

# Sustainable Value Report 2005/2006

Taking  
responsibility.



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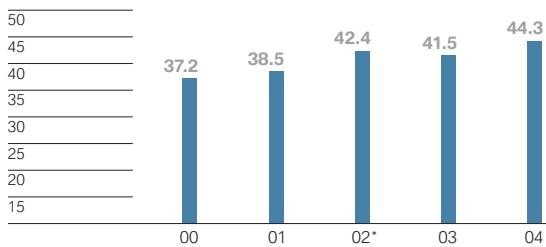
Rolls-Royce  
Motor Cars Limited



**BMW Group**

### BMW Group Revenues

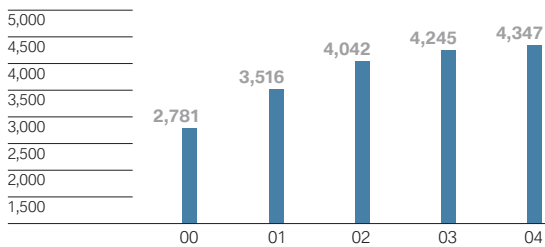
in euro billion



\*reclassified after harmonisation of internal and external reporting systems

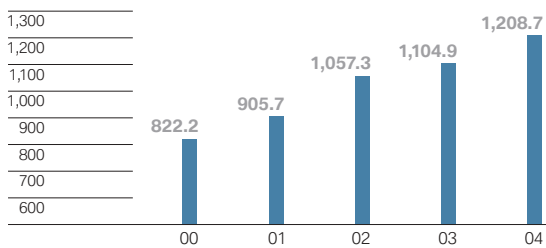
### BMW Group Capital expenditure

in euro million



### BMW Group Deliveries of automobiles\*

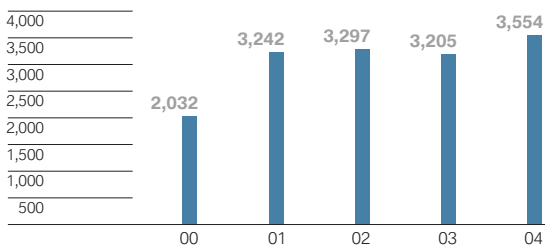
in thousand



\*adjusted for Rover/Land Rover

### BMW Group Profit before taxes

in euro million



## BMW Group in figures

<b>Economic</b>		2000	2001	2002	2003	2004
<b>Vehicle production</b>						
BMW	units	834,519	904,335	930,221	944,072	1,059,978
MINI	units	–	42,395	160,037	174,366	189,492
Rolls-Royce	units	–	–	–	502	875
Automobiles, total <sup>1)</sup>	units	1,026,755	946,730	1,090,258	1,118,940	1,250,345
Motorcycles <sup>2)</sup>	units	74,397	90,478	93,010	89,745	93,836
<b>Deliveries to customers</b>						
BMW	units	822,181	880,677	913,225	928,151	1,023,583
MINI	units	–	24,980	144,119	176,465	184,357
Rolls-Royce	units	–	–	–	300	792
Automobiles, total <sup>1)</sup>	units	1,011,874	905,657	1,057,344	1,104,916	1,208,732
Motorcycles <sup>3)</sup>	units	74,614	84,713	92,599	92,962	92,266
Revenues	euro million	37,226	38,463	42,411 <sup>4)</sup>	41,525	44,335
Capital expenditure	euro million	2,781	3,516	4,042	4,245	4,347
Cash flow	euro million	3,779	4,202	4,374	4,490	5,167
Profit before taxes	euro million	2,032	3,242	3,297	3,205	3,554
Net profit	euro million	1,209	1,866	2,020	1,947	2,222

1) including Rover Cars until 9 May 2000 and Land Rover until 30 June 2000 2) excluding C1, total production of the C1 to 2002: 33,489 units 3) excluding C1, sales volume of the C1 to 2003: 32,859 units 4) reclassified after harmonisation of internal and external reporting systems

<b>Social</b>		2000	2001	2002	2003	2004
<b>Workforce at end of year<sup>5)</sup></b>						
thereof		93,624	97,275	101,395	104,342 <sup>6)</sup>	105,972
in Germany		68,905	72,863	76,143	78,569	80,005
outside Germany		24,719	24,412	25,252	25,773	25,967
<b>BMW Group employees according to segment</b>						
Automobiles		81,913	89,292	93,216	95,913	99,043
Motorcycles		2,397	2,699	2,847	2,954	2,918
Financial Services		1,671	1,973	2,196	2,476	2,841
Other		7,643 <sup>7)</sup>	3,311	3,136	2,999	1,170
Number of apprentices		3,698	3,829	4,199	4,306	4,464
Years of service in Company <sup>8)</sup>	years	14.2	14.1	14.0	14.2	14.1

5) Figures exclude suspended contracts of employment, employees in the work and non-work phases of pre-retirement part-time arrangements and low-income earners.

6) After adjusting for disposals and transfers of group companies, the comparable number was 104,250 employees at 31 December 2003. 7) in 2000 including Oxford plant, Hams Hall and other UK companies 8) refers to BMW AG

<b>Environmental<sup>9)</sup></b>		2000	2001	2002	2003	2004
Energy consumption, total	MWh	2,636,565	2,788,126	3,503,102	3,295,277	3,672,212
Energy consumption per unit produced	MWh/unit	3.16	3.08	3.21 <sup>10)</sup>	2.94	2.94
Process water input for production, total	m <sup>3</sup>	2,481,127	2,277,757	2,293,257	2,105,625	2,469,001
Process wastewater for production, total	m <sup>3</sup>	882,286	971,938	998,917	1,101,988	1,041,526
Process wastewater for production per unit produced <sup>11)</sup>	m <sup>3</sup> /unit	1.06	1.07	0.92	0.98	0.83
Carbon dioxide (CO <sub>2</sub> ), total <sup>12)</sup>	t	870,862	897,507	1,068,690	1,125,939	1,169,786
Carbon dioxide (CO <sub>2</sub> ) per unit produced	t/unit	1.04	0.99	0.98	1.00	0.94
Waste, total	t	291,082	305,634	317,129	399,876	397,151
Waste per unit produced	kg/unit	349	354	291	357	318

9) Figures include the following automobile and engine production plants worldwide: automobile production, Dingolfing; component assembly, Landshut; automobile and engine production, Munich; automobile production, Regensburg; automobile production Rossllyn, South Africa; automobile production, Spartanburg, USA; engine production, Steyr, Austria; from 2002 MINI production, Oxford, UK, and from 2003 engine production, Hams Hall, UK. 10) higher energy intensity due to continuing conversion to environmentally friendly water-based and powder-based painting technology 11) 2000 only BMW (without Rover); 2001 only BMW; 2002 BMW and MINI 12) including CO<sub>2</sub> emissions from external power generation

The BMW Group's Sustainable Value Report 2005/2006 focuses on the current contents of the Company's commitment in the economic, environmental and social fields of responsibility. Detailed information on the BMW Group's understanding of sustainability, the individual fields of responsibility, as well as projects and publications on the subject of responsibility are available on the Internet at:

[www.bmwgroup.com/responsibility](http://www.bmwgroup.com/responsibility)

**Global Reporting Initiative.** The BMW Group has prepared the report in accordance with the 2002 Sustainability Reporting Guidelines issued by the Global Reporting Initiative (GRI). Information on and references to the GRI elements of the report and indicators can be found at:

[www.bmwgroup.com/gri](http://www.bmwgroup.com/gri)

**Sustainability objectives.** The BMW Group's sustainability objectives are reported exclusively on the Internet at:

[www.bmwgroup.com/sustainabilityobjectives](http://www.bmwgroup.com/sustainabilityobjectives)

**Corporate governance.** The subject of corporate governance is discussed in the Annual Report. The report and further information on corporate governance in the BMW Group is available on the Internet under Investor Relations at:

[www.bmwgroup.com/ir](http://www.bmwgroup.com/ir)

**Invitation to dialogue.** We would like to know what you think of this report and the BMW Group's commitment. Please send us your questions, comments and suggestions by e-mail to:

[sustainability@bmwgroup.com](mailto:sustainability@bmwgroup.com)

We look forward to hearing from you. Some of the ideas that are exchanged in this dialogue can be read on the Internet at:

[www.bmwgroup.com/responsibility](http://www.bmwgroup.com/responsibility)

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Are business success and responsibility compatible?

How can we bring together people from all over the world whose common goal is nothing but the best?

How often does a development engineer think about sustainability?

Can we make cars without environmental impacts?

Is mobility without emissions possible?

What can we accomplish in society?

How do we get to grips with HIV/AIDS?

What can we do here?

It is important to ask the right questions – and not to be satisfied with the simple answers; to consider one’s own requirements and goals and, whenever possible, to change things that need changing.

We do not always have an answer, but we never evade the issue. We consistently take our responsibility and remain open to dialogue. Responsibility for economic development, for our employees, for the environment and society. For the future of mobility. For our success.

Ladies and Gentlemen,

With the Sustainable Value Report 2005/2006, the BMW Group is reporting for the fifth time on its commitment to the environment and society. Together with the Annual Report and the interim reports, the Sustainable Value Report is a fixed component of the Company's reporting. In it we report transparently and openly on factors which have contributed to the Company's success, but which are not found in the financial statements. Thus, customers, employees, suppliers and the general public can see how the Company has taken its responsibility in many different ways – all in the context of the Company's business development. The question of corporate social responsibility is raised daily. Therefore, we would like to explain our actions and also answer critical questions. That is how we generate trust in the BMW Group and its brands. And this trust is the basis for our success. In the BMW Group we are convinced that we are successful because sustainable action is firmly anchored in our corporate management. And because we are successful, we are able to meet the high standards we set for our actions. For a company also needs the strength to pursue its long-term objectives and to plan and act accordingly.

In terms of sustainability, a company is particularly credible and effective when it takes responsibility for its products throughout their

entire life cycle – from production, through the long phase of use to end-of-life recycling. It is only here, in its own sphere of influence, that the responsibility practiced in a company can really change something permanently – and at the same time result in competitive advantages and thus create value. However, this sphere of influence does not end at the factory gates or in the salesrooms, but includes the interests of all stakeholders – of customers and employees, shareholders, business partners and other interest groups. That is why the BMW Group seeks dialogue with all stakeholders and constantly exchanges ideas with institutions, associations and non-governmental organisations. For we have to talk to one another if we are to understand and shape the future together.

This way of thinking and acting is apparent in many aspects of the BMW Group. For example, the high standards of sustainability that we have set are reflected first and foremost in our products. Our customers must be able to experience it like the proverbial Sheer Driving Pleasure. Uniformly high standards of quality, work safety and environmental protection throughout our production network create the conditions we need to ensure that the products of the BMW Group live up to the premium claim in every way. In addition, themes such as Condition Based Service or a sophisticated recycling concept create value added for the customer, improve our competitive

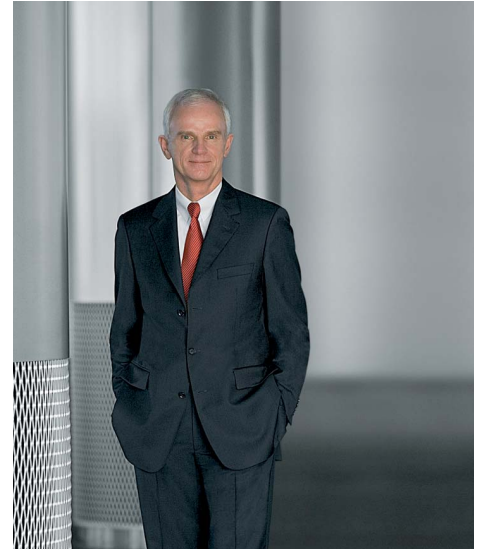


position and conserve resources and environment alike. At the same time, we cooperate with experts at universities and research institutions to develop and put into practice concepts of sustainable mobility.

The responsible use of resources in our production network worldwide helps us not only to secure a leading position among our competitors, but also to cushion the impact of fluctuations on the international raw material markets.

As an attractive employer, we shall continue to be able to recruit the most suitable and dedicated employees. After all, on the labour market, a sustainable corporate culture based on the principle of performance and reward creates competitive advantages, which cannot be measured in monetary terms – and are in fact priceless.

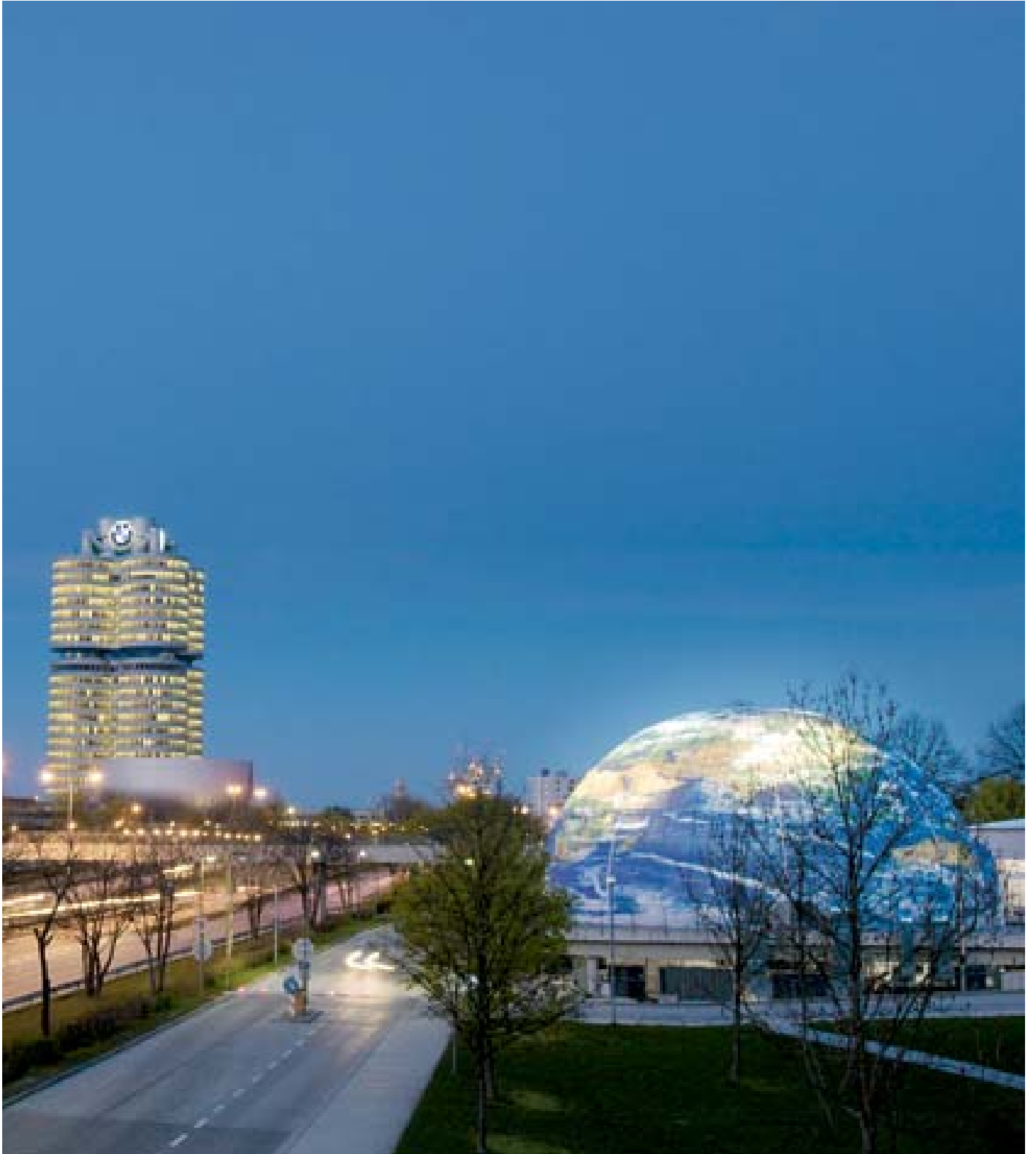
These examples all show that sustainable action and corporate success belong together in the BMW Group. This conviction has always been, and will continue to be, the basis of our success.



Helmut Panke, Chairman of the Board of Management

*Helmut Panke*

Helmut Panke  
Chairman of the Board of Management



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# 1 Sustainability as part of corporate strategy

Companies assume responsibility for their economic success as well as for the environment and society. For only companies that take account of the interests of people and the needs of the environment, i. e. that operate sustainably, can achieve long-term economic success. For the BMW Group, sustainability management means using resources efficiently and sparingly, recognising and minimising risks, acting in a socially responsible way and thus enhancing the Company's reputation. In doing so, both the management and employees constantly strive to improve on their achievements. Since sustainable actions provide the basis for viable development, the BMW Group takes this responsibility.

## The BMW Group in portrait

### Success in the premium segment

The BMW Group, like no other automobile company, focuses with its three brands BMW, MINI and Rolls-Royce exclusively on the premium segments of the international automobile markets. With its ongoing product and market initiative, the Company consistently opens up new market segments, constantly develops new sales opportunities worldwide and has thus moved into a new dimension over the last few years. Today, the BMW Group has the most comprehensive range of products in the Company's history and addresses all the premium segments of the international automobile markets of current relevance to the Company.

