition: Some of our fire departments were founded more than 75 years ago*

For many years, damage-based losses in the Bosch Group at home and abroad have been at a low level. Things should stay that way in the future, too.



*Incidentally, Bosch fire departments maintain good contacts with their counterparts in neighboring communities. In times of need, one will come to the aid of the other*



Clean and uncluttered work spaces: A big factor in reducing work accidents

## Protecting the employees at the workplace

*At Bosch central headquarters, the tasks of environmental and fire protection as well as accident prevention have been consolidated in a joint area of responsibility. We adhere to the principle that environmentally conscious actions must not exclude people – our workers – in their immediate environment. Because no one except the workers is exposed so directly to possible hazards emanating from working materials, work processes and emissions. The protection of occupational health of personnel at the workplace is an important element of environmental protection.*

Core aspects of environmental protection at Bosch

“Order and cleanliness as a prerequisite for good quality,” were just as important to the company founder Robert Bosch as taking precautions in work safety and accident prevention. In this regard, the subject of work safety belongs to a proud tradition.

Order and cleanliness are also the elements of accident prevention and environmental protection. The puddle of oil on the floor can cause a person to fall or can also seep into the groundwater, causing its contamination.

Throughout the Bosch Group in Germany, work accidents increased by 18% as compared prior year from 916 to 1,086. Considering the improved productivity and the number of newly hired employees, the accident frequency rate per one million working hours was kept at a low level compared to the relevant industry.

Work accidents can occur not only at the shop or in the office, but may also happen on the way to work or during company sports events.

Dangers threaten similarly when handling storage or shipping containers and when operating the forklift. In 1998, almost half of all accidents occurred in the transportation sector.

*Robert Bosch – his attention belonged not only to product quality but also to the safety and protection of workers in the assembly hall*

“Tripping, sliding or falling” represented another major accident type – amounting to roughly one-fifth of all accidents.

We perceive the continuous improvement of the work environment to be the most important consequence of the foregoing. Danger analyses of work areas and equipment as well as special remedies or protective measures are instrumental in decreasing the number of work accidents and, ultimately, in reducing the effects on the environment. Scientific findings provide valuable input into the design of workplaces.

Safety and environmental engineers as well as managers regularly inform company employees about sources of hazards or dangers at the workplace. In this way, the employees learn to identify and be aware of problem areas.

*These efforts are also reflected in the accident statistics. Since 1992 the number of accidents has been cut in half!*

## Training measures

In Germany, about 40 environmental protection specialists participate in regular internal and external training courses in order to keep abreast of the latest information.

In the course of introducing the Environmental Management System, employees from each location were trained to become internal environmental auditors.

Various technical departments offer training and courses through the Central Office for Advanced Education. Dedicated exclusively or in part to covering environmental protection issues, courses include, for example, a seminar on environmentally compatible or recycling-friendly design engineering or a conference on environmentally friendly surface cleaning methods.

At workshops and plants, workers meet on a regular basis in so-called learning seminars. Here they analyze innovations and company procedures. Topics also include corporate environmental protection measures, such as separating waste according to type or avoiding waste altogether.

## Environmental protection in daily work

We reduce strain on the environment through optimized test programs in the product development process: In the Automotive Equipment Business Sector, computer-controlled simulation processes are increasingly replacing driving tests so that the number of required test kilometers can be significantly reduced.

Modern error and failure prediction procedures also reduce the number of required lab tests.

Lab test benches are inspected for weak points and are optimized using a systematic test bench FMEA (Failure Mode and Effect Analysis). This leads to fewer and shorter tests, reducing energy consumption and emissions at the same time.

In the office, we separate and collect and separate waste in an environmentally conscious way. Electronic online data connections help us promote methods that reduce the amount of paper required for the exchange of information. To an increasing degree, business trips are being replaced by video conferences.

*Suggestions for environmental protection have high priority within the company suggestion system. And even outside of the normal work time, tours and events concerning environmental protection are quite popular*





## Shipping and transportation

Since early 1996, Bosch has employed a concept of well-organized cooperation with Regional Shipping Companies (RSC). Since the end of 1997, this plan has been implemented throughout Germany.

The ecological requirements for the selection of suitable freight carriers have also been defined. Among these is the use of vehicles featuring the latest technology to ensure economic shipping methods while preserving the environment in the process.

This concept divides Germany into five regions in which goods are picked up from the suppliers, collected at consolidation centers and transported in concentrated clusters to the specific Bosch plants.

The RSC concept fulfills economic and ecological requirements in equal measure:

The consolidation of shipping events reduces the number of shipments. This saves resour-

ces, relieves the burden on public transportation systems and reduces the costs of logistics.

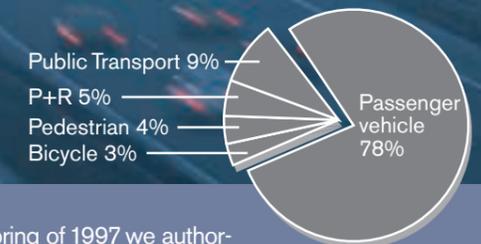
The reduction of the number of separate trips, i.e., the bundling of shipments, amounts to an average of 50% and up to 80% in peak times.

In 1997, for example, 2,900 tonnes of freight were collected in one region and shipped in accordance with the new system, using 753 trucks. Without the RSC concept, 2,232 trucks would have been required. The reduction thus amounted to 66%.

### Additional effects of the RSC concept:

Shipping routes and transportation costs are recorded in detail, providing greater clarity of the resulting ecological effects. Awarding the majority of contracts to suppliers located close to the Bosch manufacturing locations causes a shortening of travel distances and lightens the burden on the environment.

Traffic flows freely without excessive environmental burden



Mathematical models and experiences with pilot projects indicate that, apart from the possible fuel savings of approx. 20%, an improved flow of traffic can significantly reduce harmful emissions:

- Hydrocarbons by more than 40%
- Nitrous oxide by 25 to 40%
- Carbon monoxide by 25 to 45 %
- Carbon dioxide by 20%

In Germany alone, the introduction of improved traffic flows would facilitate fuel savings of several million tonnes annually.

In addition to the attendant financial savings and the economic benefits resulting from the reduction of time spent in traffic (in traffic jams, searching for parking space), there is also a savings potential of 20 million tonnes of CO<sub>2</sub> emissions annually.

In the spring of 1997 we authorized the Allensbach Institute for Opinion Research to investigate how employees come to work and what means of transportation they use.

Public transportation is used mainly in areas of high population density. This is true for Frankfurt, but also for Berlin or the area around Stuttgart.

Many Bosch locations are located outside the city limits or in rural areas. On average, a one-way trip with public transport takes 48 minutes as compared to 21 minutes by automobile. Employees returning from working the night shift need 55 minutes instead of 20 minutes by automobile.

Seventy-eight percent of Bosch workers come to work by car (incidentally, this includes an above-average share of car pools). The average is 66%.

On average, Bosch workers need 23 minutes to get to work (German average is 21 minutes)



## Using technology to protect the environment

*Production processes are subject to continuous change. Methods and practices which in the seventies mainly followed the dictate of economics are in the eighties also increasingly viewed from the standpoint of environmental compatibility.*

Environmental protection has high priority when new manufacturing processes are introduced. These objectives are systematically anchored in the requirement profile of the respective processes.

Goals include the avoidance of emissions, the most efficient utilization of materials, conservation of resources, rejection of the use of environmentally hazardous substances, plus energy conservation.

A variety of technical solutions have already been defined and are used in manufacturing.

*The use of chlorohydrocarbons for cleaning is no longer the state of the art. Today's solution are aqueous cleaning systems*

High-pressure surface cleaning

Here are several representative examples:

- *Saving water* in electroplating processes through the utilization of closed rinse water circulation systems with integrated reprocessing unit
- *Recovering valuable materials* through reprocessing and recovery of curing and carburizing salts from cleaning agent solutions or of chromizing electrolytes from electroplating rinse baths
- *Saving energy* through the use of new and improved insulating materials and the use of burner systems with higher efficiency rating in furnace systems
- *Avoiding the use of materials constituting an environmental hazard* by replacing the heat treatment in cyanide salt baths with process gas technology

Several examples of the past years will be described in more detail in the following pages.

## Component cleaning



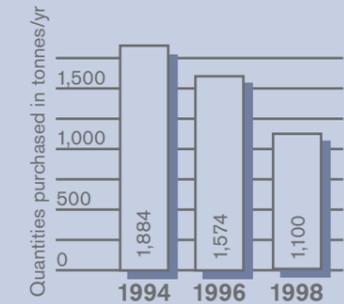
Cleaning in process line

In the eighties, the dangers of using chlorohydrocarbons as cleaning and degreasing agents were recognized. Bosch process development created new and alternative cleaning methods. Back then as today, the objective was and is to replace chlorohydrocarbons in the remaining applications with aqueous or other types of cleaning systems.

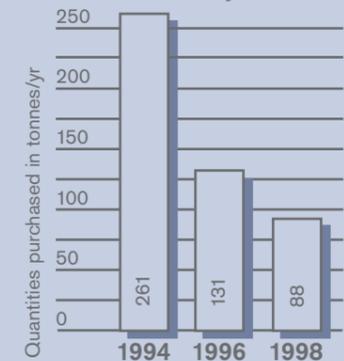
Compared with 1988, the consumption at German locations of solvents based on chlorohydrocarbons was reduced by more than 95%. The remaining 120 tonnes per year are used in sealed systems, the operation of which causes only negligible emissions.

Due to the anticipated shutdown of older production equipment, the consumed quantity will continue to drop in the years to come. As production quantities decline for products being phased out, a conversion to systems that operate free of chlorohydrocarbons is not always practical from an ecological as well as economical standpoint.