In the motorcycle business, the BMW Group also pursues this strategy and is highly successful worldwide. As a result, the number of BMW motorcycles delivered to customers has risen by more than 80 percent in the last ten years.

A wide choice of Financial Services completes the range of BMW Group products and services. In this field, the Company has grown steadily for years and thus benefits even more intensively from the automobile value added chain.

### Three brands – one claim

Premium: All three brands of the BMW Group stand for this claim – with different facets, for different market segments, but always authentic.

With meanwhile eight model series, the BMW brand embodies the proverbial Sheer Driving Pleasure which is newly interpreted in every model, but is nevertheless common to all BMW automobiles. With the MINI, the BMW Group has repositioned a classic car and thus established the term "premium" in the small car segment. And finally, Rolls-Royce motor cars have been synonymous with timeless, lasting perfection for more than one hundred years.

It is the BMW Group's consistent orientation to the premium claim that makes its vehicles so attractive. This strategy, responsible action and a dedication to success, which is shared by all the employees, characterise the Company and are the main driving forces for the BMW Group's success.

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

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

[www.rolls-roycemotorcars.com](http://www.rolls-roycemotorcars.com)

[www.bmw-motorrad.com](http://www.bmw-motorrad.com)

[www.bmw-financialservices.com](http://www.bmw-financialservices.com)

### Investments in the future

With 22 production locations, the international research and development network, 34 sales subsidiaries as well as a network of independent dealerships, the BMW Group is represented in more than 150 countries worldwide.

Germany still accounts for about half the volume of purchases. It is followed by the other countries of Western Europe with 19 percent, the member states of NAFTA (North American Free Trade Agreement) with 13 percent, the countries of Central and Eastern Europe with eight percent, the African nations with three percent and the countries of Asia and South America with two percent each.

A high level of capital expenditure ensures the BMW Group's efficient performance. In the last five years, for example, the Company has invested a total of almost euro 19 billion. This was used mainly for the expansion of the production network and the sales network, as well as for research and development.

In line with the motto "Production follows the market", the BMW Group invests in the development of new, highly promising markets. After all, capital expenditure that benefits the Company also brings economic progress to the regions near the respective locations.

The most recent example is the BMW Group's new Leipzig plant, which was opened officially in May 2005. The BMW Group is investing around euro 1.3 billion in the new location which will provide employment for some 5,500 people on the grounds

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The BMW Group's headquarters in Munich with the BMW Museum

when the plant works at full capacity. In addition to the new jobs in the plant, about the same number again will be created in the surrounding region.

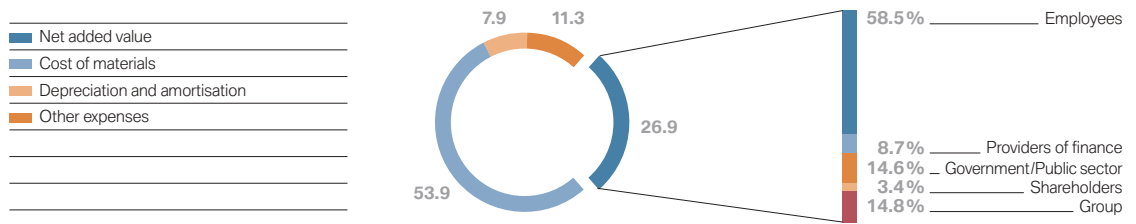
The BMW plant in Spartanburg, South Carolina, USA, is another example of a location's successful development. During the first ten years of production, the region surrounding the plant, which opened in 1994, developed very positively: capital expenditure of US dollar 400 million, which the BMW Group originally planned, has increased more than five-fold in the last ten years. Today, some 4,600 employees work in the BMW plant in Spartanburg. The multiplier effect of the investment in the plant worked wonders for growth and the creation of employment in the region.

#### The business year 2004

The year 2004 was the most successful business year in the BMW Group's history. More than 1.2 million automobiles and around 92,300 BMW motorcycles were delivered to customers in 2004. In balance sheet terms, the business volume of the Financial Services segment rose by 13.6 percent to euro 32,556 million. With the strong growth in retail, the revenues of the BMW Group also increased significantly to achieve a new record of euro 44,335 million. The Company generated pre-tax earnings of euro 3,554 million; net profit amounted to euro 2,222 million, another new record. Shareholders benefited from this development with a four cent increase in dividend to euro 0.62 per share of common stock and euro 0.64 per share of preferred stock. Not only shareholders, but also other stakeholders benefit from the BMW Group's business success. The value added statement shows the value of work performed less the value of work bought in by the BMW Group. In 2004 the net value added increased by 4.5 percent to euro 12,220 million. The government/public sector participated in this in the form of tax payments amounting to euro 1,785 million (14.6 percent). However, by far the largest share (58.5 percent), amounting to euro 7,154 million, benefited the employees. At the end of 2004, the

**BMW Group value added 2004**

in %



Company had a workforce of 105,972 employees. Thus, in 2004 the BMW Group created 1,722 new jobs, three-quarters of which were in Germany. From the end of 2000 to the end of 2004, more than 12,000 additional jobs were generated in the BMW Group, 11,000 of which were in Germany.

areas of the BMW Group and includes the most important competitive factor of any company: the employees. For example, the BMW Group is working on long-term human resources development strategies to cope successfully with demographic change. It also promotes its employees' health with a large variety of programmes and measures.

## Our understanding of sustainability

### Sustainability as management task

The BMW Group is committed to applying the concept of sustainability in practice and integrating it into daily business procedures. Therefore, the BMW Group's decisions and processes are based not only on economic but also on social and ecological criteria. The objectives are clearly defined: The resources required by the Company must be used efficiently and sparingly, risks must be recognised, opportunities taken and the Company's reputation enhanced by responsible actions towards employees and society. These aims are of decisive importance for the Company's future viability. Against this background it becomes clear why sustainability and business success belong together in the BMW Group.

### Using resources responsibly

Using production materials, water, energy and capital sustainably means handling resources sparingly, efficiently and thus responsibly. This applies to all

### Recognising and minimising risks

As a company with worldwide operations, the BMW Group is exposed to numerous ecological and social risks, which could have considerable social and economic impacts. The general public often contacts companies about issues of this kind and expresses its expectations. Companies that take account of stakeholders' concerns and try to balance interests not only reduce risk potential, but also develop opportunities. In order to achieve a global task such as climate protection, measures must be taken, for example, to reduce fleet consumption and CO<sub>2</sub> emissions at plants. At the same time, this aim triggers the development of new, resource-saving production and propulsion technologies. These processes result in future markets such as will develop for hydrogen drive.

### Building up and enhancing reputation

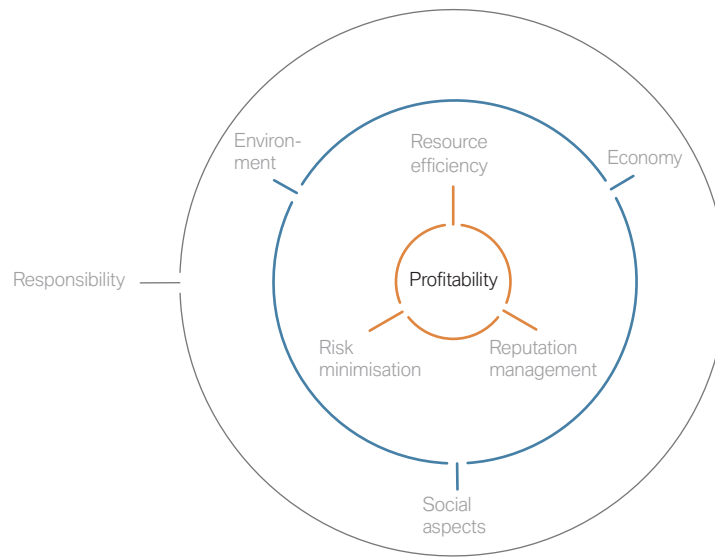
Dialogue with the Company's stakeholders forms the core of reputation management. In concrete terms, this means a constructive exchange of views with investors, employees, customers, social organisations, political institutions and business partners. The BMW Group approaches its stakeholders and

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## The BMW Group's understanding of sustainability

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creates transparency by informing them about its actions and the principles on which they are based. The Company's commitment to social responsibility is demonstrated by concrete action: as corporate citizen, the BMW Group promotes a large number of projects worldwide. In doing so, the Company contributes to social development, while at the same time increasing the credibility and social acceptance of the Company and its products.

### Measuring sustainability

Only measurable sustainability progress can be managed efficiently. That is why the BMW Group examines different methods of assessing sustainability quantitatively. In a dialogue and in cooperation with scientists outside the Company, a model for measuring sustainability was refined and adapted for corporate practice in the BMW Group. The Sustainable Value approach can be used to measure the contribution to value achieved by using the Company's economic, ecological and social resources (see also pages 16 and 17).

## Putting sustainability into practice

### Guidelines for social and ecological responsibility

As part of its objective to promote sustainable economic activity worldwide, the BMW Group supports international initiatives and the further development of voluntary standards and guidelines. As early as 2001 the BMW Group joined the Global Compact of the United Nations and firmly anchored its principles in the Company. In the Global Compact companies are committed to

- promoting and respecting human rights within their sphere of influence,
- making sure they are not complicit in human rights abuses,
- upholding the freedom of association and the effective recognition of the right to collective bargaining,
- eliminating all forms of forced and compulsory labour,
- abolishing child labour,

- eliminating discrimination in respect of employment and occupation,
- supporting a precautionary approach to environmental challenges,
- undertaking initiatives to promote greater environmental responsibility,
- encouraging the development and diffusion of environmentally friendly technologies
- and working against all forms of corruption, including extortion and bribery.

[www.unglobalcompact.org](http://www.unglobalcompact.org)

### **The ten principles in practice**

The BMW Group ensures that these ten principles are put into practice with its internal human resources and environmental guidelines, its social commitment to its employees and society, which is far more comprehensive than that prescribed by law, and its dialogue with interest groups. In addition, the BMW Group observes the standards of the International Labour Organisation (ILO), the Guidelines for Multinational Enterprises of the Organisation for Economic Cooperation and Development (OECD), the Business Charter for Sustainable Development of the International Chamber of Commerce (ICC) and the International Declaration on Cleaner Production of the United Nations Environment Programme (UNEP). Since 2003, the BMW Group has also included its partner companies and suppliers in the application of these initiatives and guidelines, and since then environmental and social criteria have been integrated into its international purchasing guidelines.

[www.ilo.org](http://www.ilo.org)

[www.oecd.org](http://www.oecd.org)

[www.iccwbo.org](http://www.iccwbo.org)

[www.unep.org](http://www.unep.org)

In the spring of 2005, the Board of Management of BMW AG, together with the employees' representatives and the International Metalworkers' Federation (IMF) signed a binding declaration on human rights and labour conditions in the BMW Group, which applies worldwide. The declaration specifies the human rights and labour principles of the Global Compact. The provisions of the declaration are based on the principles of the International Labour Organisation (ILO) as well as on legislation in various countries. The Company is committed wholeheartedly to equal opportunities and equal treatment, the prohibition of forced and child labour, as well as the freedom of

association. The agreement also sets standards for health and safety, remuneration and work-time arrangements. The complete wording of the declaration can be called up on the Internet at:

[www.bmwgroup.com/responsibility](http://www.bmwgroup.com/responsibility)

The anti-corruption principle, the tenth principle which was only added to the Global Compact in 2004, is observed consistently in the BMW Group: rules of behaviour, which, for example, promote responsible action among employees, are defined in the associate and leadership model as well as in the guidelines of the long-term human resources policy. These are based on the BMW Group's corporate culture, which is characterised by trust in the responsible action of its employees. Organisational measures, such as the separation of functions between the ordering party and Purchasing Division, as well as the involvement of that person's superior (four eyes principle), provide the basis for a workable, internal control system. This helps to reduce the risk of corruption. In addition, all areas of purchasing have been sensitised to the risk of corruption. The Group's audit department makes spot checks on the effectiveness of the internal control systems in place and, if necessary, encourages improvements. These spot checks are risk-oriented, i.e. processes and units in countries that are more exposed to the risk of corruption are checked more frequently.

### **Climate protection as corporate objective**

The international community of states has set itself important environmental objectives with the Kyoto climate targets. Germany, for example, has undertaken to reduce its CO<sub>2</sub> emissions by 21 percent by 2012 compared with the reference year 1990. The BMW Group supports the Kyoto targets. With the help of energy-efficient production processes, the BMW Group is reducing emissions from vehicle production. In the last ten years, the plants of the BMW Group have reduced their CO<sub>2</sub> emissions by around 30 percent per unit produced. The fuel consumption of the automobile fleet decreased steadily as a result of numerous measures in vehicle development. Thus, the BMW Group is acting in line with an agreement between ACEA (European Automobile Manufacturers Association) and the EU Commission, according to which CO<sub>2</sub> emissions in the automobile fleets of all European manufacturers are to be reduced in the period from 1995 to 2008 to an average of 140 grams per kilometre.



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Hydrogen, the fuel of the future: a BMW CleanEnergy vehicle in London traffic

### The BMW Group's energy strategy

Vehicle development in the BMW Group follows the concept of efficient dynamics. The BMW Group considers requirements for environmental compatibility and consumption in the context of statutory requirements and the customers' wishes in terms of comfort, safety and dynamic performance. The BMW Group's energy strategy to permanently safeguard individual mobility is designed to:

- reduce greenhouse gases,
- conserve finite fossil fuels and
- secure a long-term energy supply.

In the short and medium term, the BMW Group aims to further reduce the fuel consumption of its fleet by continuing to optimise existing engine systems and combining them with innovative lightweight automotive engineering concepts. The BMW Group is also examining the vehicle's entire energy chain in order to utilise energy potentials which have remained unused so far, such as braking energy, and is developing innovative engine technologies. For example, the Company is working on technical solutions for an automobile powered by both an internal combustion engine and an electric motor. This so-called hybrid system reduces consumption and environmental impacts. The BMW Group aims to develop an energy management system that offers advantages at all times, not just in the city. The BMW Group engineers are working on drive solutions whose power can be called up at any time and which provide more spontaneity for less consumption.

In the long term, however, the BMW Group sees a bright future for hydrogen as fuel. Therefore, it is promoting the use of liquid hydrogen as fuel of the future in its BMW CleanEnergy Initiative. In 2004, the H<sub>2</sub>R Research Car demonstrated the efficiency of hydrogen combustion engines by setting nine international records for hydrogen-powered vehicles. The sixth generation of hydrogen vehicles has been tested in the current BMW 7 Series and is in the process of series development. Within the next three years vehicles will be handed over to customers in order to test and optimise the concept in daily use.

However, hydrogen-powered vehicles cannot go into operation in large numbers until a hydrogen infrastructure has been developed. Therefore, the BMW Group is working with numerous partners from science, politics and industry to create the necessary conditions for a hydrogen infrastructure.



above -- Discussion on corporate commitment to sustainability during the BMW Group's Dialogue Forum  
below -- Visitors in the BMW Group's Earth Lounge



### Sustainability in dialogue

As the example of the CleanEnergy strategy shows, many sustainability objectives can only be achieved with partners from politics, society, science and industry. The BMW Group regularly offers and finds events that promote the continuous and systematic exchange of views with relevant stakeholders. In doing so, the Company understands the dialogue with stakeholders as a constant learning process as regards its own ability to enter into a dialogue and the possibilities of finding joint solutions. The BMW Group's attitude is characterised by problem awareness, impartiality and recognition of the stakeholder groups' commitment. After participation in the World Summit on Sustainable Development in Johannesburg, South Africa, the BMW Group organised a second Dialogue Forum in order to exchange views with a wide range of interest groups. Upon the Company's invitation, more than 6,300 guests came to 43 events at the Dialogue Forum in Munich between mid-April and mid-May 2004. The events addressed employees and investors, as well as partners from politics, industry, social organisations, science, culture, the media and education. Discussions focused on numerous aspects of sustainable action in industry, society and politics. Sustainable development is the result of many decisions and measures, which frequently have very little news value in the conventional sense. That is why representatives of the media were approached selectively in a new open form of dialogue, which differs from classic media relations. During the Dialogue Forum, Dr. Norbert Reithofer, Board Member for Production at BMW AG, and those in the Company responsible for environment, transport, human resources and finance, discussed with journalists the extent to which sustainability can be achieved and how this can be done efficiently.