Use of chlorohydrocarbons at Bosch worldwide



Use of chlorohydrocarbons at Bosch Germany



*Our goal:*

*In Germany, complete substitution of chlorohydrocarbons by 2002. Concurrently, pursuit of similar substitution policy abroad*

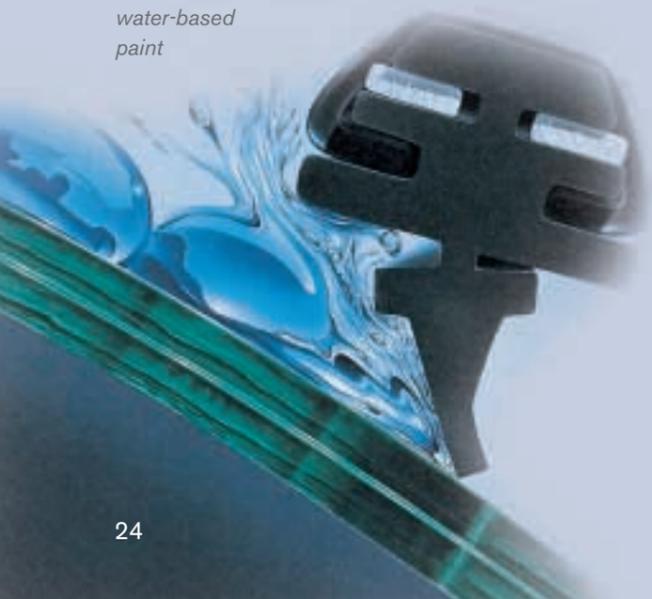


## Materials and processes for painting technology

*Some consequences of traditional paint processes using solvent-based paints are atmospheric pollution through solvent vapors, and the generation of waste that must be disposed of at special hazardous waste sites.*

*In a joint remedial effort with paint manufacturers, paints were developed that use water as the primary solvent base, containing only minimal proportions of organic solvents.*

*Windshield wiper – metal parts coated with water-based paint*



Water-based paints, for example, are used for coating windshield wipers.

Because the paint on windshield wipers must be highly corrosion-resistant, withstanding the effects of weather while still retaining an attractive appearance, this type of application is especially complex. As a result of intensive research, paint and techniques were developed which, for the most part, facilitate the conversion to water-based paint. As a result, solvent emissions were reduced by 85%.

Another advantage of water-based paint is the fact that the overspray (sprayed material that fails to contact the surface being painted) can be easily recovered and reprocessed for reuse.

The overspray, amounting to as much as 50%, is recovered through ultra-filtration in the separator system, supplemented with additives and finally, by blending with new paint, restored to the desired quality.

Paint that hardens by being exposed to ultraviolet light has even less of an effect on the environment.

Ultraviolet-hardening lacquer does not contain any solvents which would create emissions. Overspray can be collected and directly returned to the process without requiring reprocessing. To harden the paint coat, only one-sixth of the energy needed by a conventional drying oven is required.

Bosch is intensively pursuing the development and introduction of these systems.



*Painting station for hydraulic valve housings*

Our first applications for this station are painting hydraulic valve housings and pumps for the common rail injection system for diesel engines.

Because paint curing occurs very fast, i.e., within 20 seconds, the equipment can be very small and compact.

In this example, the UV hardening module has a length of only 2 metres, compared with a required length of 40 to 50 metres for the drying oven of a traditional paint system.

## Plastics processing



We apply stringent measures to materials recycling and the attendant resource conservation. Plastics processing is no exception.

One example is the direct recycling of sprues in the manufacture of plastic parts.

Compliance with material and component specifications at the points where plastic is injected into the mold must be ensured. Therefore, transition zones for the melt material between the mold and the melt injection channels in which the plastic bonds with the component must be provided.



*Sprue waste recycling at the Waiblingen plant*

The sprues, i.e., solidified plastic from the mold injection gates, are separated from the molded piece, chopped and blended into the original granulate – instead of ending up in the trash, as was previously the case.

Almost every Bosch-manufactured plastic part is made with direct sprue recovery and recycling. Dependent upon the shape of the respective part, the savings amount to between 10 and 30%.

Future applications of injection technology will be able to dispense with sprues entirely. In many areas we have already reached that point.

*Recovered granulate turns into new material*





All Bosch plants are reducing noise and pollutant emissions

## Remediation of inherited environmental burdens

At Bosch, the subject of cleaning up inherited environmental burdens is of major importance because the protection of soil and groundwater is of great concern to the generations that will succeed our own.

Starting in 1984, the Bosch Group in Germany conducted a "survey of inherited environmental burdens" at all manufacturing locations.

Wherever necessary, and in coordination with the responsible government agencies, remedial measures for the soil, soil atmosphere and groundwater were initiated. The implementation of the majority of these measures has already been concluded.

About 80% of groundwater and soil contamination were caused by chlorinated hydrocarbons.

"Cleaning up" soil contamination is accomplished with the use of vacuum systems with downstream activated charcoal filters. Groundwater is cleaned through the use of separating equipment employing the stripping process.

Pilot plant for catalytic cleansing of groundwater contaminated with chlorinated hydrocarbons



Stripping system at the Stuttgart-Feuerbach plant

Since 1996 a pilot plant has been used for catalytic cleansing of groundwater contaminated with chlorinated hydrocarbons.

To optimize this new technology, the plant is jointly operated as a research system with the University of Tuebingen. It is the only one of its kind in Europe. Chlorinated solvents are broken down by "rusty" iron into harmless substances. Providing an alternative to the traditional stripping system, the further development of this technology is currently in progress.

Our goal:

To clean up old environmental burdens at remaining locations

## Emissions



### Air emissions

When we burn natural gas and light heating oil, we keep emissions to a minimum through the use of modern combustion systems. Whenever pollutants occur as a consequence of the manufacturing process, we extract them from the exhaust or vented air with the use of separation systems. For example, electrostatic precipitation filters and oil mist separators effectively clean exhaust air that is polluted with metal cutting fluids.

We have already converted a number of processes in order to prevent the occurrence of emissions in the first place. Examples: Dry machining of geared pumps; baking lacquer instead of styrene resin to impregnate armatures for electric motors, and aqueous and powder-based paint coatings instead of using solvent-based paint. Wherever dust occurs, it is filtered from the

waste air, and welding systems are equipped with fume extraction blowers. Wherever product function tests require the use of gasoline or oil-bearing test fluids, we encapsulate the equipment to reduce emissions. This also applies to exhaust fumes from test benches in development labs.

The Bosch Group currently operates approximately 60 plants requiring official certification, some 50% of which are heating plants. Other systems comprise engine test benches, liquefied gas storage and electroplating systems.

### Noise emissions

For many years, noise emissions at our plants have been recorded and evaluated on a regular basis. As a result of this work, noise abatement measures have been introduced, limiting the noise emissions to a level that is permissible with technical systems.

Already in the planning phases for new buildings, we calculate potential noise emissions to determine noise level limits to be anticipated. These are then considered and reflected in actual construction.

In the next portion of the Bosch Environmental Report, we have prepared for you a "Guide" through our company divisions.

On the occasion of these "flying visits" you will discover some (but by no means all) examples of environmentally friendly products and manufacturing methods. These may be deemed representative of our efforts toward effective management".\*

\* Part of the Agenda 21 established by the 1992 Earth Summit held in Rio de Janeiro: Consideration of the needs of subsequent generations



## Automotive Equipment Business Sector

*In its global operations, Bosch earns 60% of total sales through with its automotive equipment. We respond in equal measure to the requests from automobile manufacturers and the heightened public awareness with regard to environmental issues. Working together with car makers, we have come closer to the soot-free diesel engine as well as the three-litre automobile.*

Bosch products for automotive technologies: their effect on environmental protection is multiplied several million-fold. This is also a consequence of the Bosch so-called "3-S-Program" from the seventies which took its name from the German words for "safe, clean, efficient".

To an increasing degree, manufacturers are replacing mechanical parts with electronic components. Bosch is the industry leader in the development and application of new electronics-based solutions.

In this context, we are focusing on three major development objectives:

### ■ Fuel savings

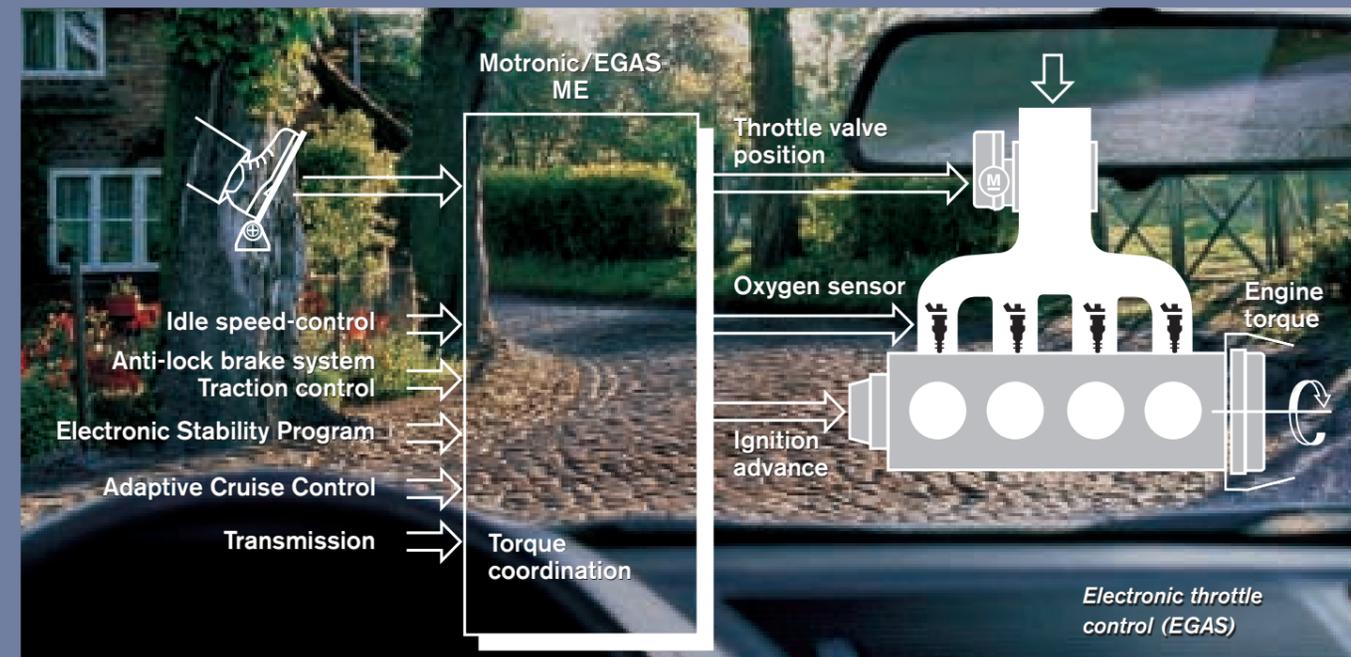
In addition to conserving valuable fossil fuel resources, this objective also causes a reduction of emissions.

### ■ Weight reduction

As a result of lighter components, vehicles consume less fuel and create fewer emissions. Less weight also means that fewer raw materials are used and therefore less primary energy is required in raw materials production.

### ■ Noise abatement

Automobile driving noise constitutes an additional strain on the environment. By optimizing the combustion process, e.g., in the case of diesel fuel injection, we are making another contribution to noise abatement.



### The next step toward reducing pollutants from gasoline engines

Since the beginning of the fifties, Bosch has made a determined effort in developing gasoline injection systems. Today, modern vehicles are equipped with fuel injection systems that are electronically controlled. While sensors are monitoring the vehicle's operating statuses, the engine receives precisely measured fuel quantities matching the respective momentary status. In conjunction with the processing of exhaust gases in the catalytic converter, these advancements have resulted in the production of gasoline engines that emit 16 times

less exhaust emissions than comparable vehicles at the beginning of the seventies.

In the near future, our current product developments, such as direct gasoline injection, will provide for a further 15% of reductions in consumption for spark ignition gasoline engines.

New Lambda sensors are facilitating innovative control strategies through improved signal quality. This may also be viewed as a contribution to reduced consumption and emissions.

In conjunction with sophisticated control algorithms, the new electronic throttle control (EGAS) ensures that the engine is always operated at the optimal setup for any driving condition. When cold-starting an engine, during warm-up or in the event of engine load changes, the

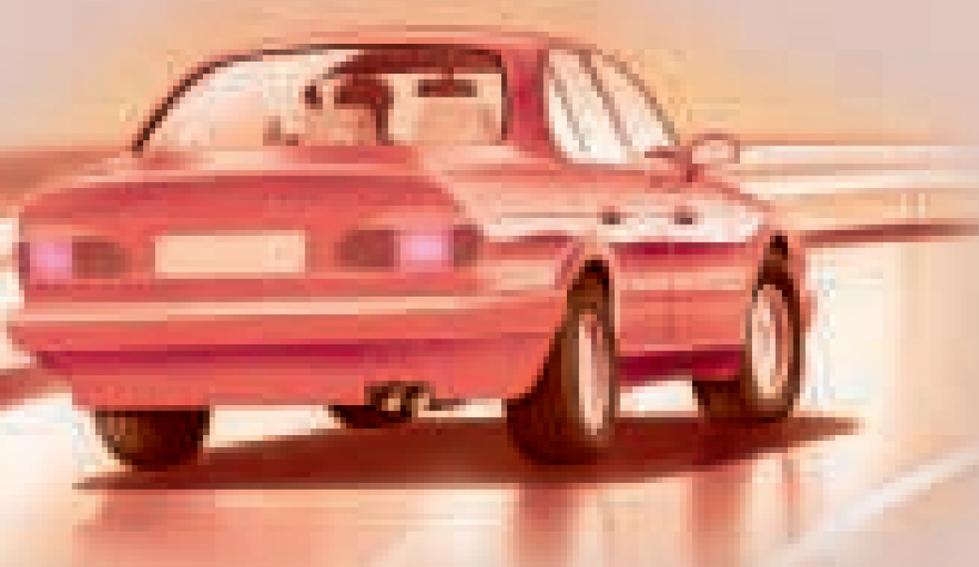
electronic accelerator helps prevent unnecessary noise and emissions.

Another contribution to these efforts comes from the new integrated electronic relay (IER) in our starter motors. Facilitating control of the complete starting process via the engine electronics, it provides for additional air intake during engine warm-up with the aid of the Bosch secondary air pump. As a result, the catalytic converter heats up more rapidly during engine starts.

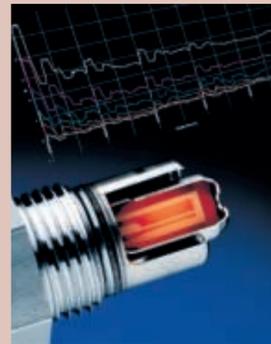
Component weight of the new EV6 injector was reduced by 50% as compared to earlier versions. Among the contributing factors was a reduction of the number of its components. Also, the improved tightness of the injection valve improves emission characteristics.

*The continuing advancements in the development of our automotive products will enable us also in the future to comply with the automotive emission and consumption regulations which are becoming more stringent worldwide*

Environmental protection within the Business Sectors

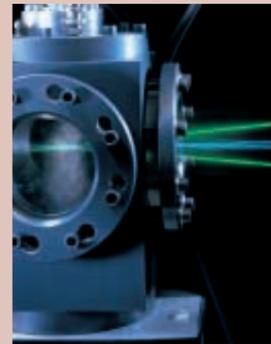


Flat-tipped broadband Lambda sensor



Bosch has developed a number of new, electronically controlled injection systems for modern diesel engines. These include the Unit Injector System (UIS) and the Common Rail System (CRS).

To reduce fuel consumption and particulate emissions, the referred diesel injection systems produce very high injection pressures (up to 2,000 bar for the UIS).



*Laser-optics techniques are used to examine the atomizing performance and mixture processing properties of a fuel injection system*

*Up to now the most efficient exhaust cleaning system for spark ignition engines is a combination of catalytic converter and oxygen sensor (Lambda sensor)*

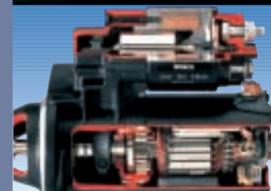


*Innovative technology for direct injection diesel engines: injectors of the new high-pressure injection system, the Unit Injector System (UIS, left) and the Common Rail System (CRS, right)*

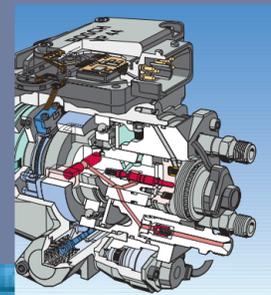
Because the fuel consumption with direct-injected diesel engines is approximately 35% below that of comparable conventional gasoline engines, emissions of the CO<sub>2</sub> greenhouse gas are distinctly below those of gasoline engines.

The electronically controlled Bosch injection systems will facilitate compliance with future emission threshold values (e.g., the Euro III Directive).

We will of course continue to develop our injection systems to further reduce fuel consumption, harmful emissions and noise from diesel engines.



*The VP44 radial-piston distributor pump for modern diesel injection engines*



**Combining aids in reduction. Take the onboard electrical system, for example**

By using two different batteries that have been optimized for their respective uses and providing intelligent electronic energy management, we have reduced overall weight. As a result, we have reduced fuel consumption and exhaust emissions. By combining individual components into integrated subassemblies and modules, the number of individual parts as well as the overall weight of the engine can be further reduced. For example, we are grouping intake pipes, electronically controlled throttle device, fuel injectors, air cleaner, sensors and control unit into a complete intake module – creating a lightweight intake assembly of compact size.

Modern multiplex systems further contribute toward reducing vehicle weight. The CAN bus system developed by ourselves can transmit a number of signals on a single data line, whereas each signal normally requires a separate cable. In addition to providing a noticeable reduction of vehicle weight, the conservation of copper – a valuable raw material – is also an important factor.

Future control units will be manufactured with the use of the newly developed micro-hybrid technology. Compared to present-day control units, further miniaturization will produce weight savings of a factor of 2 to 3.

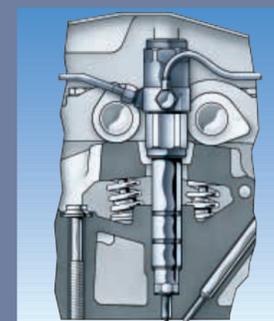
*In recent years, Bosch products and systems have been methodically optimized, producing weight reductions of up to 50%*

**Bosch also lends an ear to noise abatement in and about the vehicle**

Modern cars are becoming more environmentally friendly, also because their operating noise is being reduced. Supported by basic research and advanced methods in the area of acoustics, significant progress has been made in recent years.

New, electronically controlled diesel injection systems feature pre-injection that will make future diesel engines run extremely quiet, whether during cold starts or at normal operating temperatures. And for the new family of compact alternators (LIC-B), detailed analyses facilitate a further decrease of operating noise emitted by the devices. Raising not only the comfort level of passengers but also reducing the driving noises of modern vehicles passing by.