[www.bmwgroup.com/responsibility](http://www.bmwgroup.com/responsibility)

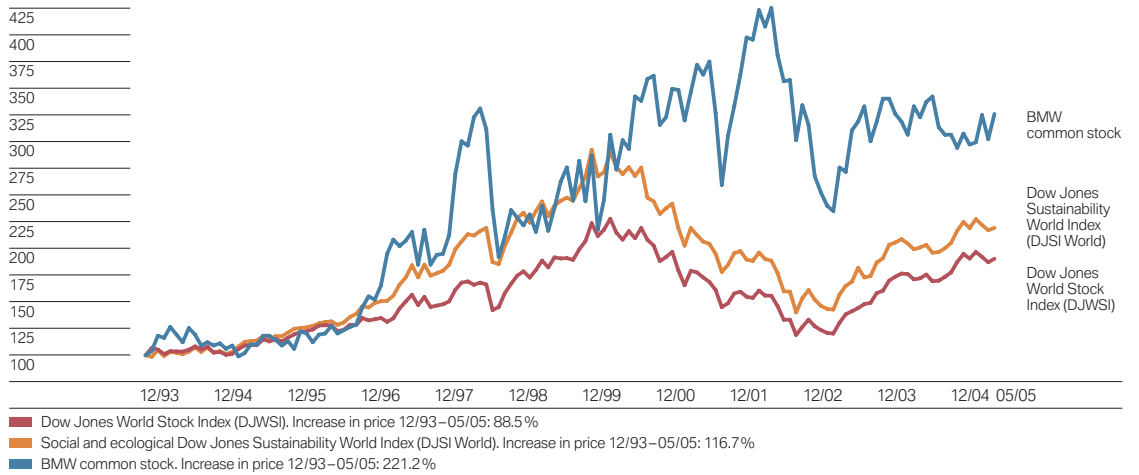
[www.econsense.de](http://www.econsense.de)

The Dialogue Forum was accompanied by an exhibition, which was open to anyone interested. Here the BMW Group presented examples of its commitment to Clean Production, BMW CleanEnergy, Mobility Management, Sustainable Service and Recycling as

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**Development of the DJSI World, the DJWSI and BMW common stock, December 1993 to May 2005**

(Index: December 1993 = 100)



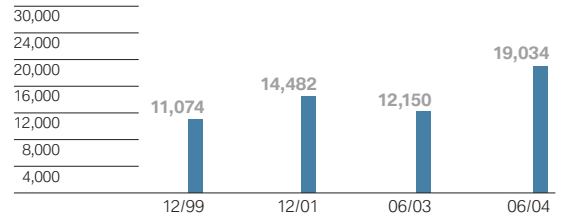
well as Social Responsibility towards employees and society.

**Financial markets: sustainability criteria gain in importance**

One of the major themes discussed at the Dialogue Forum was the impact of sustainability on the capital and financial markets. Investors increasingly take account of ethical and sustainable principles in their investment decisions. Therefore, experts now consider responsible action a competitive factor that has to be taken seriously as it contributes to the increase in a company's value.

A growing number and increasing acceptance of the financial indexes specialised in sustainability reflect the financial markets' great interest in companies that act sustainably. The BMW Group with its above-average performance in the field of sustainable operations is listed in the most important family of sustainability indexes, the Dow Jones Sustainability World Indexes (DJSI World) and Dow Jones STOXX Sustainability Indexes (DJSI STOXX). In the Corporate Responsibility Rating 2003 by oekom research, the BMW Group holds the leading position within the automobile industry. Using 200 different

**Investment volume of European sustainability funds**  
in euro million



Source: Avanzi SRI Research/SiRi Company (2004)

criteria, the Rating analyses companies' awareness of responsibility in the cultural and social field as well as the environmental compatibility of their economic activity. The BMW Group is also represented in various FTSE4Good indexes, for example as the only automobile company in the FTSE4Good Europe 50 Index. The indexes consider criteria on environment-related sustainability, the development of positive relations with interest groups, as well as the observation and promotion of human rights.  
[www.oekom-research.de](http://www.oekom-research.de)  
[www.ftse4good.com](http://www.ftse4good.com)  
[www.sam-group.com](http://www.sam-group.com)

**Concrete example --**

## Measuring the Sustainable Value.

With the Sustainable Value scientists have developed a key figure for assessing a company's sustainable performance.

Can you measure how sustainably a company operates? Can you assess quantitatively and express in monetary terms the use of social and ecological factors? If sustainability is to be integrated into company processes, you need answers to these questions: for you can only manage what you can measure. That is why the BMW Group is involved in the research project of Dr. Frank Figge, Economist at the Sustainability Research Institute of the School of Earth & Environment, Leeds University, and Dr. Tobias Hahn, Environmental Scientist at the Institute for Future Studies and Technology Assessment (IZT), Berlin. With the Sustainable Value the two scientists have developed an approach, which measures the sustainable use of ecological, social and economic resources. In doing so, they take their bearings from well-known methods of company assessment. Together with the BMW Group they have calculated the Sustainable Value for the Company and adapted the method for corporate use.

From an economic point of view, companies are assessed on the basis of their business figures, such as are found in the financial statements. These figures, for example the operating profit or return on equity, can be used to draw comparisons with other companies in the same or in another industry. Not so with sustainability. Here comparisons have always been more difficult because the ecological, social and economic dimensions cannot be linked and uniformly presented with the established instruments. Clearly defined, monetary figures on the sustainable use of resources are not available. However, the Sustainable Value provides information on the value – in monetary terms – a company generates by using ecological, social and economic resources. Since

the Sustainable Value considers the resources' contribution to value, it departs from the burden-oriented models, which have prevailed so far and only assess the harmfulness of the resources used. "In order to calculate the Sustainable Value generated in the course of a year," Tobias Hahn explains, "we consider the use of economic, ecological and social resources in relation to the operating profit – at both company and industry level."

An example: The two scientists consider the input of water within a year in relation to the operating profit. Thus, in 2003 the BMW Group generated a profit of around euro 923 per cubic metre of water used. However, in order to determine whether or not this is a positive contribution to value, this figure has to be compared with the industry average. This is calculated as a balanced average from the data published by 16 automobile manufacturers: BMW Group, Daihatsu, DaimlerChrysler, Ford, Fiat Auto, General Motors, Honda, Hyundai, Isuzu, Mitsubishi, Nissan, PSA, Renault, Suzuki, Toyota and Volkswagen Group. In 2003, the industry-average operating profit per cubic metre of water used amounted to euro 96. The difference of euro 827 shows the additional value created by the input of one cubic metre of water at the BMW Group. If you multiply this additional value by the BMW Group's water input, you get the contribution to value achieved by the more efficient use of resources. These monetary comparative values are determined for all indicators and calculated for all the resources used within a year. "Sustainable Value is created", Frank Figge summarises, "when a company uses economic, ecological and social resources more efficiently than the industry average."

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**Calculation of the Sustainable Value using the example of the BMW Group's water input in 2003**

	BMW Group	Automobile industry
Profit earned per cubic meter of water used (euro/m <sup>3</sup> water)	923	96
Value spread (euro/m <sup>3</sup> water)	827	
Water input (m <sup>3</sup> )	3,633,135	
Value created (euro million)	3,006	

Sources: Annual Report BMW AG 2003 and reports of other automobile manufacturers 2003, own calculations

The Sustainable Value shows which resources in the company are used most or least effectively to create value. So far the Sustainable Value does not consider influences outside the company, such as the extent to which suppliers produce in a sustainable and efficient way, or product-related aspects. However, the range of factors for consideration could be increased if reliable data are available. The Sustainable Value does not cover social projects as the value of social commitment can be neither quantified nor expressed in monetary terms. The primary objective of the Sustainable Value approach is thus not to express a company's sustainability in a single figure. The importance and attractiveness of the approach in practice lies in the new scientific method which builds a bridge between value orientation and sustainability. The main advantage for companies is that the Sustainable Value presents sustainability success like economic success. This also helps, for example, SRI (Socially Responsible Investment) investors in their analysis. In the medium to long term, the Sustainable Value could become the basic element of a sustainability audit.

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

The following figures are used to calculate the Sustainable Value:

- emissions of carbon dioxide (CO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>) and sulphur oxides (SO<sub>x</sub>), as well as volatile organic compounds (VOC), the total volume of waste and water consumption,
- the number of accidents at work and the number of employees,
- the capital input.

These indicators are chosen because of their importance for sustainable development, and because relevant data are both quantifiable and available.

**01 -- The main building of Leeds University. This is where scientific ideas are developed for corporate practice.**  
**02 -- Historic reading room of Leeds University Library**

01



02





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## 2 Assuming product responsibility

Responsibility for mankind and environment is part of an automobile manufacturer's product responsibility. This claim applies particularly strongly to a premium manufacturer, such as the BMW Group, whose customers expect unusual performance in terms of dynamics, motoring experience, quality, safety and service, but also responsible use of resources. Furthermore, this claim must be put into practice consistently during the vehicle's entire life cycle – from design, development, production and sale to service and recycling. The findings of the life cycle assessment case studies help to assess the environmental compatibility of components and materials. In order to reduce fuel consumption and emissions, the BMW Group selectively optimises existing engine technologies, develops solutions for an automobile powered by both an internal combustion engine and an electric motor, and works on the hydrogen combustion engine as a progressive propulsion system. Another of the BMW Group's objectives is to increase road safety. With new technologies and concepts, the Company aims to enhance the safety of both vehicles and traffic overall.

## Considering environmental impacts as a whole

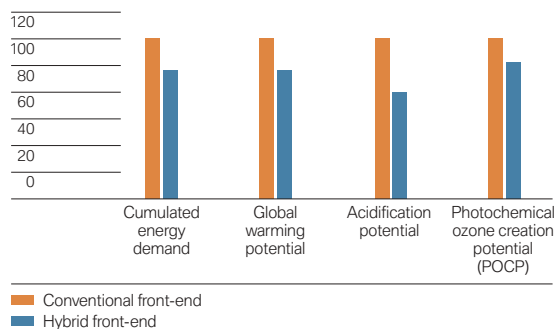
### Life cycle assessment takes account of all environmental aspects

In its environmental guidelines, the BMW Group committed itself to reducing the environmental impacts of its vehicles over their entire life cycle. Within an automobile's life cycle, vehicle use makes the greatest impact on the environment. The remaining environmental impacts are shared by production and disposal or recycling. Therefore, product development focuses, among other things, on reducing climate-relevant emissions during vehicle use. The weight of an automobile is decisive: the lighter the vehicle, the lower the fuel consumption and emissions. Nevertheless, lighter components are not necessarily more environmentally compatible. For example, they can involve additional processes during production. Product life cycle assessment (LCA) provides help in decision-making. The advantages and disadvantages of different concepts are shown and can be weighed against one another to find an optimum solution that takes account of all relevant environmental aspects. In product development, LCAs can be used to determine almost all the vehicle's relevant environmental impacts throughout its entire life cycle: from production through use and service to recycling.

A product life cycle assessment case study arranges an otherwise barely manageable quantity of data according to environmental indicators. This means the individual data are allocated to a few categories of direct relevance to the environment. This method is internationally established in standard DIN EN ISO 14040ff. The most relevant indicators for the automobile industry are:

- cumulated energy demand. This is considered the key indicator for the consumption of fossil resources;
- global warming potential. This includes all greenhouse gases, such as CO<sub>2</sub>, methane or chlorofluorocarbons;
- acidification potential. This considers air pollution, particularly by sulphur dioxide (SO<sub>2</sub>) and nitrogen oxide (NO<sub>x</sub>);

Comparison of conventional and hybrid front-end concepts in percent



- photochemical ozone creation potential (POCP). This indicator includes all emissions that can contribute to increased ozone values, particularly in urban areas.

An example from the field of lightweight engineering shows what this really means. In the BMW Group's Landshut Innovation and Technology Centre, specialists in lightweight engineering are dedicated to the development and application of new materials as well as new production processes for lightweight metal and plastics.

During the pre-development phase of the BMW 1 Series, engineers used a life cycle assessment case study to compare the usual structure of a front-end made of several aluminium and plastic components with an innovative steel/polyamide hybrid concept. The latter's impact on the environment is 16 to 40 percent lower than the conventional front-end in all categories studied. The new component concept has two major advantages: significantly lower weight and the avoidance of energy-intensive light-metal components.

### Standardised recycling as an integral part of vehicle development

According to EU legislation, only five percent of an automobile's weight may be brought to landfill from 2015. However, these quotas must be demonstrated in vehicle type testing from 2008. The engineers of the BMW Group Recycling and Dismantling Centre (RDZ) near Munich determine how vehicles have to



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above -- Recycling-optimised plastic components of the BMW 1 Series  
 below -- Fitting a luggage compartment panel made of renewable raw materials



be designed to ensure they can be recycled economically. Thus, possible disposal scenarios for the individual components are integrated into vehicle development. In addition, the recycling engineers attach importance to the choice of materials and the marking of components according to materials. Recycling experts test raw materials that have been recovered by recycling, so-called secondary raw materials, to see if they can be reused technically, environmentally and economically and thus come full circle. Design for recycling aims at developing technologies for the economically and environmentally viable recycling of materials. The BMW Group also increasingly integrates renewable raw materials, such as flax, sisal and cotton fibres into its vehicle production. Renewable raw materials demonstrate their positive properties particularly well in composites. Renewable raw materials are currently used mainly as base materials for door and side panels. Around 24 kilograms of renewable raw materials are used in each BMW 7 Series automobile. In addition to their positive properties, renewable resources have an extremely favourable CO<sub>2</sub> balance.

Recycling-optimised product design pays off later during recycling. Before dismantling, all fluids that could pollute the environment, such as oil, fuel, brake fluid and coolant, are removed from the vehicle. In all BMW Group vehicles, the components for fluids have been designed for quick and easy access and emptying with standard tools.

In addition to removing fluids, the law requires that all pyrotechnic components be neutralised before the vehicle is dismantled. Depending on the model, up to 19 pyrotechnic components in airbags, seatbelt tensioners and other systems fulfil functions that increase safety. However, the removal, collection and central disposal of pyrotechnic components involve a great deal of work. Therefore, it would be preferable to release the built-in pyrotechnic components before dismantling the vehicle and recycle them with the remaining vehicle. To this end, the BMW Group, together with all the automobile manufacturers in ACEA, the European Automobile Manufacturers Association, has developed a neutralisation tool, the Airbag Master, which can neutralise the pyrotechnic components of all manufacturers quickly and simply.



above -- Fluids such as oil and fuel have to be removed before the vehicle is recycled.  
 centre -- Pre-treatment: Releasing the pyrotechnic components with a standardised neutralisation tool  
 below -- Pyrotechnic units of the MINI after neutralisation

### Material cycles increase economic efficiency

In addition to fluid removal and the neutralisation of pyrotechnic components, it is particularly important to close material cycles. Material cycles help to conserve resources and make recycling economically viable. This applies, for example, to the recycling of precious metals such as rhodium, platinum and palladium, which are used in catalytic converters. Together with specialised recycling plants and suppliers, the BMW Group has developed a material cycle for these precious metals. Specialised plants separate the precious metals from their base material by melting them down and then supply manufacturers of catalytic converters with the precious metals they have recovered. Apart from the environmental advantages, this process also pays off for the BMW Group, for it is less dependent on price fluctuations on the precious metal markets. The long-term objective is to meet a large part of the demand for precious metals for catalytic converters with closed material cycles.

### Worldwide network for research and development

The claim to integrating sustainability in the product life cycle presents BMW Group research and development engineers with complex tasks. For in addition to developing individual technical components, they have to reconcile a variety of conflicting aims, such as high safety requirements and low fuel consumption on the one hand and dynamic performance on the other. Innovation management in the worldwide research and development network creates the right conditions – from the initial idea to its implementation. The BMW Group goes about this in three stages: in the innovation research phase, employees seek possible technical developments in other industries, then innovation control assesses market opportunities and customer benefit. The task of innovation transfer is to efficiently turn priority innovations into products which are ready for the market. In 2004, in addition to other distinctions the BMW Group received the “Best Innovator Award” for German companies for its innovation management, and in June 2005 it was named one of Europe’s five most innovative companies by the Fraunhofer Institute.

[www.bmwgroup.com/innovation](http://www.bmwgroup.com/innovation)



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The BMW Group employs more than 8,500 people in its research and development network worldwide. This network includes locations in the United States, Japan, Austria and Germany. At the largest single location, the Research and Innovation Centre (FIZ) in Munich, engineers work on technical solutions together with IT specialists, designers, scientists and suppliers. The FIZ is also closely linked with other development centres that track down new trends worldwide and adapt them for automotive application. These include the BMW Technology Office in Palo Alto, Silicon Valley, BMW Group Designworks/USA in Los Angeles, the BMW Technology Office in Tokyo as well as BMW Group Car IT and BMW Group Research and Technology in Munich. In order to bring together experts from different disciplines, the BMW Group cooperates closely with scientific partners, for example from the Fraunhofer Society or the Max Planck Society and universities worldwide. The BMW Group also selectively promotes the exchange of ideas with small and medium-sized companies. In the Virtual Innovation Agency (VIA), a website which is open to the public, system developers and suppliers as well as potential suppliers can discuss their concepts with BMW Group experts.

[www.bmwgroup.com/via](http://www.bmwgroup.com/via)

## Drive technologies to further reduce emissions

### Improving existing propulsion technology

In the short and medium term, the BMW Group will continue to reduce fleet consumption and emissions by optimising existing drive technologies. In the coming years, petrol and diesel engines will remain the most important drive technologies worldwide. The results of a study carried out in 2004 by Mercer Management Consulting indicate that in 2011 petrol engines will have a market share of more than 70 percent and diesel engines of around 23 percent. According to the Mercer study, alternative drive systems will then account for a market share of almost seven percent. In the long term, the BMW Group aims to develop the hydrogen combustion engine as a viable future drive system.