The fully encapsulated, water-cooled alternator (LIF) will feature a noise level that is another 15 to 20 dB lower, rendering it practically inaudible during vehicle operation.



*Injector for the Common Rail System*

Decidedly reduced operating noise is also accomplished by modern Bosch blower systems for engine cooling. The load-dependent electronic speed control for the blower motor also contributes to noise reduction. And finally, starting the car is made quieter through the combination of modern engine controls and the integrated electronic starter relay (IER).

**Diagnosis: Everything stays in the green with the right Bosch system**



*Two measuring devices in the cold cell with XY and UV recorder*

To an increasing degree, self-diagnostic systems are being integrated into automotive onboard systems (OBD) requiring specific compliance with environmental factors. In the event of a defect which may cause the vehicle's operation to impose a higher burden upon the environment, the driver will be informed and requested to visit the nearest automotive service station. The diagnostics systems in late-generation engine control systems detect, for example, defects in the catalytic converter, poor combustion and engine "misses", leaks in the fuel and fuel tank system, as well as exhaust system malfunctions.

By selecting the right materials, we reduce energy consumption and further distance ourselves from problem materials

Energy savings potentials are identified through a comprehensive approach to evaluating the cost of primary energy required to manufacture our products.



For example, in the manufacture of a headlight, an 80% contingent of the primary energy cost accrues in the course of manufacturing the actual materials, with the balance of 20% being used in the further processing of these materials.

As demonstrated, savings potentials occur primarily in the areas of materials selection and product design.

We therefore dispense with problem materials, such as heavy metals, asbestos, phenol, chlorohydrocarbons and other materials that constitute health hazards.

Already during the product design phase, we ensure the use of gentle surface treatment processes. For example, the new EV6 injector is no longer painted, and its proof test is performed with air instead of gasoline.

Specialized equipment separates collected thermoplastics, thermoset plastics and rubber waste for reuse.

## Bosch Service. It's also a little bit of environmental tuning

Bosch Service stations are the home of automotive specialists.

By fine-tuning engine adjustments and reducing pollutant emissions to lowest levels, highly qualified technicians contribute to the preservation of the environment.

There are strict requirements for service agents regarding the procurement, storage, processing and disposal of materials.

As members of the Bosch Partner System (BPS), Bosch Services have access to a well-organized consulting and support system. This makes it easier for each partner to adapt his procedures to the legal requirements for efficient environmental protection.

The training of the environmental specialist ranks among the important elements of the BPS support package.



To confirm full compliance with all required measures, Bosch Service can issue a "BPS Environmental Certificate"

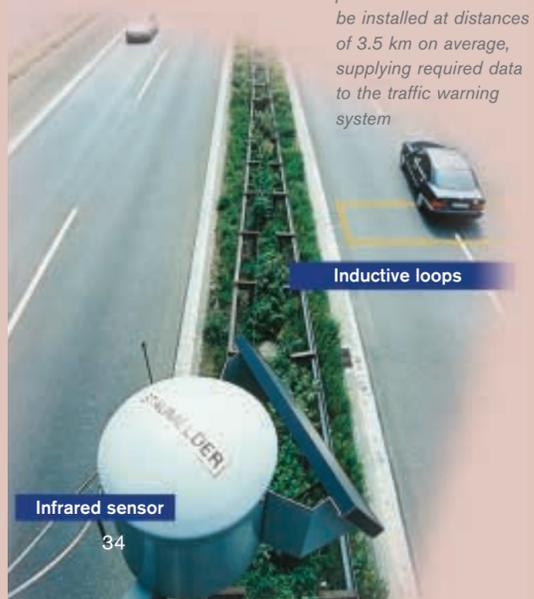
## Automotive Equipment Business Sector

### Mobile Communications Division (Blaupunkt)

Environmental protection within the Business Sectors

*In 1998, more than 45.7 million vehicles were registered to drive on approximately 231,000 kilometers of German roads. As a result, Germany has the highest traffic density in Europe. Traffic backups occur during peak holiday travel seasons and while commuters are driving to and from work, providing a sense of foreboding of the total traffic "gridlock" that has been repeatedly predicted by traffic experts. Moreover, the referred traffic backups present an ecological and economical challenge.*

*On German Autobahn expressways, solar-powered sensors will be installed at distances of 3.5 km on average, supplying required data to the traffic warning system*



Inductive loops

Infrared sensor

The Mobile Communications Division (Blaupunkt) is working on measures to help car and truck drivers save fuel and keep their composure while at the same time avoid having to wait in traffic.

Blaupunkt equipment with telematics capabilities calculate the geographic position of the vehicle with the help of a network of satellites spanning the globe. Navigation instructions guide the driver directly to his destination, without having to use a map.

In 1998, further improvements were made. "Dynamic" navigation represents an upgrade of the Blaupunkt TravelPilot: For the first time, route recommendations are supplemented by current information about the traffic situation. In combination with the 1,800 traffic report points installed to-date and the centralized control facility, the navigation system utilizes the continuous stream of incoming traffic data to integrate the resulting findings in progressive route planning.



*We developed the Comand (Cockpit Management and Data System) electronic driver information system. With its integrated dynamic navigation system, Comand adapts its route to the traffic situation. It also provides numerous operating functions*

Wherever traffic backups and developing bottlenecks can be detected and simply circumnavigated, millions of automobiles will save millions of litres of fuel annually. This will produce a permanent reduction of CO<sub>2</sub> emissions while increasing traffic safety.

Another goal is to integrate direct report and response options in the respective Blaupunkt equipment, enabling the motorist to communicate with a central control facility. In the event of a breakdown or other emergency, assistance could be automatically summoned from the vehicle.

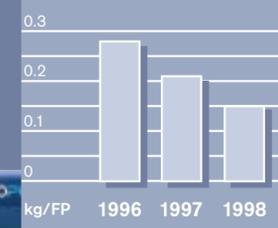


As the inventor of the classic traffic radio, Blaupunkt has helped for decades to relieve traffic problems, lightening the burden on man and environment.

With regard to the manufacture of the respective products, the Mobile Communications Division (Blaupunkt) has developed a guideline entitled "Ecologically Appropriate Development of Car Radios" as far back as in 1992. Experiences gleaned through the practical application of this guideline also came to bear on ongoing development:

- Painted surfaces were replaced by structured surfaces.
- Component variety has been minimized
- Prohibited materials lists were issued to suppliers (Bosch standard N2580).
- Checklists for all designers

#### Waste quantity trends referenced to finished products (FP)



## Communications Technology Business Sector

*Although precise forecasts are not yet possible, the experts agree: Substantial environmental benefits will also be inherent in the communications and safety systems from this division. Just as Bosch aerospace technology benefits the environment all over our blue planet.*



**Bosch has lent a helping hand to the development of the cellular phone. Because it fits in the palm of your hand, Germans have named it "Handy"**

Bosch has developed telephone equipment, which compared to predecessors uses 25 % less energy, is more compact and makes do without tantalum capacitors and rechargeable batteries containing cadmium.

In 1996, within the Signo model series, there has even been a special series of 10,000 telephone terminal devices. To facilitate the recovery and recycling process, all housing parts are made from a single type of plastic, use a single screw size for all attachment points, and even the PC board is snap-mounted inside the device without requiring mounting screws.

In 1996, in the safety technology and private network sectors, we were able to reuse 1,500 tonnes of electronic waste. This was done in cooperation with a waste disposal company providing support in the recovery and dismantling of old equipment.

*Modern telecommunications save cost, driving expense and travel time*



Up to 200 parts in one tool – and all are recyclable

## Consumer Goods Business Sector

### Power Tools Division

*Even in the manufacture of technical products, environmental concerns can assume a high priority. Our Power Tools Division proves that the exemplary commitment of our workers provides us with an abundance of suggestions. When these ideas are put into action (58.5% to-date), pride, acceptance and motivation are created: Environmental protection becomes a subject of constant discussion that is accepted unanimously.*

The company suggestion system for environmental protection issues: Five hundred eighty-four ideas have already been implemented through the auspices of the "Environmental Action Campaign for the Nineties" (AUF 90)\*.

Already in the early eighties, the increasing awareness of environmental concerns caused the Electric Tool Division to formulate an Environmental Guideline. The year 1986 marked the first time that employees were informed of their special obligations toward the environment.

After 1990, all associates were included in defining the environmental activities of the business division.

AUF 90 initiated a number of proposals for improving the methods of environmental protection.

Four division coordinators and 40 team leaders organized the collection of ideas for the environment in the areas of development, manufacturing, administration and sales.

AUF 90 was established as a long-term instrument for one decade; this was done to underscore the importance of the suggestion campaign. AUF 90 is now already in its eighth year and for the past three years the emphasis has been on implementing selected proposals.

#### AUF 90 figures during its entire term

Total ideas up to 1998:	996
Implemented:	55.8% 584
Being worked on:	22.1% 220
Put on hold:	6.3% 62
Cannot be implemented:	13.1% 130

The following belong to the ideas already implemented:

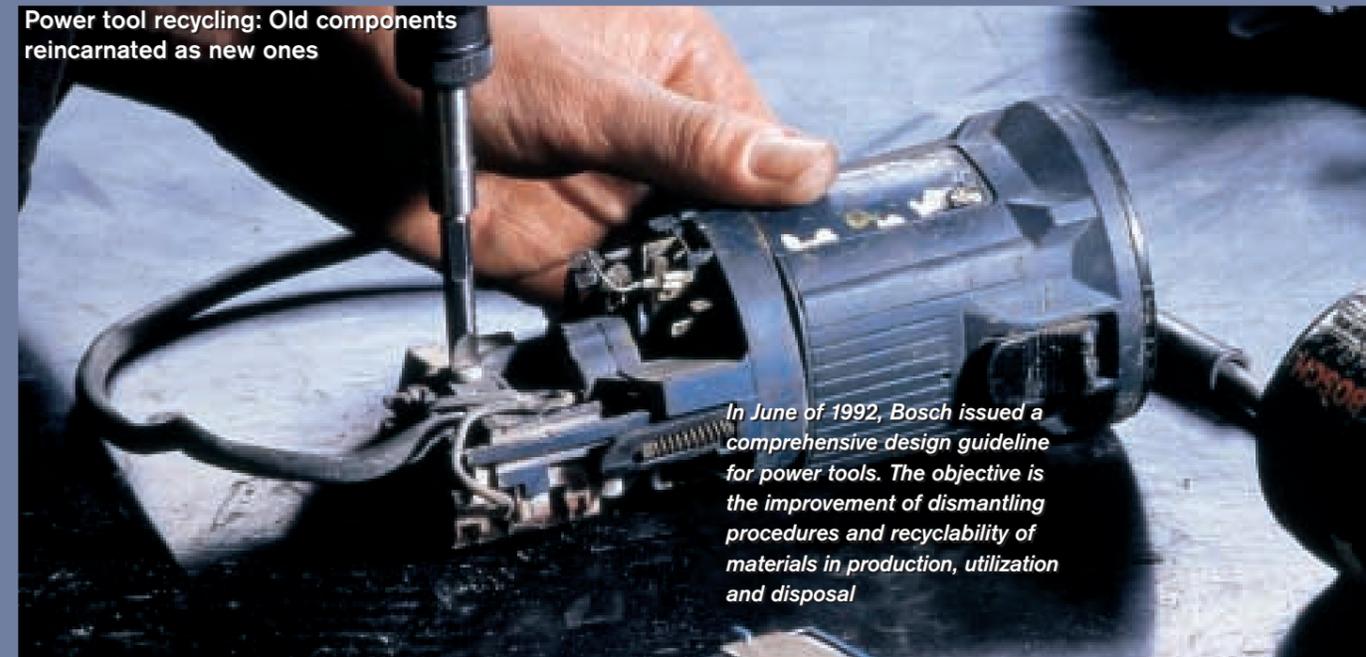
- Production free of chloro-hydrocarbons (1991)
- Single-material packaging made of almost 100% recycled material (1992)
- Design guidelines for environmentally friendly power tools (1992)
- Power tool recycling, introduced already in 1994

AUF 90 adheres to the philosophy of achieving ongoing improvement by continuously updating the subject matter.

However, many small intermediate steps form one large step on the path toward an improved environment.

But the end of the nineties does not signify the end of AUF 90. What will change will not be the numerous activities but rather the name of the program. AUF 21 will ensure the continuation of this environmental program while making the transition into the next century.

#### Power tool recycling: Old components reincarnated as new ones



*In June of 1992, Bosch issued a comprehensive design guideline for power tools. The objective is the improvement of dismantling procedures and recyclability of materials in production, utilization and disposal*

Bosch takes back power tools that have become worn out after years and decades of use, at no charge and through the dealer network. Containing up to 200 individual parts, these tools are dismantled at a Bosch recycling center, sorted, examined for reuse and discarded where indicated.

The objective is to dismantle electric tools into their individual parts to the extent possible, and to leave less and less material for the shredder.

First, the type of plastic making up the housing is identified, either by visual inspection, by its coding (Bosch plastics ID codes have been in use since 1992) or by scanning with special devices. Once this is done, the dismantling and separation into 13 categories can begin.

Wiring and connectors are separated and cut. The armature and field are broken down at low temperature in order to recover the copper. Iron, steel and castings (transmission parts, metal paneling, mounting devices) that are pure metal are recycled in the high temperature furnace. PC boards freed of harmful substances go to the foundry to recover metals. Casing, guides or attached parts made of aluminum are melted down again.

Very often, electric components, such as capacitors, switches or circuit boards, plastic parts inside the power tool, fan wheels, air guide plates or any type of small part, must be sorted. Subsequent to sorting, they can still be used, either through heat application or as straight material. Identification of materials and the limitation of their variety should alleviate this problem in the future.

Equipment that cannot be dismantled is submitted to external recycling operations. It is then broken down and all ferrous metals magnetically separated.

Identified plastic parts are subjected to a granulation process, producing regranelite which in turn becomes technical parts, accessories and transport cases.

*Sensitizing purchasers of technical products*

*Since 1991, Bosch has published and distributed to its trade partners two technical information tutorials describing the methods of handling power tools in an environmentally friendly manner. Also included are discussion on recycling and sales points for use by environment-conscious professional power tool dealers*



\* AUF 90 = German abbreviation of "Environmental Action Campaign for the Nineties"



Self-built biotope at the Leinfelden plant in 1990



## Consumer Goods Business Sector

### Bosch Thermotechnology Division

Besides natural gas, no other primary energy source generates as little CO<sub>2</sub> when burned.

In recent years, the Thermotechnology Division has sold a hundred thousand devices with improved natural gas conservation technology.

CO <sub>2</sub> formation with various fuels	
Fuel used in kg/kWh	
Brown coal	0.40
Hard coal	0.33
Heating oil (heavy)	0.28
Heating oil (light)	0.26
Natural gas	0.20



In the nineties, the development of thermotechnology was characterized by stricter limit values for hazardous substances and emissions guidelines, such as those in the amendment to the first regulation of the Federal Statute on Emission Protection ("Small Heating Systems", 1. BlmSchV). This defines the prerequisites for the "Blue Angel" environmental certification mark. Similar regulations appeared in regional models, such as the Hamburg promotional program. At the same time, on the occasion of purchasing a new heating system or water heater, increasing numbers of owners of private homes or apartments are prepared to make a contribution toward environmental protection, even if that comes at a slightly higher price.

Introduced in 1998, our ThermoStar vane-type burner explores new avenues in heating technology: Through the special arrangement of vanes on the burner surface in conjunction with water cooling, the combustion temperature can be directly controlled over the entire performance range. This reduces

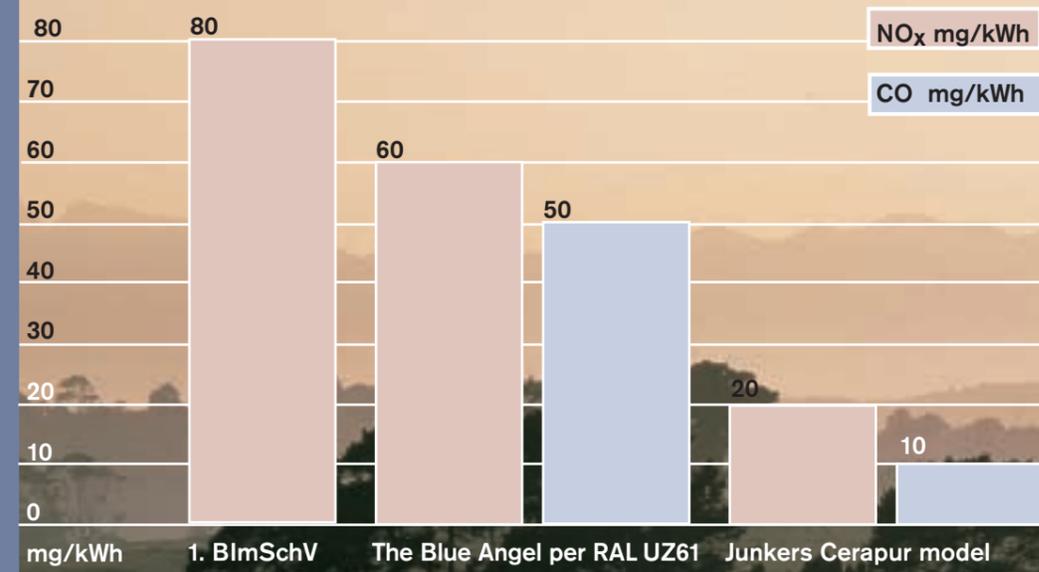
nitrous oxide emissions without increasing carbon monoxide output.

In addition, the Bosch Heatronic provides an electronic "brain" for optimal control, simple service and high comfort.

Thanks to our "Strong Thermals" concept, Junkers equipment can operate continuously and with minimum expense for maintenance – and all this regardless of changing environmental conditions, such as fluctuating gas quality and pressure, for example.

For water heating with combination equipment, the Bosch Heatronic provides three control levels are available. Using the ECO setting, the environmentally conscious user saves both gas and water. To trigger the requirement signal patented by Junkers, the water tap need be opened only briefly. A little later, the hot water is ready. In contrast to conventional technology, the user is not required to let a large quantity of cold water run out of the tap, instead enjoying "comfort on demand" in the truest sense.

Downward movement of limit values for emissions have defined developments in thermotechnology



However, changing the NO<sub>x</sub> and CO emissions of appliances is only one part of the overall environmental aspect in thermotechnology. Another important task is to reduce the carbon dioxide emissions from gas appliances.

It is currently not possible to remove these harmful substances from the combustion exhaust gases. For this reason, only two methods remain: Conversion to fuels that burn with low CO<sub>2</sub> emissions, or reduction of the use of primary energy.

The manufacturers of gas appliances must therefore endeavor to increase equipment efficiency. This precisely characterizes the relevant Bosch activities in recent years.



Economy without sacrificing comfort. Good for pocketbook and environment

For example, we have raised the efficiency standard of our conventional gas appliances (Cerastar) by some 5% to about 90%, and that of fuel value appliances (Cerapur) to about 108% (100% = standard).

When compared with the data in the above diagram, this explains the significant reduction potential that results from the uncompromising use of modern technology – and especially of fuel value technology.