The BMW Group continues to develop existing drive technologies in order to reduce fuel consumption and emissions. For example, all new petrol engines, with the exception of the M power units, now feature fully variable VALVETRONIC valve train, which increases the efficiency of internal combustion engines. Together with variable camshaft adjustment, VALVETRONIC controls the valve opening times and timing as a function of the accelerator pedal position. Thus, the valves always work efficiently. This reduces the fuel consumption and thus the CO<sub>2</sub> emissions of petrol engines by around ten percent in the European test cycle and at the same time reduces emissions. In 2003, the BMW Group received the European Environmental Press Award in Gold for this technology.

[www.bmwgroup.com/scienceclub](http://www.bmwgroup.com/scienceclub)

The new straight-six petrol engine, introduced in 2004, combines efficient dynamics with high ecological requirements. Although it has the same displacement as its predecessor, the new engine has more than twelve percent more output. At the same time, fuel consumption has been reduced by up to ten percent. In the development phase, the new engine's life cycle assessment case study showed that the large number of innovations would help to minimise impacts on the environment not only during the engine's use phase but throughout its entire life cycle. This is partly because the power unit is ten



above -- Diesel engines with particulate filter before being fitted into the vehicles  
below -- An engine on the test stand in the Steyr plant



kilograms or seven percent lighter than its predecessor. The composite magnesium/aluminium crankcase, for example, weighs only 57 percent of a comparable grey-cast iron block and 24 percent less than an aluminium crankcase. After the composite magnesium/aluminium crankcase, the new light-weight camshafts make the most significant contribution to minimising the power unit's weight. The engine's efficiency has also been enhanced by on-demand control of some of the auxiliary equipment. This includes a variable-volume oil pump and an electric water pump. In the case of the oil pump, on-demand control reduces the mechanical power required by up to two kilowatts compared with a conventional oil pump. The electric water pump operates independently of the current engine speed and is controlled entirely by the engine's actual cooling requirement. This reduces the water pump's maximum power consumption by 90 percent to only 200 watts.

#### **Diesel engines with convincingly economical consumption**

The BMW Group constantly enhances the technology of its diesel engines. In 2004, the BMW 535d Sedan and the BMW 535d Touring were the first series-production vehicles to be fitted with straight-six diesel power units with Variable Twin Turbo technology. Although the two-stage turbo charging increases dynamics, diesel fuel consumption is economical. Two different-sized turbochargers are arranged successively in the intake air pipe and the exhaust pipe. Depending on engine speed, intake air is compressed by one of the turbochargers or by both, as required. The smaller charger develops high charging pressure at a low engine speed, while the larger one increases output at higher engine speeds. The result: The three-litre engine with Variable Twin Turbo technology has the same power potential as a four-litre V8 diesel engine. However, the three-litre engine weighs significantly less and its fuel consumption is lower. The BMW 535d Sedan\* and BMW 535d Touring\* with Variable Twin Turbo

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technology need 8.0 and 8.2 litres respectively per 100 kilometres in the EU cycle.

Various improvements, for example in drive technology, aerodynamics and lightweight automotive engineering enabled the BMW Group to significantly reduce the fuel consumption and CO<sub>2</sub> emissions of its vehicles from 1990 to 2005. In doing so, the BMW Group is fulfilling its contribution to the voluntary commitment by the Association of the German Automotive Industry (VDA) to reduce the fuel consumption of its fleet by 25 percent during this period. Both the inclusion of new models with economical fuel consumption, such as the MINI, and the increase in the share of diesel vehicles lowered the fuel consumption of the BMW Group's fleet. However, the development of the BMW 3 Series in recent years demonstrates the technical progress particularly clearly: despite a 32 percent increase in the vehicle's weight to meet safety and comfort requirements, the fuel consumption of the BMW 316i\*\* fell by 22 percent between 1983 and 2003. The limited exhaust emissions, i.e. the output of noxious substances permitted by law, were reduced by as much as 95 percent.

### Particulate filters without disadvantages for the customer

The BMW Group has already made great advances in equipping all its diesel models with particulate filters as standard as soon as possible. Since March 2004, the BMW Group has equipped the BMW 5 Series with a progressive diesel particulate filter, which requires no servicing during the car's lifetime, functions without additives, does not increase fuel consumption and does not require special engine oil qualities. Since the spring of 2005

\*Fuel consumption of the BMW 535d Sedan and Touring (automatic transmission): urban from 10.9 to 11.1 l/100 km, extra-urban from 6.3 to 6.5 l/100 km, combined from 8.0 to 8.2 l/100 km, CO<sub>2</sub> emissions from 211 to 216 g/km

\*\*Fuel consumption of the BMW 316i Sedan and Touring (manual and automatic transmission): urban from 9.9 to 10.9 l/100 km, extra-urban from 5.5 to 6.4 l/100 km, combined from 7.1 to 8.1 l/100 km, CO<sub>2</sub> emissions from 172 to 196 g/km

the diesel variants of the updated BMW 7 Series have been equipped with particulate filter as standard. Since the summer of 2005, it has also been available in the BMW 1 Series, and from the autumn of 2005 all new BMW 3 Series, X3 and X5 vehicles will be equipped with particulate filter ex works. Thus, the BMW Group is fulfilling ahead of time the pledge of the German automobile industry to equip with a particulate filter all diesel cars destined for the German market by 2008. Retrofit solutions are possible for all vehicles that meet the EU3 exhaust emission standard. According to the German Federal Environmental Agency (UBA), closed diesel particulate filter systems that are fitted ex works achieve a collection rate, namely the share of particulate emissions left in the filter, of more than 99 percent. Thus, the particulate concentration in the exhaust emission is similar to that of the ambient air. However, diesel particulate filters alone cannot solve the problem of fine particulate matter, the causes of which are largely to be found outside the transport sector.

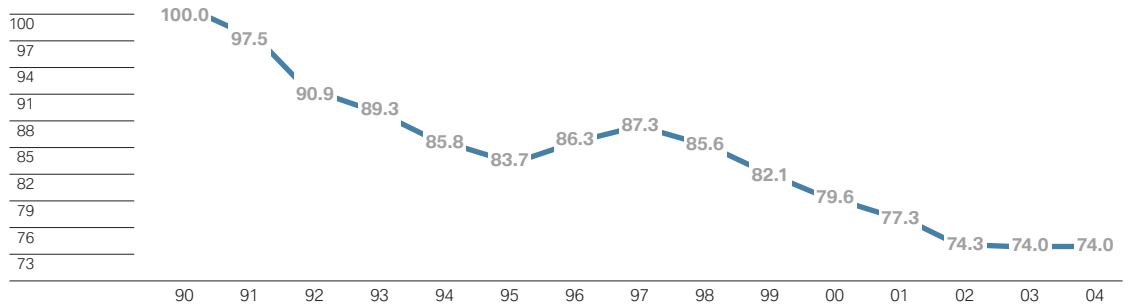
### Innovative drive technologies

The BMW Group regards the hydrogen combustion engine as the drive concept of the future. With BMW CleanEnergy, the Company is pursuing a long-term strategy of using hydrogen, produced without CO<sub>2</sub>, and of almost entirely avoiding climate-relevant emissions. However, it will take some time to develop a hydrogen infrastructure.

Against this background, the BMW Group constantly enhances the efficiency of the conventional combustion engine without reducing sporting performance or Sheer Driving Pleasure in any way. Efficient dynamics tops the list of the Development Division's specifications. The engineers of the BMW Group attach importance not only to steady gains in engine efficiency, but also increasingly to the effective management of energy flows in the vehicle. Therefore, they analyse all consumption and transmission links in the vehicle for previously unused potentials. Their development offers significant benefits for the customer – in the vehicle's daily use

### Fuel consumption of BMW Group cars

(Index: 1990 = 100; Basis: fleet consumption of newly registered cars measured on the basis of the New European Driving Cycle in accordance with the VDA commitment for passenger/estate cars\*)



\*The adoption of the uniform VDA computation method for measurement in accordance with the DIN 1/3 mix (up to 1996) and the New European Driving Cycle (from 1997 onwards) gives rise to minor variances compared to earlier BMW Group Annual Reports and Sustainable Value Reports.

and not just in the test cycle required by law. These observations resulted in a highly effective package of technology, which the BMW Group will apply successively throughout its entire model range. With this package of technology, fuel consumption in the European test cycle is again ten percent down on current BMW vehicles, which already have an extremely favourable ratio of consumption to output compared with the competition.

The first and pivotal step towards implementing this package will be next year's introduction of the BMW High Precision Injection. Then it will be possible, for the first time, to develop in a series the fuel consumption potential otherwise associated with direct injection in theory. The engine will run almost throughout its entire operating range from idling to fast driving on the motorway on a lean petrol/air mixture. The systems available on the market so far could not manage this and often did not come up to customers' expectations. The BMW Group will offer BMW High Precision Injection in addition to VALVETRONIC, which has already contributed effectively to reducing fuel consumption.

The recovery of braking energy also plays a key role. Break energy regeneration fulfils this task:

if the driver brakes or removes his foot from the accelerator, valuable energy can be fed into the battery again. So far this energy has been lost as heat energy.

A third important element is Auto-Start-Stop. The engine is switched off when the vehicle comes to a halt and started very quickly again when the journey is to be continued. This technology helps to save fuel, particularly in stop-and-go operation.

This package of technology shows how much potential is still to be found in the further development of the internal combustion engine and its auxiliary equipment.

### Electric motor combined with the combustion engine

In the medium term, the energy management of the drive train will progress beyond the measures described towards a hybrid drive. In the so-called hybrid vehicles available on the market so far, the electric batteries take up extra space and increase the vehicle's weight. Moreover, full power is not always available.

The BMW Group has presented a hybrid drive in an exemplary way in a BMW X5 experimental vehicle

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EfficientDynamics. An electric motor fitted between the internal combustion engine and the gearbox supports the conventional drive system during acceleration. The active gear integrates the power electronics in the gearbox, reducing the additional weight and construction space required compared with conventional hybrid solutions. The active gear is run on high-power capacitors, rather than on batteries. Capacitors can take up energy that is generated when braking or accelerating, and discharge it again, far more quickly than conventional batteries. Thus, capacitors achieve a significantly higher power density than conventional batteries. The electric energy is permanently available and enhances the vehicle's dynamics. Torque increases to 1,000 Nm in the lower engine speed range. The BMW X5 experimental vehicle needs up to 15 percent less fuel in the test driving cycle.

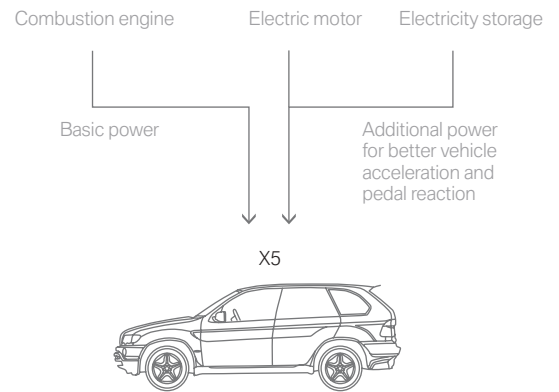
At the International Motor Show (IAA) in Frankfurt, the BMW Group's concept vehicle BMW Concept X3 EfficientDynamics showed what the future hybrid drive could be like.

[www.bmwgroup.com/energymanagement](http://www.bmwgroup.com/energymanagement)

Natural gas drive is not a long-term solution for the BMW Group. Natural gas is a fossil fuel and thus is neither infinitely available nor free of CO<sub>2</sub> emissions. Furthermore, the use of natural gas reduces CO<sub>2</sub> emissions only to a limited degree, when considering the energy needed to obtain the extra quantities, which have to be imported from Russia and Southeast Asia. Increasing mobility will offset this reduction of CO<sub>2</sub> emissions within just a few years. In addition, the increased use of natural gas would require a change in the fuel infrastructure – a step that would tie up resources for the development of the hydrogen infrastructure and thus further postpone its implementation.

Biomass is an alternative fuel to natural gas. The use of biomass reduces CO<sub>2</sub> emissions. Today, engines of the BMW Group can already run on these synthetic fuels or on mixtures of synthetic and con-

**BMW X5 experimental vehicle EfficientDynamics**



ventional fuels. There is no need to develop a separate infrastructure for these fuels. However, synthetic fuels made from biomass can satisfy no more than ten to 20 percent of the energy demand for future mobility because of the limited area available for producing this biomass and because of competition with other users, such as private households or power plants.

## Hydrogen – fuel of the future

### The process of developing hydrogen vehicles for series production

When developing hydrogen drive, there are basically two ways to use the energy stored in the hydrogen for automobiles: either with a combustion engine or a fuel cell which generates electric power from hydrogen. The BMW Group uses the technology with the most advantages for the respective purpose. The combustion engine is its first choice for vehicle propulsion. The BMW Group's research engineers are examining the use of fuel cells to supply its on-board systems with electricity.

In 2004, the hydrogen-powered BMW H<sub>2</sub>R Record Car demonstrated the power and efficiency of the hydrogen combustion engine. At Miramas in France, it set nine international records, which are recognised by the FIA (Fédération Internationale de l'Automobile) for hydrogen-powered vehicles with combustion engine. In doing so, the BMW H<sub>2</sub>R with its twelve-cylinder power unit developing output of more than 285 bhp achieved a top speed of more than 300 km/h. The BMW Group continues to develop the hydrogen combustion engine. It is studying cryogenic mixture formation and high-pressure direct injection.

The process of series development of the BMW Group's hydrogen-powered vehicle with combustion engine is based on the BMW 7 Series. The current sixth generation of hydrogen-powered vehicles has both a hydrogen and a petrol tank. With this dual mode combustion engine, the vehicle can be used in the development phase of the hydrogen infrastructure when filling stations are few and far between. Thus, drivers will maintain their freedom of movement while the hydrogen infrastructure is still being established. Within the next three years vehicles will be handed over to customers in order to test and optimise the concept in daily use. In the following generation, the automobile's customer-friendliness will be optimised and its costs reduced in order to prepare the hydrogen vehicle for widespread use.

### The fuel cell in research

The BMW Group engages in research on the so-called "cold" combustion of hydrogen in a fuel cell for supplying a car's on-board networks with energy. While conventional batteries are charged by generators and thus take power from the engine, the fuel cells can be fed directly from the hydrogen tank. Thus, they work independently of the engine as Auxiliary Power Unit (APU). The use of a fuel cell to supply the on-board system with power has advantages over previous solutions. A fuel cell supplies more power than a generator driven by the engine, works only when the user needs electric power and thus reduces fuel consumption. It also relieves the engine by more than ten kilowatts and thus increases its power. If the fuel cell also supplies power to water and oil pumps, brake boosters and by-wire applications, i. e. electrically powered auxiliary equipment that is independent of the engine, fuel consumption is reduced even more.

### Partnerships for hydrogen

The BMW Group cooperates with a network of industrial partners on the series development of the BMW 7 Series hydrogen automobile. For example, Magna Steyr is developing and supplying the tank for the hydrogen. This cryo-tank holds 140 litres of cryogenic, liquid hydrogen and permits a range of between 200 and 300 kilometres in addition to the petrol tank, which continues to be fitted. Apart from drive technology, a fully functional infrastructure is essential in order to be able to use hydrogen-powered vehicles. Infrastructure issues include, for example, a "uniform" tank-filling system for liquid hydrogen. Infrastructure measures also include the establishment of a standard tanking system that is just as easy to use as existing ones. The BMW Group is developing such a tank-filling system in cooperation with General Motors and Honda.

[www.bmw.com/cleanenergy](http://www.bmw.com/cleanenergy)

The BMW Group promotes the advantages of hydrogen as fuel not only by developing technical solutions, but also by exchanging ideas with political decision-makers, the energy industry and the gen-



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above -- Establishing an infrastructure for hydrogen: the first public hydrogen filling station in Munich  
 below -- The team of the BMW CleanEnergy H<sub>2</sub>R vehicle after the record-breaking trials



eral public. For several years, the BMW Group has worked with other automobile manufacturers, energy and oil companies together with the German Federal Ministry of Transport, Building and Housing on the Transport Energy Strategy (TES). In 2001, TES stated, in its interim report, that hydrogen is the most advantageous alternative fuel in the long term. At the same time, it initiated the Clean Energy Partnership (CEP) in order to advance practical hydrogen technology in Germany. The project, with a budget of euro 33 million and supported by the German Federal Government, is scheduled to run until 2007. In order to produce hydrogen, CEP suggests using, as far as possible, energy whose generation does not cause CO<sub>2</sub> emissions. This includes hydrogen generated by solar, water and wind power or the gasification of biomass. The BMW Group provides CEP with hydrogen vehicles. In addition, CEP tests the daily operation of a hydrogen filling station that opened in Berlin in the autumn of 2004. Apart from petrol and diesel fuel, customers can fill their tank here with gaseous hydrogen and liquid hydrogen. Since 1999, the BMW Group and project partners have successfully run a hydrogen filling station at Munich Airport. Basically, hydrogen can be stored and transported in both liquid and gaseous form, although the high storage densities of petrol and diesel fuel have not been achieved yet. However, in a liquid aggregate state, hydrogen has a higher energy density, resulting in a greater range with the same tank volume. Liquid hydrogen is stored at a low pressure of below five to six bar, while gaseous hydrogen is stored at a pressure of currently 350 bar, and in future of up to 700 bar. Since the energy density of gaseous hydrogen with 700 bar is still significantly lower than that of liquid hydrogen, the BMW Group advocates the use of liquid rather than gaseous hydrogen. During the course of comprehensive tests on liquid hydrogen tanks, TÜV Süddeutschland (an independent technical inspection company in southern Germany) concluded that hydrogen vehicles can be used just as safely as petrol-driven vehicles.