In 1995, the specific carbon dioxide emissions for heating in private households in the former West Germany (now officially termed "Old Federal Lands") amounted to 0.28 kg per CO<sub>2</sub>/kWh. In the New Federal Lands, the figure was 0.34 kg per CO<sub>2</sub>/kWh.

The above diagram depicts compliance with emission standards by modern gas appliances



Interior of the modern Cerapur gas-fired water heater



## Consumer Goods Business Sector

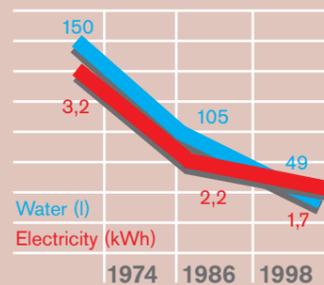
### Household appliances

About 34 million washing machines and about 17 million dishwashers operate in approximately 36 million German households. If each of these appliances were to save only one litre of water each time it is used, the volume of water saved in one year would fill a train of tank cars 3,300 km long. The volume of water is equal to that flowing down the Rhine river at Koblenz in the course of just under two hours.

In fact, in recent years, Bosch washing machines have reduced their water requirement per wash by 100 l (to a current 49 l), and dishwashers have cut theirs from 60 l (to a pleasantly frugal 14 l). Modern technology can make significant contributions toward conserving resources.

The energy consumption of our electric appliances has similarly been cut in the last 25 years. Washing machines need 46% less electricity, dishwashers 57%, electric stoves 43% and refrigerators 78%.

Water and electricity consumption figures for Bosch washing machines



Our household appliances are decidedly economical when it comes to electricity and water consumption rates. Throughout the entire production process, we are also striving to think and act with more awareness for environment-related issues.

In 1995, we were the first company in our industry to implement the European Ecological Audit Order. And by the end of 1998, all of our seven domestic appliance manufacturing locations in Germany had a certified environmental management system.

Since 1992, the Bosch and Siemens Household Appliance GmbH (BSH) has documented efforts, successes and future projects in their own environmental report.

Another measure should be contemplated from the standpoint of informational openness and aggressive pursuit of environmental protection: The annual Input/Output balance sheet records all environmentally relevant flows of material and energy passing through our plant gates in the course of one year.

*Robert Bosch Household Appliances GmbH will be happy to send you their current environmental report:*

Robert Bosch  
Hausgeräte GmbH  
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Phone +49 89 45 90-00  
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*Bosch refrigerators today:  
0% CFC/HFC,  
78% less power consumption compared with 1974, plus an average service life of 14 years*

#### Clear advantage for the environment: The Aqua Sensor

Using a dishwasher is more environmentally friendly than washing dishes by hand. For our new generation of appliances, we once again managed to reduce the consumption of water, energy, salt and detergents. After rinsing, the Aqua Sensor measures the degree of water turbidity to determine whether the water is still clean enough for another rinse cycle. If this is the case, one rinse cycle can be omitted. When the dishwasher is fully loaded and the dishes are not very dirty, our dishwasher needs 14 litres of water. And to keep energy consumption as low as possible, the heat generated during the first cycle is used to warm the water for the next wash cycle.

For increased dishwashing efficiency, some models provide the separate use of the top basket for cleaning small loads of dishes.

While on the subject of washing – our washing machines need only 0.95 kWh of electricity and just under 39 litres (slightly over 10 gallons) of water for a 5-kg load of normally dirty colored laundry at a temperature of 60 °C. The Aqua Sensor measures the turbidity of the water in order to extend the rinse time or – in the event that the water is found to be less cloudy – to automatically reduce the rinse cycles from three to two.

#### Very clever: Our stoves

Since 1973, the power consumption of our electric stoves for one hour of continuous oven operation has been lowered by 43%.

Individual cooking zones detect the diameter of saucepans by means of the Autofocus feature, automatically adjusting the size of the required heating surface. A so-called cooking sensor prevent boiling-over by constantly measuring the pot temperature, enabling the control electronics to regulate the heat setting automatically. A feature that is as practical as it is economical. Thanks to innovative design, the energy consumption of our stovetops has declined by 10 to 15% since 1996.

#### Energy label: Look before you buy

As early as 1995 we introduced the energy label developed by the European Union. An appliance is rated in seven categories ranging from “highly energy-efficient” (A) to “extremely poor” (G), providing customers with a valuable aid in making purchasing decisions.

*The main proportion of the effect of appliances on the environment occurs during their operation in the home. In recent years, we have made great progress in saving water and energy*





Gears for geared pumps

## Capital Goods Business Sector

### Automation Technology Division

An example of how environmental protection is also economical: Substituting hazardous materials.

#### Phasing out metal-plated surfaces

In the past, in order to provide rust protection, we phosphatized the housing and gray cast iron parts on radial piston pumps that are used in industrial hydraulic equipment. This surface protection required ten immersion baths for degreasing, pickling, rinsing and bonding the parts.

The waste water created from these processes had to be fed to a waste water treatment system, and heavy metals that were filtered out had to be disposed of as special waste.

Disposal costs of DM 200,000 per annum were saved by providing a rust-free delivery of raw parts and avoiding rust in the production process.

#### UV-paint replaces solvent-based paint

Recently a UV-paint system was put into operation for the production of industrial hydraulic valves. The goal of this investment was to convert to a solvent-free paint while simultaneously dropping the additional phosphating step for the surface. In contrast to before – painting with a spray gun before a water screen and then drying in an oven – painting is now completely automatic in a chamber and hardening is done in a closed system under UV-light.

#### Strain on the environment has been reduced by:

- Cutting emissions of 300 kg solvents p.a.
- Disposing of 450 kg paints p.a. from overspray
- Saving several 10,000 kWh p.a. for drying

#### Dry machining

The manufacture of gear wheels is a core technology in the production of geared pumps for vehicle hydraulics. Before, this was only possible with oil as a cooling lubricant. The metal chips mixed with oil required disposal as special waste.

Acquiring gear hobbing machines which operate “dry” produced the following ecological and economical advantages:

- No cutting fluids needed
- Metal chips are treated as waste (not special waste)
- Fire protection equipment is no longer needed on the machinery
- Reduced manufacturing costs, shorter processing times, longer tool cycles
- No more airborne oil mist in ambient air

#### Endless filter replaces filter fleece

Frequently, filter fleece from cutting fluid reprocessing systems for aluminum machining requires disposal as special or hazardous waste. In the past, only systems with filtered discharge were used. After several technical changes, it is now possible to retrofit to endless filter rolls. This concrete example of a system that machines housings for geared pumps illustrates the point that environmentally beneficial advantages can be achieved while costs are reduced at the same time.

- Filter media were saved
- Filter change frequency was reduced
- Expense of disposal and lost oil were reduced



#### So that wind power generators never drop their blades

Because they are emission-free, windmill power generators are becoming a primary source of generating energy. The blades make the actual contribution to efficiency.

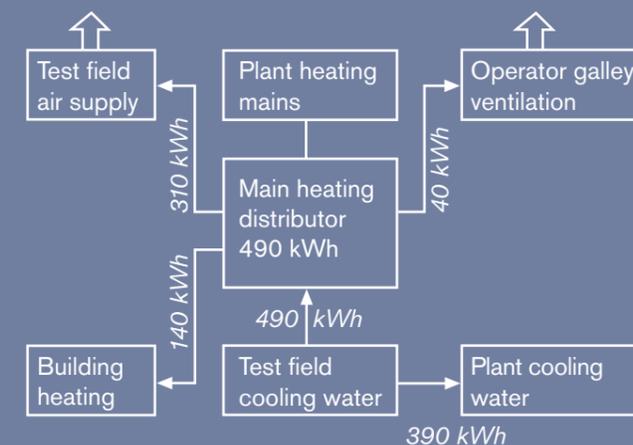
Electro-hydraulic adjustment drives from Bosch quickly adjust the blades to adapt to continuously changing wind speeds. The hydraulic cylinder, control valve and position measuring system are combined into a compact unit in the drive module in a way that saves resources. Further advantages are high functional reliability, longevity, and resistance to wind and weather.

#### Products are tested hot, the tester keeps his cool

It was already clear in the planning phase of the endurance benches for hydraulic aggregates that the expected waste heat should be used as much as possible to heat the building and intake air in the air ventilation system.

At an outside temperature of  $-12^{\circ}\text{C}$  and an average test field power of 1,150 kWh,

about 76.5% (880 kWh) are given off to the cooling water of the test field. The remaining 23.5% (270 kWh) heat goes to the outside air via the room ventilation system. From the waste heat, 490 kWh is used to heat the test field and intake air as well as the building heating. The remaining 390 kWh is removed via the plant's cooling water.



Test heat distribution diagram



Radial piston pump



Geared Pumps



## Capital Goods Business Sector

### Packaging Machinery Division

*Strength, secure shipping, hygiene, comfortable use, product protection – these are the essential requirements that must be met by modern packaging for the retail customer. On the other hand, more and more consumers have become concerned about packaging that is perceived as being too elaborate.*

If the contents of a package spoil and turn to waste, this burdens the environment. If savings are made at the wrong spot when selecting and manufacturing the packaging and the product is insufficiently packaged, the disadvantage for the consumer is usually even greater.

The machine and packaging material form a system that is adapted so well to the packaged goods that it offers maximum product protection at the lowest possible packaging cost.

Bosch is engaged in aggressive development work with the objective of significantly reducing package weight.

Optimized protection of goods while reducing material expenditures at the same time, the Packaging Machinery Division is working on both, proving its commitment to the environment on a daily basis.