[www.bmw.de](http://www.bmw.de)  
[www.cep-berlin.de](http://www.cep-berlin.de)



above -- BMW CleanEnergy vehicle in China  
 below -- Visitors to the CleanEnergy Exhibition in the Chinese Science & Technology Museum, Beijing



The BMW Group supports the worldwide introduction of hydrogen as fuel in international partnerships, projects and initiatives. Specialists of the BMW Group have been appointed to numerous international advisory bodies. These include the California Hydrogen Highway Implementation Advisory Panel and the European Hydrogen and Fuel Cell Technology Platform (EHP) as well as the Deployment Strategy Panel. The EHP held its first general assembly in Brussels at the beginning of 2004. The forum focuses on the development and use of economical, competitive European energy systems based on hydrogen and fuel cell technologies for mobile and stationary applications. In the coming ten years, the European Union will provide up to euro 2.8 billion to promote a hydrogen economy which is compatible with the environment.

[www.hydrogenhighway.ca.gov](http://www.hydrogenhighway.ca.gov)

[www.europa.eu.int/comm/research/energy](http://www.europa.eu.int/comm/research/energy)

### Research on hydrogen technology in China

The debate about the opportunities and risks of hydrogen technology plays a special role in China. Although motorisation is only just beginning, air pollution is already extremely high in China's urban areas. In addition, worldwide oil reserves are limited. Hydrogen-powered automobiles are a viable alternative for the future from both ecological and economic viewpoints. Therefore, the BMW Group supports research on hydrogen technology in China with numerous projects.

Specialists from the BMW Group are taking part in a study on the "Feasibility of a hydrogen-based road traffic system in China". The Company also works with German and Chinese experts from politics, industry and science on a project entitled "Alternative fuels for China". This project focuses on the following questions:

- What energy potentials are available in the People's Republic of China and what priorities does the national energy policy set?
- How can China develop an infrastructure for hydrogen?

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- How will demand for energy develop in China in the short and long term, and how will this impact on the environment?

As part of the project, the BMW Group aims to deepen its contacts with Chinese universities. Together with Chinese authorities and institutions involved in research and development, the BMW Group is considering further partnerships for cooperation in the further development of hydrogen technology for automobiles in China.

In Beijing, the BMW Group has presented hydrogen technology to the Chinese public in the Chinese Science & Technology Museum since May 2004. The BMW CleanEnergy Exhibition informs visitors interactively about the production, distribution and use of hydrogen. The Chinese Science & Technology Museum attracts 1.8 million visitors a year.

## Efficient traffic systems for environment and safety

### Assistance systems promote the flow of traffic and prevent accidents

Advances in vehicle technology reduce fuel consumption and emissions and increase the safety of the individual automobiles. Holistic solutions for vehicles and traffic can also reduce impacts on the environment and increase safety for people. A more efficiently organised traffic system serves both environmental and safety aspects, as safety and traffic management systems are increasingly linked.

Together with 26 partners, the BMW Group introduced comprehensive traffic management in the Munich urban area with the Mobinet project. This includes, for example, a mobile service to find a parking place or an individual arrivals service, which helps visitors to events to find their way around the city. The Netinfo traffic guidance system and the sector control, developed as part of Mobinet, are unique. Every minute, with the help of several

thousand detectors, an image of the traffic situation is calculated and transmitted to more than 50-square-metre large indicator boards over Germany's A8, A9 and A96 motorways. Red sections or indications on the boards tell drivers which stretches of road are congested. The demonstrable effects: the traffic is more evenly distributed, the amount of time spent in traffic jams is reduced.

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

For four years until the spring of 2005, the research project INVENT (in German short for “intelligent traffic and user-friendly technology”) focused on technologies that make traffic safer and more efficient, avoid accidents and prevent traffic congestion. Modern sensors, traffic, information and communications technologies are fused to create assistance systems which provide vehicle guidance support for drivers, warn drivers of dangers and always indicate the fastest route. Twenty-four companies from different industries cooperated in the project in order to link different technologies. The project is supported by the German Federal Ministry of Education and Research which will also promote INVENT’s successor projects.

The BMW Group developed two trial systems for the INVENT component project “Anticipatory Active Safety”: the lane-change and the intersection assistant. The lane-change assistant supports drivers when they change lane or want to keep in lane and thus increases road safety. Around 20 percent of accidents with injuries occur as a result of lane changes or a lack of lane-keeping control. For example, in lane-change manoeuvres, the system warns the driver of vehicles approaching in the blind spot. With intersections accounting for 52 percent of accidents with injuries, they also involve a high accident risk. In a first version, the intersection assistant warns drivers against running a stop sign. In future, the system will automatically recognise traffic with right of way crossing at intersections, oncoming traffic when turning off or red lights and, if necessary, warn the driver in time.



above -- The lane-change assistant supports the driver's lane-change manoeuvres.

below -- On the screen, the driver recognises road congestion and dangers – transmitted by vehicle-vehicle-communications.



In the INVENT project “Traffic Management 2010”, the research partners study ways of preventing traffic jams and making traffic in urban areas flow more smoothly. The BMW Group supported the “Vehicle-Vehicle-Communications” project in the “Traffic Performance Assistance” component project. With linked vehicles the system informs the driver of the current traffic state on the road ahead. Thus, the driver can avoid congested roads in good time. In future, third-generation dynamic navigation systems are to process information on traffic jams directly and propose alternative routes. In traffic congestion, these systems have been shown to shorten travelling time by around ten percent. Flowing traffic reduces the vehicles’ impact on the environment and improves the capacity utilisation of the existing infrastructure.

[www.invent-online.de](http://www.invent-online.de)

In future, Extended Floating Car Data (XFCD) could provide a technological basis for modern traffic systems, such as are researched by INVENT. The system developed by the BMW Group collects and processes traffic data. The vehicles, acting as mobile sensors in the traffic, form spontaneous networks for transmitting data. While in flowing traffic, the sensors collect information on the beginning and end of traffic jams, accidents, ice, oil on the road or hydroplaning and send it by GPRS (General Packet Radio Service) to traffic guidance centres or by WLAN (Wireless Local Area Network) to vehicles in the direct vicinity to warn them. If only ten percent of all vehicles were equipped with Extended Floating Car Data this type of intelligent traffic guidance would be generally effective.

### **BMW ConnectedDrive: Network for greater safety and comfort**

BMW ConnectedDrive links driver, vehicle and environment to make driving safer, as well as more pleasant and efficient. The concept includes online services, assistance systems and telematics. The active safety systems prevent accidents by recognising dangerous situations in advance and thus

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enabling the driver to react in time. Active Cruise Control (ACC), for example, which is part of BMW ConnectedDrive, measures the distance to the vehicle in front by radar and automatically maintains a safe distance. Dynamic Brake Control (DBC) also increases safety. When the brake pedal is applied suddenly, DBC increases braking power regardless of how hard the pedal is pressed, until the maximum degree of deceleration is reached. The braking distance is shortened.

[www.bmwgroup.com/connecteddrive](http://www.bmwgroup.com/connecteddrive)

[www.bmw.com/technologyguide](http://www.bmw.com/technologyguide)

### Innovations for more safety

The interaction of systems that help to avoid accidents or reduce their consequences increases the safety of the BMW Group's vehicles. The BMW Group is increasing safety and comfort when motoring at night with two new driver assist systems, which will be available as special equipment for various BMW model series in future.

Driving in the dark is one of the most strenuous driving situations and tends to involve the most risks. This is where BMW Night Vision and High-Beam Assist come in. With BMW Night Vision, critical situations in the half-light and at night can be identified earlier than was previously possible. This is achieved by a thermal imaging camera which covers an area of 300 metres in front of the vehicle. The image thus created on the central monitor displays objects more brilliantly, the greater the warmth registered by the camera. People (pedestrians on the edge of the road) and animals (wild animals crossing the road) are the brightest areas of the image – and, at the same time, these are particularly important points to concentrate on while driving.

With High-Beam Assist, a camera sensor integrated into the rear mirror casing registers road traffic and automatically switches the high beam on or off, depending on traffic and light conditions. High-Beam Assist makes a significant contribution to ensuring that the high beam is used more frequently. It also prevents other road users from being dazzled if the driver switches to low beam too late or not at all. All

in all, High-Beam Assist increases safety for all road users.

Passive safety is promoted, for example, by an airbag that protects the head in lateral collisions (Inflatable Tubular Structure, ITS). A Smart Airbag controls the optimum deployment of the airbags. The airbag's sensor system recognises whether the vehicle is involved in a minor or serious accident. The airbag inflates to different levels depending on the severity of impact and thus reduces the consequences of the accident for the occupants.

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

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

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

[www.rolls-roycemotorcars.com](http://www.rolls-roycemotorcars.com)

**Concrete example --**

## From the drawing board to the road.

Sustainability begins long before series production.

The fifth generation of BMW 3 Series automobiles, launched in the spring of 2005, continues the tradition of the BMW Group's most successful model series over the last three decades. During the five-year development process involving countless individual decisions, a vehicle was created that not only arouses the enthusiasm of drivers and is economically successful, but also takes account of environmental aspects and ensures a high level of motoring safety.

**Five years before the beginning of series production.**

The first design sketches of the new BMW 3 Series are ready. The engineers use these to make a first shell, which gives a rough idea of the new vehicle. Vehicle specifications, such as dimensions and performance, are determined – and so decisions are also made in respect of sustainability. Fuel consumption, emissions and recycling properties are all firmly anchored in the specifications for the new BMW 3 Series.

**Six months later.** The finished characteristic profile of the BMW 3 Series is passed on to the concept development team. In the next twelve to 18 months, the vehicle takes concrete shape. At this early stage, the design engineers already pay attention to such requirements as environmentally compatible product design. Thus, they lay the foundations for the increasing use of recyclates (raw materials recovered by recycling). In the new BMW 3 Series, the proportion of plastic parts made from recyclates increased to more than 15 percent.

For the first time, engineers constantly use a central, virtual working platform to develop the new BMW 3 Series. This virtual vehicle consists of com-

ponents constructed on the computer. Since all project members have access to the current state of development at all times, components can be developed simultaneously. This saves valuable development time. It also conserves resources as far fewer test parts and vehicles are needed up to the time the car is ready for series production.

Environmentally compatible product design also includes a suitable lightweight engineering concept. Should the body be made of aluminium, a composite aluminium/steel structure or sheet steel? Life cycle assessment case studies compiled for other vehicle projects showed the weight advantage of an aluminium body, but extra work is involved in aluminium extraction and processing. This finding supported the decision in favour of a body made of strong and extra-strong steels.

This not only reduces weight significantly. The strong and extra-strong steels, as well as strut structures as reinforcements also ensure optimum body rigidity and thus greater safety. "Despite larger dimensions and greater crash safety, we have achieved 25 percent more body rigidity without extra weight. In fact, after deducting the weight of equipment, we have reduced the weight of the body by almost 30 kilograms," says Dr. Wolfgang Epple, Project Director responsible for the new BMW 3 Series. Increased body rigidity helps the new BMW 3 Series to pass the hardest crash tests worldwide and offers occupants an outstanding level of safety.

In addition to analysing alternative materials, the engineers of the BMW Group are inspired by nature in the field of lightweight automotive engineering. So-called bionics show research engineers new approaches to solutions that enhance the fuel con-

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01 -- Designer Joji Nagashima works on the design of the new BMW 3 Series.

02 -- The clay model is prepared.

03 -- The future vehicle takes shape.

03



sumption, safety and dynamics of new vehicles. A vivid example of this is the production technology used for the lightweight structure of the instrument panel of the BMW 3 Series: the engineers were guided by the bone structure of mammals to develop the process technology required. In the case of moulded integral foams, solid material is used only in areas under great strain, in other parts the structure is full of tiny air pockets like a foam. The result: a component that is 20 percent lighter in weight.

**50 months before series production begins.** At the same time as developing the new BMW 3 Series, the engineers work in top gear on the development of a new six-cylinder engine concept and on the enhancement of the four-cylinder engines. Long before the first power unit goes into operation, the combustion processes in the engine are simulated in complex models in order to fully exhaust potentials for improvement in fuel consumption and emissions. For within the entire life cycle, vehicle use has the strongest impact on the environment. Despite a significant increase in output, the BMW Group manages to noticeably reduce fuel consumption with a new concept for the six-cylinder petrol engines. A whole bundle of measures makes this possible. They range from innovative components such as the composite magnesium/aluminium crankcase, through an electric water pump to newly optimised VALVETRONIC technology.

**December 2004.** Production of the new BMW 3 Series begins in the Munich plant. The BMW plants in Regensburg, Leipzig and Rosslyn, South Africa, follow at the beginning of 2005. In vehicle production, the BMW Group sets great store by energy-optimised production and heat recovery systems as well as the use of waste heat. As a result, energy consumption per unit produced fell by 21.8 percent in the last eight years. CO<sub>2</sub> emissions from production sank by almost 20 percent in the same period.

Water is used carefully in production. Closed cooling cycles have long been common practice in production processes. These systems are extremely

efficient. For example, the volume of wastewater per vehicle has decreased by almost 35 percent since 1997. In the last four years alone, water consumption in the production process has fallen by almost 22 percent. Innovative technologies in the paint shops reduce not only water consumption, but also emissions of volatile organic compounds (VOC). These have been significantly reduced due to the application of water-based and powder-based painting technology. In the BMW plant in Regensburg alone, the use of powder-based painting technology saves more than 140 tons of VOC a year.

**Spring 2005.** The first customers take delivery of their new BMW 3 Series automobiles. Dynamics and sustainability have been coordinated convincingly. Although new models of the BMW Group are increasingly safe, comfortable, spacious and powerful, fuel consumption and emissions of noxious substances continue to decrease significantly. For example, the BMW 3 Series: despite increased output of 20 kW, at 8.7 litres a BMW 330i\* needs 0.4 litres less petrol than the previous model. A further indication of efficient dynamics is that the BMW 320d\*\* has 10 kW more output (120 kW/163 bhp) but emits only 153 grams of CO<sub>2</sub> per kilometre with fuel consumption of 5.7 litres.

A comparison between the first BMW 320 (1975) and the current BMW 320i\*\*\* shows how much progress has been made in the last three decades. Despite an increase in output of 30 kW/41 bhp and far more dynamics, comfort and safety, the new model's fuel consumption has been

\*Fuel consumption of the BMW 330i Sedan and Touring (manual and automatic transmission): urban from 12.7 to 13.3 l/100 km, extra-urban from 6.4 to 7.0 l/100 km, combined from 8.7 to 9.3 l/100 km, CO<sub>2</sub> emissions from 210 to 224 g/km

\*\*Fuel consumption of the BMW 320d Sedan and Touring (manual and automatic transmission): urban from 7.8 to 9.4 l/100 km, extra-urban from 4.5 to 5.5 l/100 km, combined from 5.7 to 6.9 l/100 km, CO<sub>2</sub> emissions from 153 to 184 g/km

\*\*\*Fuel consumption of the BMW 320i Sedan und Touring (manual and automatic transmission): urban from 10.7 to 11.3 l/100 km, extra-urban from 5.6 to 6.3 l/100 km, combined from 7.4 to 8.1 l/100 km, CO<sub>2</sub> emissions from 178 to 196 g/km



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01 -- Employees on the body assembly line  
 02 -- Cathodic dip painting in the BMW plant in Leipzig  
 03 -- Exhaust assembly: example of an ergonomic working environment

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reduced by around 26 percent to 7.4 litres. As a result of this progress and other features, all BMW 3 Series models comply with the EU4 emission standard, which requires that emissions be reduced by half compared with the EU3 standard applicable until the end of 2004.

**First service.** Fuel consumption and emissions are not the only environmental impacts of vehicle use. That is why the engineers designing the new BMW 3 Series also paid special attention to minimising maintenance and maximising the life of wearing parts. In the new BMW 3 Series, for example, oils in the transmission and rear axle as well the ribbed V belts for the engine's auxiliary equipment no longer have to be changed. Nor is it necessary to change spark plugs, air filters or diesel fuel filters in the first 100,000 kilometres or so. With the service and maintenance concept known as Condition Based Service (CBS), wearing parts are no longer replaced at rigid intervals, but only when they really need renewing. This saves resources and reduces environmental impacts significantly.

**At the end of the life cycle.** Coming full circle, solutions for the environmentally equitable recycling of end-of-life vehicles, which were already considered in the development phase, now come into play. Fluid-carrying components that have to be emptied are quick and easy to access and pyrotechnic components, such as airbags, can be neutralised safely and simply. Thus, the vehicles can be recycled in an environmentally equitable and economically efficient way.