*This poly-tube bag won an award in the 19<sup>th</sup> and 20<sup>th</sup> German Packaging Competition in 1996 and 1997*



#### Standup bags for baby food

To protect baby food so that it does not lose vitamins and other ingredients, it must be protected against oxygen, light and water vapor. In order to remove the oxygen, the packages are evacuated several times. However, a deep vacuum cannot be created for baby food because the product itself would clump up, impairing the solubility. In addition, the package must of course be gas-tight, because otherwise the quality of the contents would suffer.

The solution: On a vertical poly-tube bag machine, a compact square package made of compound packaging material is manufactured with a sealing layer, filled under protective gas, lightly evacuated and then sealed. Through the prior step of rinsing with protective gas, the normally used deep vacuum is not necessary. Expensive evacuating machinery can be eliminated, without diminishing the protection of the contents.

The development goal of combining clear ecological and economical advantages was attained. Proud proof of this is the award we won in the 19<sup>th</sup> German Packaging Competition in 1996.

The standup bag makes it possible to have 60% better utilization of the shipping palette for two 500 g portions in a carton enclosure. There is 90% less waste and 50% less packaging weight for a 100% recyclable carton.

#### H-Milk now in a poly-tube bag: A new level of quality and storage life

In the household, poly-tube bags for milk have the reputation of being difficult to handle and easy to break. On the other hand, they are extremely easy on the environment because one litre of product requires only about 10 g of packaging material.



*Poly-Tube Bags in Use*

In cooperation with a partner company, a new packaging system for H-Milk was developed. The bag consists of a combination of various plastics, in contrast to containers for fresh milk. The filled product is well-protected by the high gas and light permeability of this plastic combination. Along with an innovative sealing process, the packages are drop and tear resistant. However, the ecological advantages of the poly-tube bag and the simple disposal via the Dual System (in Germany) remain intact. Shipping empty containers, which impacts the environment, is also a thing of the past.



*The new developed aseptic machinery ensures a high level of hygienic safety. Now, H-Milk will actually enjoy the storage life that its name promises*

Our tube bag for H-milk is currently being introduced to the market in Germany. A study on behalf of the Federal Environmental Office confirms that the poly-tube bag package has very good marks when measured by ecological standards.

Waste that reaches the dump or is burned, wastewater and exhaust must also be considered when evaluating a packaging system.

The result of the poly-tube bag is especially positive here because little energy is used for its manufacture on account of the low weight, and the bag can be incinerated without reservations.

This poly-tube bag also won an award at the German packaging competition.

*Both systems save material and energy resources on a scale that lies between 30–50% depending on the basis of comparison*



## Corporate and environmental protection figures

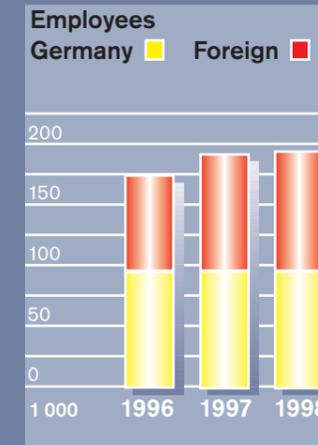
The following data is a summary of all environmentally pertinent data of Bosch locations (except Household Appliances) in Germany.

For several subject areas, there was extensive data collected in the past. For others, this data is being collected now within the framework of introducing the Environmental Management System.

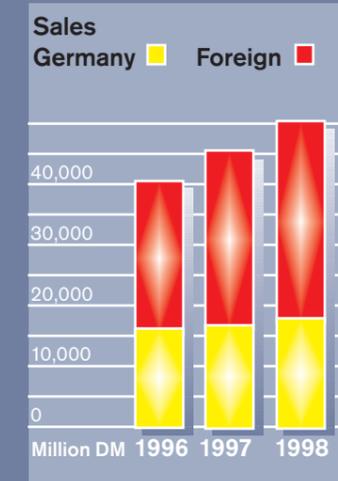
	Unit	1996	1997	1998
<b>Total Employees</b>		172,359	179,719	189,537
<b>Sales Worldwide</b>	Million DM	41,146	46,851	50,333
<b>Input</b>				
<b>Energy Consumption</b>	GWh			
Electricity		1,090	1,046	1,104
Heat (Natural gas, heating oil, remote heat)		1,035	994	765
<b>Water Consumption</b>	m <sup>3</sup>			
Purchased from Public supply		2,477,863	2,139,445	2,678,838
Own supply		894,403	957,627	918,608
<b>Land Use Analysis</b>	m <sup>2</sup>			
Property Area		8,242,966	8,407,933	8,470,159
Green Area		6,429,037	6,515,417	6,648,459
Building Area		1,813,929	1,892,516	1,821,700
Other Sealed Areas		4,615,108	4,622,901	4,826,759
<b>Selected Raw/Auxiliary and Working Materials</b>	t			
Non-water-mixable cooling lubricants (KSS)		2,738	3,840	3,718
Water-mixable cooling lubricants		975	1 086	1 246
Oils and Greases		2,343	2,715	3,487
Paints and Coating Materials		597	572	604
Acids and Alkalies		5,698	6,191	5,317
Surface Cleaning Agents		753	833	827
<b>Output</b>				
<b>Atmospheric emissions<sup>1</sup></b>	t			
CO <sub>2</sub>		172,198	165,474	127,916
CO		15,3	14,7	11,2
NO <sub>x</sub> (NO + NO <sub>2</sub> as NO <sub>2</sub> )		128	123	95
SO <sub>2</sub>		50	48	33
<b>Waste Water</b>	m <sup>3</sup>			
Passing into surface water		701,120	774,056	788,992
Passing into sewage system		2,419,798	2,136,120	2,591,674
Domestic waste water		855,798	743,435	940,286
Untreated plant sewage		759,066	585,367	790,075
Treated plant sewage		804,934	807,318	861,313
<b>Solid Waste</b>	t			
Waste for recycling <sup>2</sup>		55,206	62,013	68,277
of this: requires special monitoring		8,462	10,366	12,895
requires monitoring		46,744	51,647	55,382
Waste for disposal <sup>2</sup>		6,043	4,562	5,524
of this: requires special monitoring		4,839	3,900	3,912
requires monitoring		1,204	662	1,612
Demolition waste		4,078	6,030	8,267
Industrial Waste		10,011	9,653	10,313

<sup>1</sup> Calculated from the use of heating material

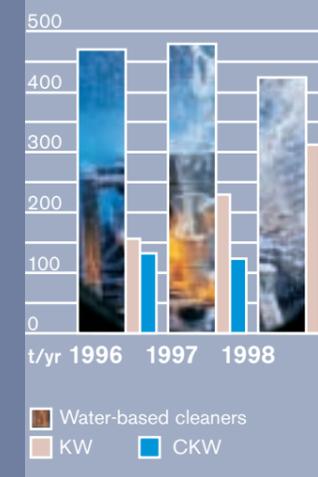
<sup>2</sup> Not including demolition waste and industrial waste



Fortunately the development of sales and employees has an increasing tendency. For improved clarity, we also indicate the foreign component.

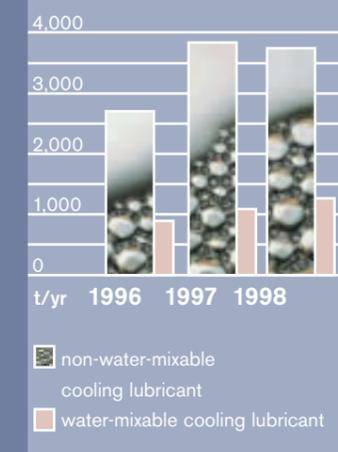


### Use of various cleaning media



Of the 827 tons of surface cleaners used in 1998, 11% was halogenated solvents, 38% hydrocarbons and 51% water-based cleaners.

### Cooling lubricants

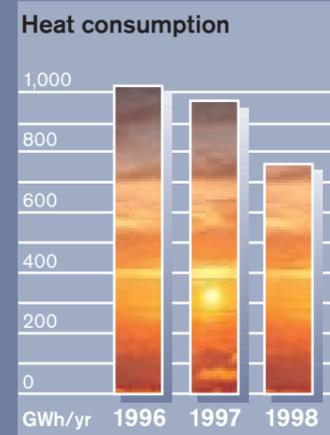
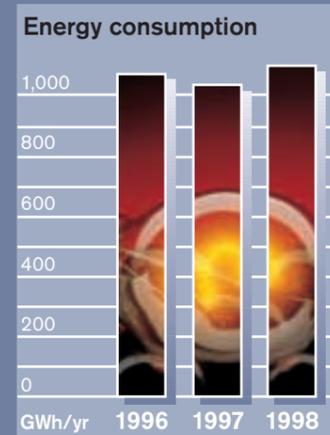




# Environmental protection figures

## Energy consumption

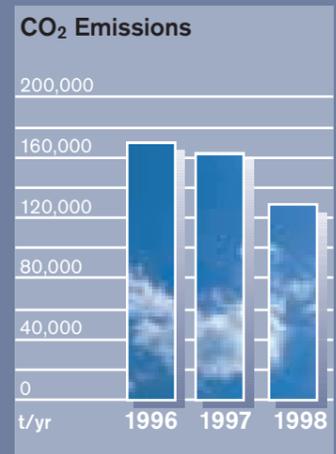
The consumption of electricity and heat varies only little despite production was increasing. This is a result of our efforts toward more efficient energy utilization.



In Germany, Bosch operates a total of 62 systems in which are subject to certification as per the German 4<sup>th</sup> BImSchV ordinance. About half of these systems are heating and furnace systems.