With the new BMW 3 Series, the BMW Group has created a vehicle that meets the standards of sustainability in many respects. This is confirmed, for example, by the Öko-Trend Auto-Umwelt Ranking 2005. Each year the environmental institute Öko-Trend assesses all the automobiles on the German market according to criteria such as fuel consumption and emissions of noxious substances, as well as conservation of resources, environmental management and recycling. In addition to a first in its category for the BMW 320d and outstanding ratings for other vehicles of the BMW Group, the Company takes first place in the manufacturer's ranking.

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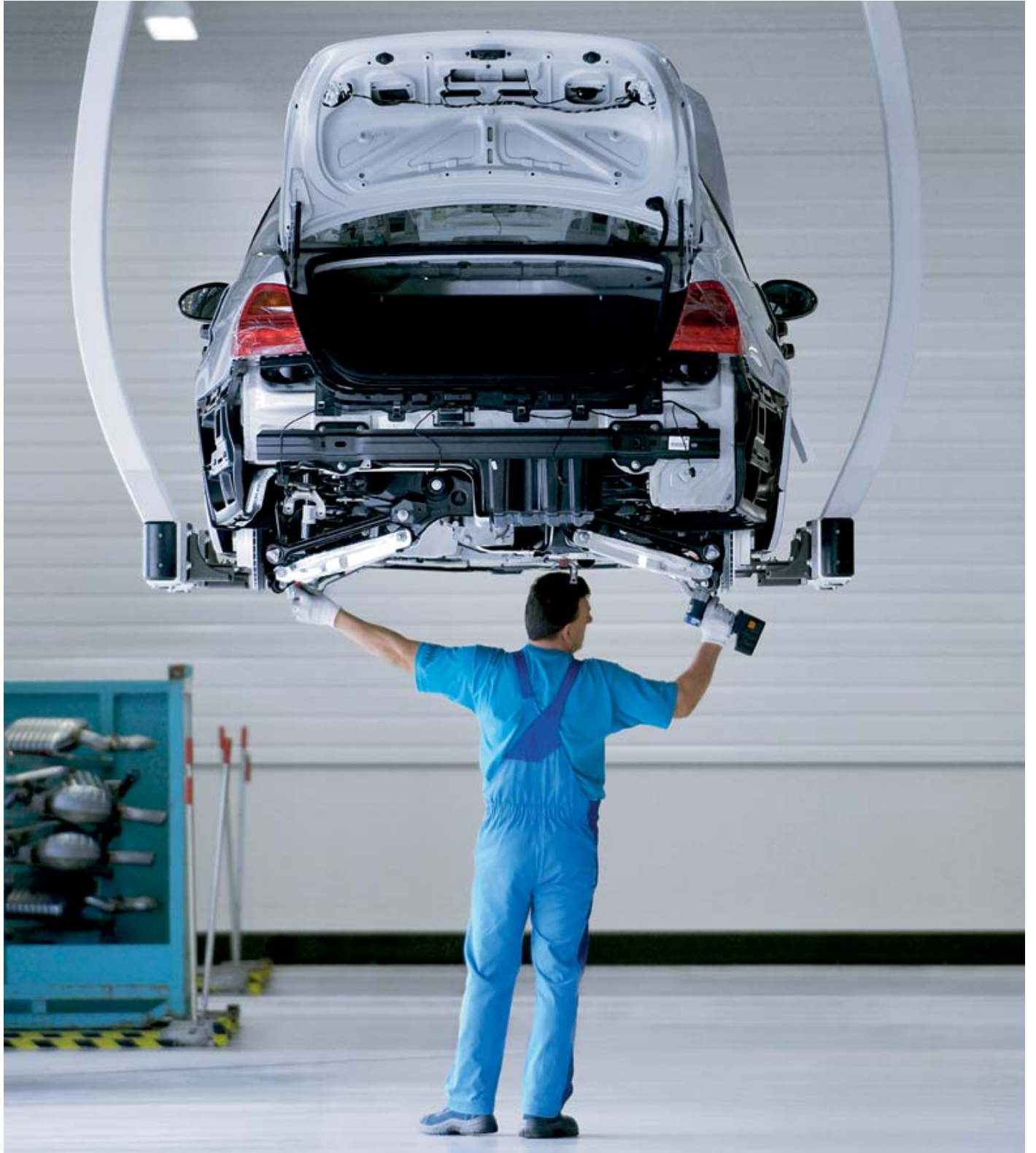


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- 01 -- Testing gap dimensions is part of quality management.
- 02 -- The fuel-tank filling robot operates without emissions.
- 03 -- Dynamic performance and sustainability are compatible with one another.

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### 3 Uniform standards in the production network

Customers all over the world expect their automobiles to have uniform quality standards. In the BMW Group, the associated claim applies to far more than the characteristics of the vehicle: regardless of production location, resources are used efficiently and negative impacts on man and environment are reduced. To achieve this, the BMW Group is committed to uniformly high standards of quality, health and safety and environmental protection in the entire production process – from suppliers through production to logistics.

## Flexibility in production and sales

### Expansion of the production network

The BMW Group has further expanded its worldwide production network with the new plant in Leipzig and the joint venture in Shenyang, China. When including contract production of the BMW X3 in Graz, Austria, the BMW Group is represented by 22 production plants in twelve countries on four continents. In 2004, capital expenditure focused on the construction of the new plant in Leipzig. A total of euro 1.3 billion has been invested in this plant. The principles of the Global Compact of the United Nations, which is supported by the BMW Group, also apply at the new production plants.

[www.bmw-werk-leipzig.de](http://www.bmw-werk-leipzig.de)

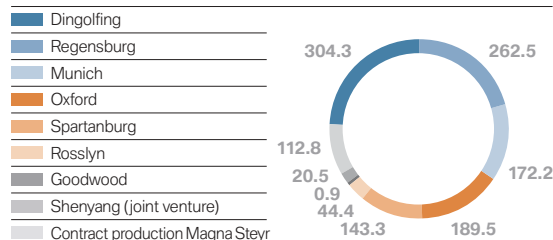
### Breathing structures in production

When expanding its production network, the BMW Group follows the requirements of the market. With "breathing structures", the production network can react quickly and flexibly to changes in demand and individual customer wishes. As a result of innovative work time models, operating times and individual work time are no longer linked. In the new BMW plant in Leipzig, for example, plant operating time can vary between 60 and 140 hours a week. Work time accounts keep a record of working time: depending on production requirements, employees either build up or use time credits on their work time accounts. With these measures, the production of the BMW Group can breathe, so to speak, and thus react quickly to market fluctuations, whenever necessary. Variable production lines ensure this flexibility on the technical side. Various model series or several versions of a model can be produced in almost all the BMW Group's plants. With the scope offered by these systems, production capacities can be adapted flexibly to the respective market situation.

### Closely linked production and sales

The high level of flexibility in production is essential for the BMW Group's customer-oriented sales and production process. This optimises the entire process chain from the order to the delivery of automobiles and motorcycles. The customer-oriented sales and production process takes account of the

Automobile production of the BMW Group by plant in 2004  
in 1,000 units



customers' individual wishes. Thus, the BMW Group can accommodate customer changes to their ordered vehicle up to six days before production begins. At the same time, the customer-oriented sales and production process shortens the time between scheduling a vehicle for production and handing it over to a dealer in the same country from 28 to ten days. Online ordering enables the dealer to show the customer the desired automobile on the computer screen and confirm that the vehicle can be completed as required and delivered on the agreed date. The BMW Group deals with up to 140,000 subsequent customer changes a month. Moreover, it benefits from extra "change flexibility" as many customers then select more high grade equipment for their vehicles.

## High standards of health and safety and environmental protection

### Management systems ensure continuous improvement

Technologies and organisational structures are interlinked throughout the production network. Components, parts and materials can be used the same way at all plants. Uniform standards and related management systems, together with appropriate production principles and technologies, are decisive for they ensure the same high-quality workmanship of the vehicles worldwide. This claim extends beyond the quality of the vehicle to include environmental protection and health and safety. Management

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above -- Manufacture for Rolls-Royce Motor Cars in Goodwood, United Kingdom  
 centre -- Final inspection of the paintwork at MINI in the Oxford plant, United Kingdom  
 below -- Chassis assembly in the BMW plant Dingolfing



systems for quality, environmental protection and safety help to show the production network's strengths and weaknesses so that appropriate measures can be introduced. This promotes the continuous improvement process.

**Responsibility for health and safety**

The BMW Group constantly increases the safety of machinery and equipment and promotes the ergonomic design of processes and work sequences. Accident prevention measures are standard for all work processes in the BMW Group. Thus, the number of reportable industrial accidents at the German plants has been reduced by 60 percent within ten years. Uniform health and safety standards and management systems, some of which are also certified by an independent body to external standards, such as the international Occupational Health and Safety Assessment Series (OHSAS), guarantee high standards of health and safety at the production plants. With the help of management systems, the BMW Group integrates labour protection into operating structures and processes and protects the health of its employees.

In 2004, the German trade supervisory authorities certified the plants in Munich, Dingolfing, Regensburg and Landshut in accordance with OHRIS (Occupational Health and Risk Management System). The contents of OHRIS are almost identical with the international OHSAS management system. In 2005, the BMW retail outlet in Munich was the first automobile business in Germany to receive the certificate of DEKRA Intertek Certification GmbH for an integrated management system for health and safety and environmental protection. In 2004, the retail outlet, which has had a certified environmental management system since 2000, combined health, safety and environmental protection in an integrated management system. This increases work safety, reduces environmental impacts and conserves resources. The amount of administrative work also decreases. The joint venture in Shenyang, China, is the most recent example of ISO certification of production plants in emerging markets; it has had the ISO certificate 9000 since it officially opened in May 2004. The aim is now to introduce an environmental management system in accordance with DIN EN ISO 14001.

### **From the environmental manager to environmental management**

The BMW Group has engaged actively in environmental protection for decades. A unit devoted to environmental protection within the Group was created more than 30 years ago. Today, around 70 full-time employees work in the BMW Group's environmental protection organisation worldwide. They are responsible for, and monitor, company environmental protection and work on its continuous improvement. In 2004, the Company invested around euro 34.2 million in production-related environmental protection in Germany alone.

Environmental management systems guarantee company environmental protection at all locations. This includes putting into practice the standards of the International Declaration on Cleaner Production of the United Nations Environment Programme. This declaration, signed by the BMW Group, contains commitments to reducing the consumption of resources and avoiding negative impacts on the environment in the production process from the very start, rather than using end-of-pipe solutions. Environmental management systems are introduced in several stages. First, the status quo is analysed in detail at the location concerned. The local environmental managers collect data on the environment-related aspects of various activities at the plant, such as energy and water consumption or emissions of noxious substances. In doing so, the environmental manager works closely with the employees at the respective location in order to include in the analysis their observations and experience of the impacts of individual work processes on man and environment. The environment-related aspects are also weighted. After examining the local statutory requirements, those responsible develop practical solutions for improvements. Only when all aspects of environmental protection have been solved, can certification take place.

[www.uneptie.org/pc/cp/declaration](http://www.uneptie.org/pc/cp/declaration)

Certification by an independent technical inspection body, such as TÜV CERT, proves that such a management system has been introduced successfully. It is followed by annual assessments by BMW Group internal audits as well as by external audits every three years. These constantly reveal weak-

nesses in the environmental management system and targets that have not yet been achieved, and thus trigger improvements. The group-wide exchange between environmental managers and plant directors makes this knowledge available at all locations. Moreover, continuous dialogue between the various locations promotes the improvement of the environmental management systems throughout the Company.

These processes and measures ensure that the same standards of quality, health and safety and environmental protection are applied everywhere. The production plants of the BMW Group have been certified to DIN EN ISO 14001 for environmental management systems since 1999. Some of the plants also meet the standards of the European Eco Management and Audit Scheme (EMAS II). In 2004, the BMW Group had an independent audit carried out group-wide to ISO 14001. The environmental management systems of the local CKD (completely knocked down) assembly plants and the joint venture in Shenyang, China, are also scheduled to be externally certified by 2006.

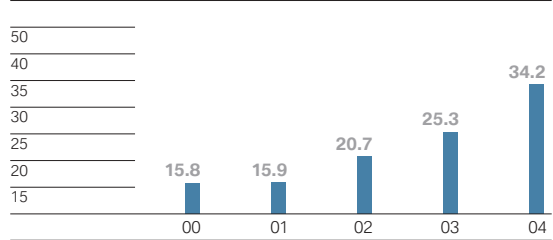
### **Environmental performance figure: Measuring progress in environmental protection**

The BMW Group is the first automobile manufacturer to measure the performance of its environmental protection in production with environmental performance figures and thus create a reliable database for the further development of production-related environmental protection. Performance figures are an indicator for continuous improvements in company environmental protection: each month the plants determine their water and energy consumption as well as the volume of wastewater and waste generated per unit produced. The comparison with the previous year is made in two stages. First, the individual monthly values for waste, wastewater, energy and water consumption in the course of the year are added up and compared with the previous year's average. This enables the BMW Group to see whether the environmental impacts of production have changed in the four individual categories. For an overall view, an average value is calculated from the four individual values and compared with the previous year's value. A number less than one indicates an improvement in environmental performance.



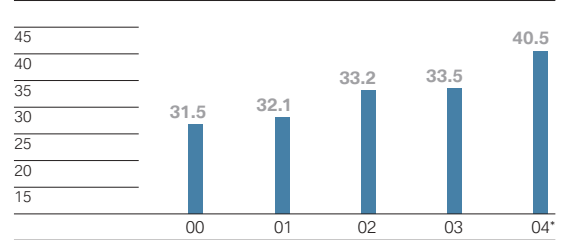
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**Investment in environmental protection**  
in euro million



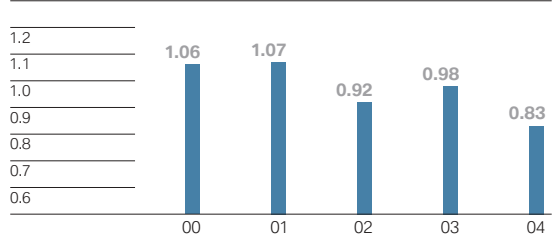
Data excluding large-scale investment only for BMW Group production locations in Germany

**Ongoing expenditure on environmental protection**  
in euro million

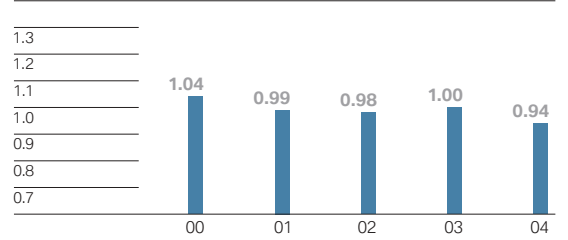


\*including Leipzig plant from 2004

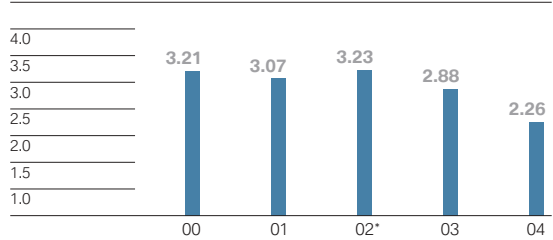
**Process wastewater for production per unit produced**  
in m<sup>3</sup>



**CO<sub>2</sub> emissions per unit produced**  
in t

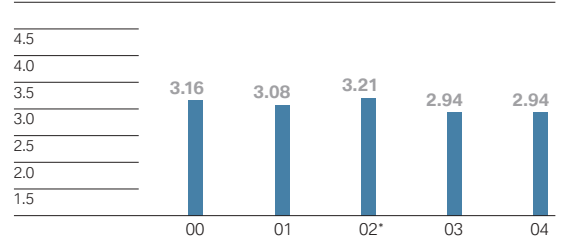


**Volatile organic compounds (VOC) per unit produced**  
in kg



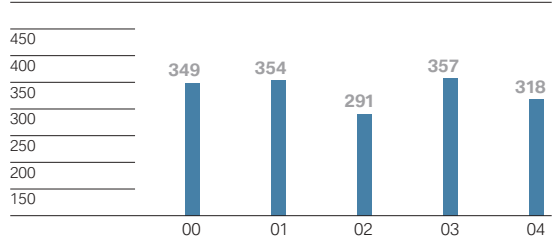
\*increase in 2002 due to new method of calculation in accordance with the VOC Regulation (31st Regulation on the Implementation of the Federal Immission Control Act)

**Energy consumed per unit produced**  
in MWh



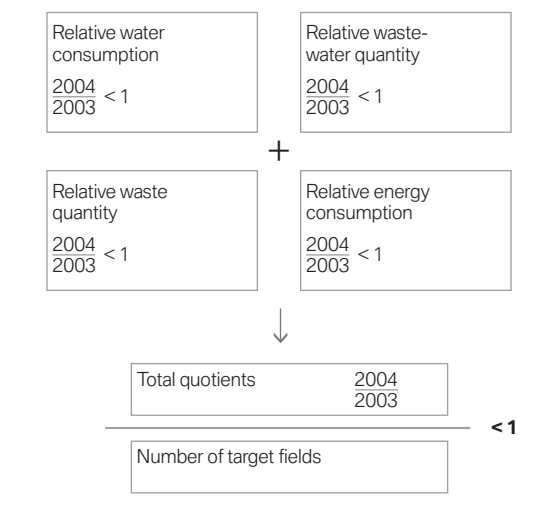
\*higher energy intensity through continuing conversion to environmentally friendly water-based and powder-based painting technology.