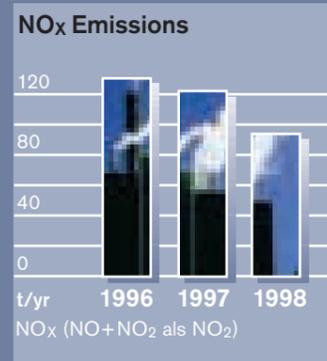
## Air emissions

Emissions are calculated from the determined heat consumption.

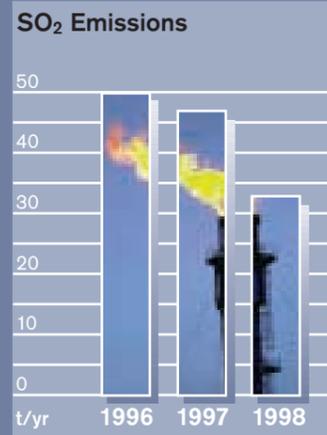


*In determining heat consumption, the segment of remote heat was not considered because these emissions were not generated at Bosch locations*

Total CO emissions in 1996 amounted to 15.3 tonnes, to about 14.7 tonnes in 1997 and 11.2 tonnes in 1998.



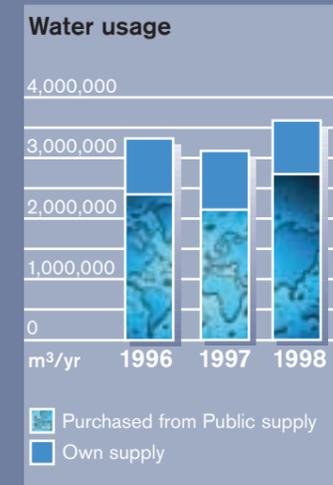
The heat used by Bosch is generated from natural gas (75%), remote heat (15%), and heating oil (10%).



## Water usage

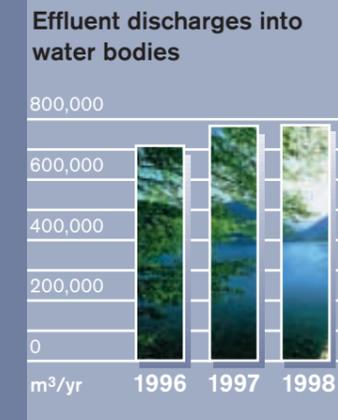
The water usage also follows the trend in production increase.

We obtain one-quarter of our required water from our own supply, which lessens the work associated with preparing drinking water.

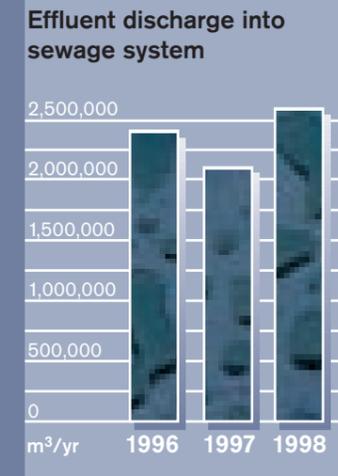


With the dip in 1997, the tabulations for water usage and effluent discharges reflect a conversion to new products in large plants, while the rise in 1998 reflects the increase in production.

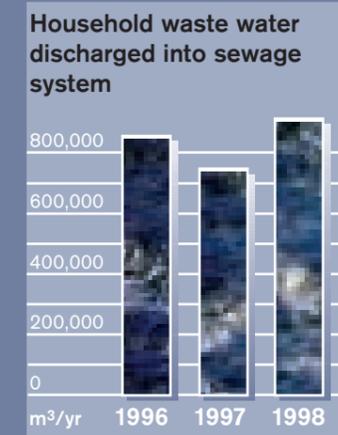
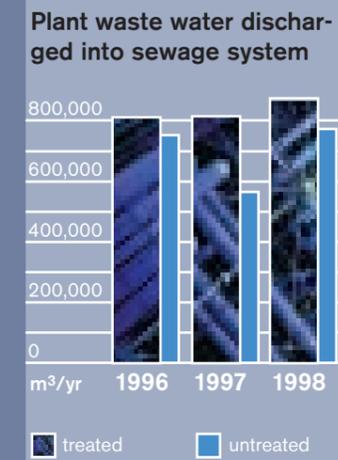
## Effluent discharge



The discharge into water bodies includes drainage of rain water and cold water, and approved disposal at points where no sewer system is available.



The discharge into the sewer system is classified as household waste water and treated or untreated plant waste water.



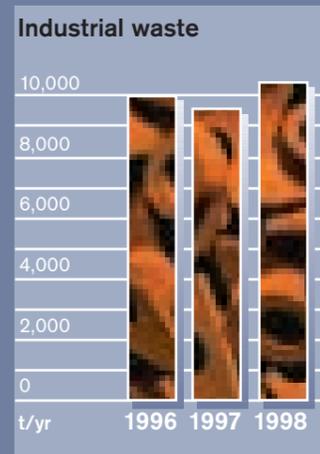
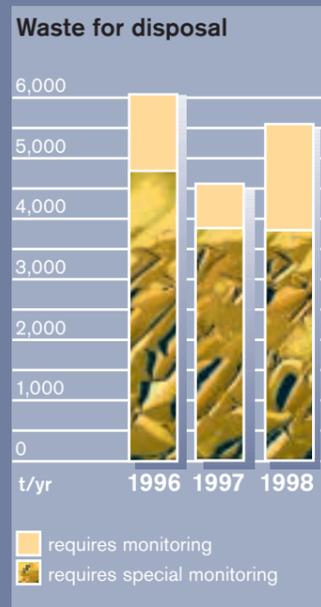
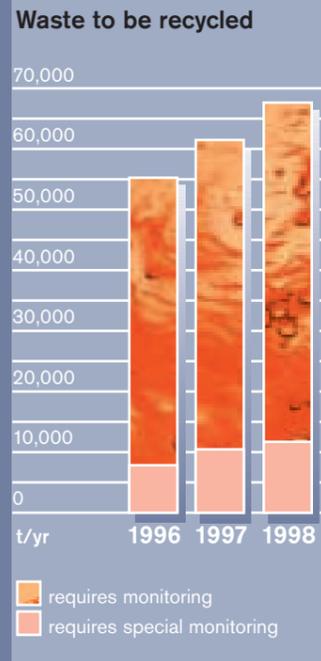
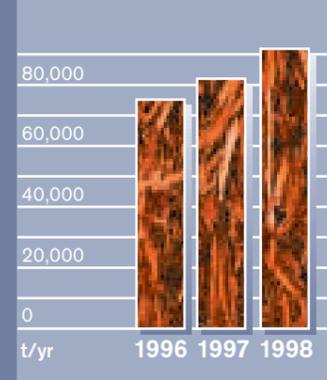


## Environmental protection figures

### Waste

In 1998, a total of 92,381 tonnes of waste were produced. The increase in this annual amount as compared with preceding years is explained by the rise in production volumes. It is worthy of note that more and more waste is channeled into recycling of some kind, while actual disposal waste volumes are receding. The increase in demolition waste confirms that the increase in production is linked to a number of building modification projects. By contrast, the volume of industrial waste remains virtually unchanged.

### Total waste volume



### Environmental protection expenditures

The annual costs for environmental protection include investments and current expenses.

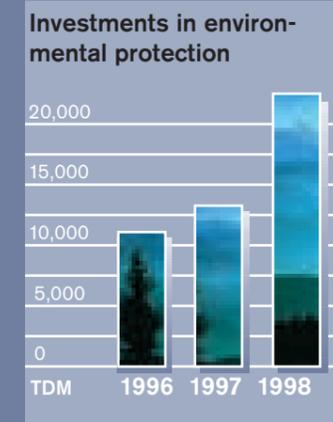
The following fields of activity are differentiated:

1. Waste Management
2. Soil/Water Conservation
3. Noise control
4. Air protection
5. Nature conservation/ Landscape preservation
6. Soil cleanup

The costs for environmental protection in Germany were determined for the Bosch Group for the first time in 1996. This figure is based on the methodology outlined in Article 15 of the Environmental Statistics Law.

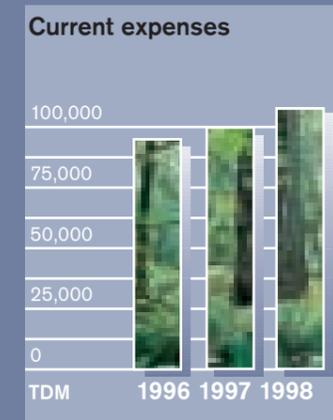
### Investment

Overall, the Bosch locations invested 23 million DM in economic goods in 1998, which serve to protect the environment. Soil and groundwater protection made up the greatest segment, drainages were redeveloped as well as chemical stores. Moreover, the wastewater treatment facilities were expanded.



### Ongoing Expense for Environmental Protection

In 1998, the ongoing expense for environmental protection was about 110 million DM for all locations in Germany.



This sum includes capital and operating costs, personnel, auxiliary and operating materials, energy and outside services – as well as fees, contributions and emissions taxes. All of these expenses are made up of many individual amounts and measures.

Here are several examples:

Waste disposal fees, operating collection points for residual material, wastewater treatment facilities and cleaning exhaust air containing oil.

### Current expenses in 1998

Total: 110.53 million DM



Current expenditure breakdown, per field of activity

- 1 Waste management 34%
- 2 Soil/Water conservation 49%
- 3 Noise control 1%
- 4 Air protection 12%
- 5 Nature conservation/ Landscape preservation 1%
- 6 Soil cleanup 3%



## Contact persons

Questions about Environmental Protection at Bosch are answered by:

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*Information about the Product  
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**Corporate Sales and  
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*You can request product  
brochures from the  
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*And scientific literature  
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**Technical-Scientific Infor-  
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*The **Corporate Public  
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