**Waste per unit produced**  
in kg



For an overview of the BMW Group's key figures and progress in the field of environmental progress, see pages 86 and 87.

### Environmental performance figure



The BMW Group collects performance figures in the entire production network. All in all, the environmental performance figure serves as an instrument for managing continuous improvement of environmental performance.

## Concepts for innovative environmental protection on site

### Supporting the Kyoto Protocol

CO<sub>2</sub> emissions are an important indicator for environmental impacts in production. At the UN Climate Conference in Kyoto, Japan, in 1997 the industrial nations committed themselves to reducing emissions of six greenhouse gases by six to eight percent from 1990 levels by 2012. The Kyoto Protocol entered into force on 16 February 2005. As regulatory system, the European Union introduced an emissions trading system. Each member state sets itself a national limit for CO<sub>2</sub> emissions and allocates in-

dustry an emission allowance for each plant. Companies whose greenhouse gas emissions exceed their allowance have to modernise their plants or buy "free" emission certificates. This market-based instrument ensures that emissions are reduced cost-effectively, while taking account of the burdens on the individual companies. The Federal Government has set a binding target for Germany: between 2008 and 2012, emissions of greenhouse gases are to be reduced by 21 percent compared with the reference year 1990. Austria and Great Britain are to reduce their emissions by 13 and 12.5 percent respectively.

In order to meet these emission targets, the BMW Group has reduced its CO<sub>2</sub> emissions per unit produced by around 30 percent in the last ten years. The BMW Group achieved this reduction mainly by using natural gas, community heating and combined heat and power systems. When the emissions trading system began on 1 January 2005, the BMW Group showed a balanced account between the CO<sub>2</sub> emissions expected at its European production locations and the allocated emission allowances.

<http://unfccc.int>

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

The BMW Group continues to reduce CO<sub>2</sub> emissions in production with various innovative concepts and technologies. For example, it increasingly uses energy generated without CO<sub>2</sub> emissions. The BMW plant in Spartanburg, USA, acquires around one-quarter of its energy from methane gas from a nearby public landfill. In Munich, the BMW Group and the Munich City Utilities have developed a concept for reducing CO<sub>2</sub> emissions with groundwater cooling. The new Project House, part of the BMW Group's Research and Innovation Centre, is cooled with groundwater that is near the surface. The ten to twelve degree water passes through a heat exchanger and is fed into the building's cooling system. Afterwards, the water that has heated up to a maximum of 17 degrees is returned to the cycle. The cooling system is supplied by nearby drains for the Munich Underground, i.e. pipes that collect the flow-

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above -- Energy efficiency in the Leipzig plant: Exhaust air from the factory halls is used for heat recovery with a total of 20 heat wheels.

below -- Reduction of CO<sub>2</sub> emissions in the BMW retail outlet in The Hague: A fuel cell supplies the energy.



ing groundwater and lead it below the Underground system. Groundwater cooling replaces predominantly conventional, electrically operated refrigerating machines. This avoids up to 4,500 tons of CO<sub>2</sub> emissions a year and saves around 7 million kilowatt-hours of electricity, which is equivalent to the annual electricity consumption of more than 3,000 private households in Germany. Both the Federal Ministry for the Environment and the Bavarian Ministry of Economic Affairs supported this Munich project. The BMW Group is currently considering extending the use of groundwater cooling to other locations.

The BMW Group's Research and Innovation Centre (FIZ) harnesses not only the natural energy of groundwater cooling, such as in the Project House, but also energy generated by engine test stands. The BMW Group tests petrol and hydrogen combustion engines on 36 engine test stands. For example, the engine of the hydrogen-powered H<sub>2</sub>R Record Car was tested here. The attached generators convert the mechanical energy that develops during testing into electric energy. This electric power of up to ten megawatts suffices to supply electricity for the entire test stand building with its workshops, offices and laboratories. At peak hours, the engine test stands generate an energy surplus of 1.5 megawatts, that is 15 percent of the energy that can be achieved in theory, which flows into the Research and Innovation Centre's electricity network. The engine heat generated by test stand operation is also processed. Water that has heated up when cooling the engines flows through a heat exchanger into the building's heating system. This helps to meet a large part of the heating capacity required for the test stand building.

Another innovative approach to reduce energy consumption and thus CO<sub>2</sub> emissions has been put into practice in the BMW retail outlet in The Hague in the Netherlands. There the BMW retail outlet is applying the BMW CleanEnergy strategy, which advances the development of hydrogen combustion engines for automobiles, to a pilot project on the stationary use of a fuel cell. Electricity and heat are produced from hydrogen using fuel cell technology.

In Vaillant GmbH, the BMW Group has found a partner with years of experience in the use of fuel cells to generate power. The PEM fuel cell used (PEM: Polymer Electrolyte Membrane) has rated electrical power of 4.6 kilowatts. With a combined heat and power system, it also has heat output of 7.0 kilowatts. The fuel cell uses this to supply the building's air-conditioning systems. The fuel cell is fed with hydrogen, which is currently produced from natural gas in a reformer. The long-term aim is to produce hydrogen from primary energies that are free of CO<sub>2</sub> emissions. If the test phase is successful, this self-sufficient energy technology is to be applied at other locations in order to promote, in keeping with the BMW CleanEnergy strategy, a CO<sub>2</sub>-free hydrogen economy as the only viable long-term solution to energy and environmental problems.

[www.bmwgroup.com/h2ague\\_project](http://www.bmwgroup.com/h2ague_project)

### **Avoiding solvents**

The BMW Group's environmental protection concepts do not only include the reduction of CO<sub>2</sub> emissions. New methods in vehicle painting reduce emissions of polluting solvents. These more environment-friendly technologies are used throughout the BMW Group's production network. The plant in Shenyang, for example, has one of the most modern paint shops in China. After the BMW Group had successfully introduced water-based paints at several locations in Germany, BMW South Africa was, in 1996, the first South African automobile manufacturer to switch to this technology. Emissions from solvents in the form of volatile organic compounds (VOCs) sank significantly. South African suppliers along the value added chain also adopted the new technology. An infrastructure was developed for environmentally compatible water-based paint technology, creating new jobs and providing other manufacturers with an incentive to use the environment-friendly technology. Water-based paints have been standard in the entire BMW Group for years.

Meanwhile, the BMW Group has continued to refine its methods of painting. In the new plant in Leipzig it uses powder-based clear paint technology. In doing so, the Company benefits from years of

experience gained from the production network. In the Dingolfing plant, for example, the BMW Group pioneered the use of powder-based clear paint technology in 1997. So far, the Company is the only manufacturer worldwide to use this extremely environment-friendly paint technology. Clear paint is used for the vehicle's last functional coat of paint. Put more simply, this top coat protects the vehicle's paintwork and gives the automobile its brilliant surface. Powder-based clear paint technology is far superior to conventional methods from environmental points of view. For example, neither water nor solvents are required to apply this dry substance. Nor does the equipment need to be treated with chemical cleaning agents. The powder is filtered as fine as dust, charged electrostatically with high tension and applied to the earthed body with high-rotation bell sprayers. Then the powder is heated until it melts. When it cools, it covers the vehicle with a firm clear paint coating. Conventional methods of painting retain overspray with water. With powder-based clear paint technology, however, any excess material is held back within the paint shop and mixed with fresh powder. This ensures almost total use of materials. As in the Leipzig and Dingolfing plants, this painting technology is also used in the Regensburg plant. Around 2,500 vehicles a day are currently painted using powder-based clear paint technology.

### **Conserving the diversity of species at company locations**

Not only the emissions of a company location, but also nature conservation in its immediate surroundings are of environmental relevance. The BMW Group's objective is to maintain and, if possible, even to enhance the quality of the natural environment at its locations. Therefore, the Company examines how construction projects and changes in land use affect the diversity of species of fauna and flora. Before the BMW Group decides to use an area, it collects "ecological evidence". Experts study the diversity of species and the biological importance of the areas. Then they assess how much the scheduled construction projects have to be adapted and what kind of protective measures have to be introduced. The steps that the BMW Group takes usually

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above -- The proving grounds at Aschheim near Munich: The BMW Group has tested vehicles here for more than three decades.  
 centre -- Ecologically valuable neglected grassland along the test track provides a habitat for animals and plants.  
 below -- A small copper on the grounds of the test track at Miramas in the south of France.



improve the situation for fauna and flora, particularly near protected areas which provide a habitat for endangered species of animals and plants.

In 2000, the BMW Group carried out an ecological survey of the proving grounds in Aschheim, which were laid out in 1971. The grounds, located to the north of Munich, are used for testing automobile handling and safety in different situations, for example on a high-speed measuring track. As part of the survey, the BMW Group turned grassland into biotopes and thus upgraded it ecologically. The new biotopes include, for example, ponds supplied with groundwater and neglected grassland. Neglected grasslands are green areas low in nutrients where a large variety of plants thrive and provide a habitat for rare species of insect. In 2003, an independent planning office inspected the measures that had been completed. The experts found that the variety of butterflies on the grounds had increased since 2000. Twenty-one species (2000: 18 species) now populate the grounds, along with all sorts of frogs and toads and seven species of grasshopper. The results on the flora were also positive: the 67-hectare area was classed as being of average importance in terms of nature conservation. One of the areas of neglected grassland was rated as being of regional importance, while four others were of local importance. The BMW Group used the findings of the ecological evidence for further measures to maintain and enhance the quality of the environment. For example, more green areas were laid out and the biotopes linked by neglected grassland.

Studies of the proving grounds at Miramas in France also show that changes in land use and construction projects in the BMW Group are compatible with nature and can even enhance the natural environment. As early as 2001 and 2002 the BMW Group conducted surveys of the state of the ecosystem along the test track and had 25 sections of the grounds examined. In doing so, a large variety of species was found. In addition to 69 species of bird, the grounds are home to 34 grasshopper and 33 butterfly species. In 2004, these results also influenced the construction of new sections of track. Building on ecologically valuable areas is prohibited. In addition, the BMW Group has decided against

planting non-indigenous trees and bushes and fertilising fallow land.

The procedure for construction projects on the proving grounds in Aschheim and Miramas is by no means exceptional. On the contrary, the BMW Group considers the ecological impacts of its production plants and proving grounds on their immediate surroundings in all its building decisions. For example, it took account of the ecological evidence and surveys of the state of the environment for construction projects at its Wackersdorf, Munich, Regensburg and Leipzig locations.

## High standards for suppliers and logistics

### Selecting suppliers

The BMW Group also takes responsibility for observing social and environmental standards in cooperation with around 3,000 service-providers and suppliers worldwide, 970 of whom were core suppliers in 2004. In addition to quality targets and cost aspects, the BMW Group's national and international purchasing guidelines include both social and environmental criteria. For example, suppliers undertake to use energy and raw materials efficiently and to provide relevant information, upon request. The purchasing guidelines also contain criteria such as the prohibition of child and forced labour, as well as of discrimination and corruption. In the spirit of cooperation and in constant contact with the suppliers, BMW Group experts from the fields of purchasing, development, quality management and logistics assess once a year on average how the suppliers put product- and production-related environmental protection into practice and observe social standards.

In order to obtain reliable data on the status of sustainability at its partner companies, the BMW Group made a survey of its international suppliers back in 2003. In doing so, it assessed various factors, including observation of the social principles

of the Global Compact, the OECD Guidelines for Multinational Enterprises and the standards of the International Labour Organisation (ILO), and gathered information on the environmental management system, environment-oriented product development and recycling regulations relating to automobiles.

[www.ilo.org](http://www.ilo.org)

[www.bmwgroup.com/responsibility](http://www.bmwgroup.com/responsibility)

Since the spring of 2005, the BMW Group has further institutionalised the use of data on suppliers' sustainability. With the Suppliers Database, the BMW Group can enquire, with IT assistance, whether potential new suppliers apply principles of sustainability before it decides on a supplier. In addition, since the summer of 2005 existing suppliers have been able to update their data in the system once a year. Thus, the BMW Group obtains an exact overview of its suppliers' social and ecological standards worldwide.

In emerging markets, awareness of environmental protection and the standards required by law does not always reach small and medium-sized suppliers. That is why BMW South Africa initiated a management programme to inform suppliers which standards are required by law, how they actively contribute to environmental protection and what benefits they bring their company. The programme's success is reflected in part by the increase in certifications to DIN EN ISO 14001. In the meantime, around 90 percent of the suppliers have this certificate, compared with only around ten percent in 2000. A study is currently focusing on the knowledge transfer from BMW South Africa to its suppliers during environmental projects. Every quarter, the suppliers of BMW South Africa provide data for this study. BMW South Africa uses these data to identify suppliers who need assistance in putting environmental standards into practice, and helps them as required.

When embarking upon new projects the BMW Group also examines the social and environmental standards of possible partners in order to ensure that the standards are observed throughout the value added chain. An example: The BMW engine plant

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above -- Delivery of exhaust systems in the Leipzig plant: the so-called “docking fingers” of the assembly halls shorten transport distances in production.

below -- When transported in closed railway wagons, the vehicles do not need any protective films or hoods.

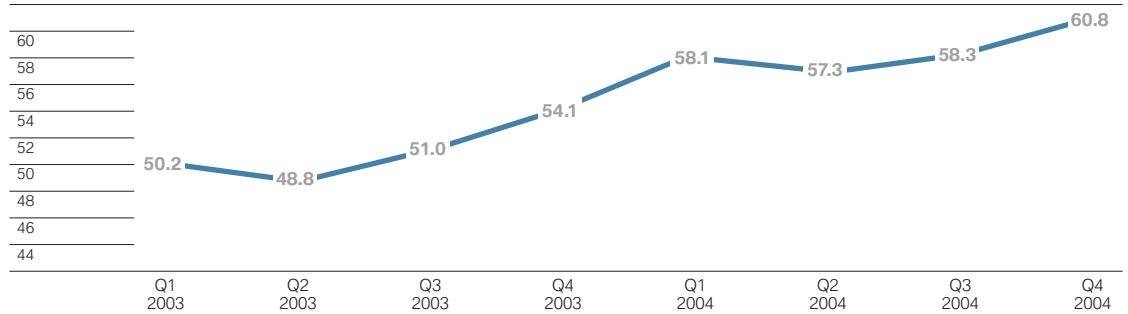


in Steyr, Austria, which produces around 700,000 engines a year, conducted a competitive enquiry among suppliers worldwide as part of development of a new four-cylinder diesel engine. Forty-seven potential suppliers returned their completed “Sustainability questionnaire”. Unlike the national and international survey of suppliers, this broader survey also included companies that had not worked for the BMW Group before. The suppliers provided information on their economic data and whether they supported international initiatives to protect human rights and safeguard labour and social standards, such as the Global Compact. The BMW Group also enquired about the status of environmental management in each company. Not only the application of an internationally valid environmental management system was decisive, but also the use of environmentally compatible production methods, such as design for recycling, or of life cycle assessment case studies.

The results showed that all the companies surveyed have an environmental management system. And nearly all the potential suppliers take account of standards for environment-oriented product development. Three-quarters of the suppliers who took part are governed by fixed social standards, such as a code of conduct or a corporate ethics charter. The potential suppliers also claim adherence to environmental and social standards along their value added chain. Thus, around 85 percent of the companies demand that their sub-suppliers meet corresponding environmental and social standards. Together with other criteria, the BMW Group used all these facts and figures to select suitable partners.

[www.bmw-plant-steyr.com](http://www.bmw-plant-steyr.com)

**Share of finished BMW Group vehicles transported from the plants by rail in 2003/2004**  
in percent



### Logistics as part of environmental management

The BMW Group's logistics planning and transport logistics regulate the supply of production locations with production materials and components as well as the delivery of spare parts and accessories to the dealerships and, of course, the distribution of new vehicles. Around 2,700 supplier locations and all service workshops worldwide are integrated into the Company's goods flow management. Around two million transport containers made of steel and plastics are used to deliver parts and components to the individual locations. Logistics planning and transport logistics ensure that efficient logistics structures are developed and utilised. The BMW Group's logistics experts elaborate environment-friendly transport solutions in accordance with these guidelines. The reason: around one-third of the emissions of noxious substances that occur during vehicle production are generated along the transport chain that extends from the suppliers, through deliveries between locations to the delivery of the vehicle to the customer. In order to reduce environmental impacts, the BMW Group's logistics experts are working on specific projects to

- shift transport to more ecologically compatible means of transport, for example from road to rail, and minimise air cargo,
- cut the volume of freight by optimising packaging, container filling and the capacity utilisation of the means of transport and traffic networks,
- and reduce the materials used to protect the surfaces of the new vehicles during transport.

Using an environmental management system that has been certified to DIN EN ISO 14001 since 2003, the BMW Group records key figures such as the share of vehicles delivered by rail or the share of air cargo in deliveries from Europe to overseas plants. The CO<sub>2</sub> emissions in relation to the transport performance in ton-kilometres serve as an indicator for progress in the field of environmental management. The BMW Group uses these key figures to find out how much its logistics solutions contribute to environmental protection.

### Shifting from road to rail

The BMW Group's logistics experts cannot directly influence the transport performance from the supply market to the various locations of the production network. However, since they are involved in the selection of suppliers, they ensure that ecological aspects are also taken into account during transport from the suppliers to the BMW Group. Nor can the logistics experts directly influence the transport of the finished automobiles to the sales market. After all, the development of the sales markets and plant allocation, i.e. the plant at which a particular vehicle is produced, determine the transport performance. However, the BMW Group's logistics experts are working on the development of ecological transport structures from the plants to the sales markets. Thus, infrastructure projects at individual plants promote the increased use of rail transport. For example, all new cars destined for the UK market are now loaded directly onto railway wagons in the BMW plant in Munich. Deliveries to Germany's Rhine-Ruhr



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conurbation, as well as to Belgium, Italy and Spain have also been shifted from road to rail. With the introduction of the new BMW 3 Series, around 60 percent of the new cars from the Munich plant are delivered directly by rail. This means 15,000 fewer truck journeys a year and thus a significant reduction of the burden of heavy traffic in the city of Munich. The shift to rail transport for deliveries from the German plants to Italy and Spain alone reduces emissions of CO<sub>2</sub> by 12,200 tons a year. In Rosslyn, South Africa, and Spartanburg, USA, around 70 percent of new vehicles now leave the BMW plant by rail. From 2003 to 2004, the BMW Group increased the share of rail transport for its new vehicles worldwide by around eight percentage points to 60 percent. In 2004, further adjustments were made at the Dingolfing, Regensburg and Munich plants so that more materials could be supplied, and more vehicles dispatched by rail. In order to supply the German plants with materials, the BMW Group currently uses five rail links for logistics, i. e. five routes on which freight trains travel for the BMW Group.

The use of trucks for the worldwide supply of spare parts, which is organised by the centralised spare parts distribution centre in Dingolfing, has also been reduced. Trucks based at the Dingolfing logistics centre used to travel 190,000 kilometres a year in order to supply the distribution centre with spare parts from the external warehouses. In June 2005, the BMW Group opened a new store and logistics centre. As the so-called Dynamics Centre is located near the plants, it replaces almost all the external warehouses and thus reduces significantly the transport performance each year.

### Combining rail and sea

The BMW Group also chooses ecologically favourable routes to ports for its overseas transport. For example, it changed the port of departure for vehicles produced in Germany for the UK market from Zeebrugge to Cuxhaven, relieving road traffic of 4,300 truck journeys a year. This shift also reduced transport time. Rail links to the respective ports are also used for the global supply of spare parts from the BMW plant in Dingolfing, the transport of BMW motorcycles from Berlin and the supply of the BMW plants in Spartanburg and Rosslyn. A new rail link has been specially opened between the vehicle dis-

tribution centre in Rosslyn and the port of Durban. Each day it is used to transport two hundred new vehicles that are either leaving the plant or being imported for the South African market.

The efforts to shift traffic within the BMW Group to ecologically equitable means of transport, such as rail and sea, have already been successful. In 2004, 15 percent of transport was by road and six percent by rail, while sea transport accounted for the lion's share of around 79 percent of the total.

### Environmentally compatible vehicle protection during transport

One of the objectives of environmental management in the field of logistics is to reduce the environmental impacts of the materials used to protect vehicle surfaces during transport to the customer. Basically, a variety of materials and systems provide suitable protection during transport, for example protective films and hoods or closed transport. Transport without protection of any kind is also possible, provided it is combined with an innovative special clean to remove any marks caused by rust film. A life cycle assessment case study contributed to decision-finding by pinpointing which types of protection during transport were most environment-friendly. The study found that closed or unprotected transport followed by a special clean has the least impacts on the environment. By the end of 2006 the BMW Group aims to switch gradually – without product quality being affected – to vehicle distribution without surface protection. In doing so, it is relying on innovative washing methods and distribution with closed wagons and covered transshipment terminals. The BMW Group will probably deliver all new vehicles without extra surface protection worldwide from 2007.

[www.bmwgroup.com/production](http://www.bmwgroup.com/production)

[www.bmwgroup.com/responsibility](http://www.bmwgroup.com/responsibility)

### Concrete example --

## Sustainable production.

The youngest factory in the BMW Group's worldwide production network, the BMW plant in Leipzig, sets standards in terms of sustainability and conservation of resources.

July 2001 was an important month for sustainability in automotive engineering: on 18 July, the BMW Group decided to build a new plant in Leipzig for euro 1.3 billion. The tightening of the provisions of the Federal Immission Control Act (BImSchG) also came into force that month: Leipzig was thus the first automobile plant to be constructed entirely in line with the strictest-ever requirements in German environmental legislation. However, the ambitions of the plant's planners went way beyond the provisions of the law: in terms of sustainability and conservation of resources, they developed solutions for the plant that point well into the future.

You gain a first impression of this when you approach the plant on the long feeder from the A14 motorway, past freshly planted avenues of trees, wetlands edged with reeds and lush green meadows. Before the first excavator arrived at the 208-hectare plot, an independent landscape planning office conducted a comprehensive ecological survey of the location. While the assembly halls and central building were under construction, landscape gardeners planted the grounds, carefully embedding the factory in its surroundings and providing a habitat for all kinds of different animals and plants. A good 2,200 poplars, limes, ash and other indigenous trees and more than 4,000 cubic metres of hedges were planted, almost 900,000 square metres of neglected grassland with herbs such as Carthusian pink, cat's-foot and mullein were sown, and a wetland biotope with a 4,900-square-metre reed belt was laid out. As a result of measures such as these and constant, open dialogue with neighbours, environmental organisations and authorities, no objections whatsoever were raised to the Company's application for building permission. The otherwise obligatory and time-consuming official debate of all the pros and cons simply was not necessary.

When the gardeners had finished their work, the biologists returned, recorded the flora and fauna on the factory grounds for a second time and reached an amazing conclusion: at 105 percent, the ecological value of the finished plant was greater than that of the fields and meadows on which the grounds of the plant are now located.

However, this value is likely to change in future as the Leipzig plant is designed for flexible growth. As a result of large open spaces and the patented "finger structure" of the assembly hall, production lines can be extended and assembly elements installed at any time without interruptions to ongoing production. Thus, the plant can grow to meet the requirements of the market and the BMW production network. Important suppliers moved into two supply centres – another novel feature of the Leipzig plant. In these supply centres, BMW employees and suppliers assemble large modules such as cockpits and seats right next door to the production line, so to speak, thereby reducing the volume of transport to the plant by around 20 percent. Besides, this close cooperation with suppliers is a real advantage when it comes to quality. "With our module partners on the spot, we can start up more quickly, cope with problems more rapidly and all deal better with risks", explains Peter Claussen, Plant Director.

Together with suppliers and colleagues from other automobile plants, Claussen is currently involved in establishing the Automobile Cluster East Germany, which is to promote automotive innovation in the region and safeguard growth on a permanent basis. The BMW Group's decision had already been an extremely important signal for the Saxon metropolis where almost 100,000 jobs in industry were lost after German reunification.

In the medium term, 5,500 new jobs will be created on the grounds of the BMW plant alone.

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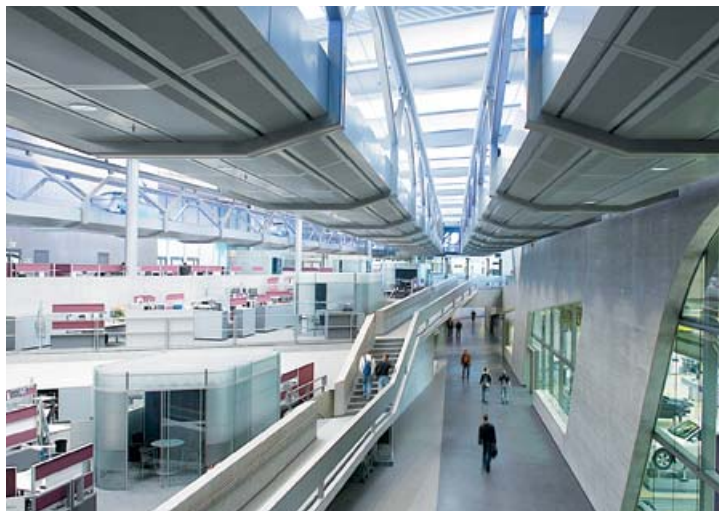
- 01 -- BMW plant in Leipzig: 2,200 trees were planted on the factory grounds.
- 02 -- Numerous large erratic boulders were found during construction work and now serve as decorative elements and biotope.
- 03 -- Transparent architecture: The planning and administrative employees' workplaces are in the central building between body shop, paint shop and assembly.

01

02



03



Experts are expecting the same number again to be established indirectly as a result of the BMW Group's presence in the Leipzig/Halle region. "Saxony is not alone in benefiting from this new industrial beacon. It sheds its light on the whole of central Germany", wrote "Mitteldeutsche Zeitung", one of the region's dailies, after the decision in favour of Leipzig, and "BMW slows migration to the West". Indeed, 70 per cent of the employees at the plant come from Leipzig and the neighbouring areas of Halle, Bitterfeld and Dessau. By the end of 2004, 125,000 people had applied for a job at the new plant. Those selected were by no means the youngest, but a healthy mix of young and experienced employees, of men and women but, above all, of people who were willing to learn. The oldest newcomer was 59 years old when he was hired, and the percentage of female employees is also above the average in the Leipzig plant. In projects such as "Poleposition" by PUUL GmbH, the unemployed were prepared selectively for job applications and re-entry into the working world. Result: around 600 of the jobless were offered an unlimited contract of employment at the Leipzig plant.

These contracts are based on a flexible mix of more than 200 work time models, which were developed by employees' representatives, trade unions and company management under the title "BMW formula for work" – an important condition for the decision in favour of Leipzig. For only with the "BMW formula for work" can the Leipzig plant react optimally at all times to market requirements and capacity utilisation. Unbureaucratically and at short notice, plant operating time can be varied between 60 and 140 hours a week, as and when required. An example: while body shop and assembly are currently scheduled for an average 80-hour week, painting, spraying and drying operations in the paint shop, the most capital-intensive section of any auto-

mobile plant, generally run for more than 120 hours a week.

And here only water-based colour paints and powder-based clear paint – and thus the most environment-friendly paint technologies – are used. As the first of its kind, the Leipzig paint shop will also be accessible to visitors. Through the windows of a glass passageway they will be able to watch the entire painting process and see how excess powder is collected and recycled. Waste heat is also recovered and used to heat the paint booths.

In short, the plant is just as free of emissions as it is full of technological innovations and sustainable concepts. "Basically, we have drawn on and optimised the whole of the BMW Group's expertise on plant planning", says Plant Director Claussen of this unusual location, which has been "finished" officially since its inauguration on 13 May. But as a breathing, intelligent, self-regulating organism, the BMW plant in Leipzig is only at the beginning of a great future.

[www.bmw-werk-leipzig.de](http://www.bmw-werk-leipzig.de)

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01



02

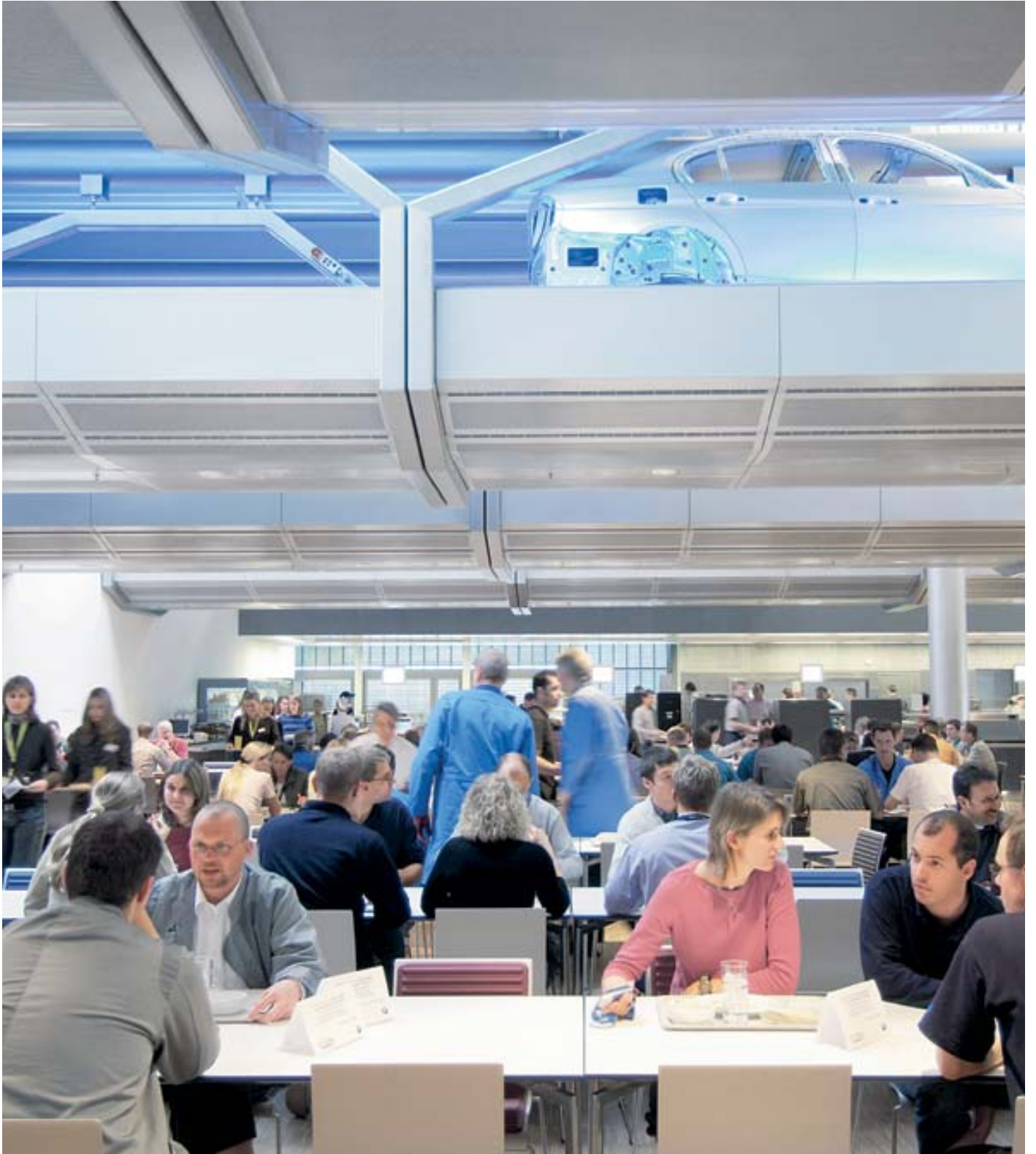
01 -- Computer-controlled paint shop

02 -- Powder-based painting technology uses almost all the material und requires neither water nor solvents.

03 -- In the BMW plant in Leipzig, a mix of more than 200 work time models is essential in order to react flexibly to market requirements and capacity utilisation.

03





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## 4 People make the difference

The qualifications, motivation and creativity of its employees are decisive for the BMW Group's success. The almost 106,000 employees worldwide work in an environment that is defined by trust, esteem, mutual understanding, performance and reward. The corporate culture that has evolved over the years is the reason for the employees' great dedication and their strong identification with the BMW Group. This is supported by the good cooperation between company management and works council. Uniform human resources and social policy guidelines apply for all employees worldwide. The objective of the Company's value-oriented and values-based human resources policy is to constantly promote and develop its employees. Personal development opportunities along with flexible work time arrangements make the BMW Group a successful, attractive employer who is able to cope with social challenges, such as demographic change.

## Uniform guidelines worldwide

### Reacting to general conditions – taking appropriate measures

Conditions change constantly for the BMW Group: internationalisation, technical innovations, social challenges, but also new legal requirements and, not least, the general development of the labour markets. The BMW Group systematically collects and evaluates data on the impacts on the Company and adapts its human resources processes, systems and instruments accordingly. This procedure is supplemented by constructive cooperation with the works council. This course of action enables the BMW Group to operate successfully in a corporate environment that is changing increasingly quickly.

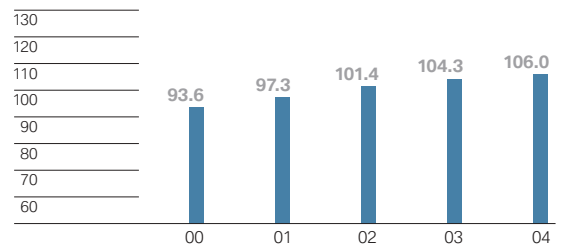
While the company-wide planning process is centrally managed, the respective human resources departments support the management staff at the individual locations. The objective is to use, increase and develop the qualifications and expertise of the employees so that each of them, depending on their talents, abilities and knowledge, can contribute as much as possible to the Company's success. This applies to technical as well as to personal and social competences. Human resources activities are based on this objective and on corporate strategy. They include, for example,

- selective development of competence in innovative fields,
- the planning of human resources development measures, such as qualification courses and programmes for young employees,
- the concentration of human resources marketing on future target groups,
- influencing education policy in the development of courses of study and jobs requiring special training.

### Advancing labour and social standards together

Although specific conditions differ at the individual locations, uniform human resources and social policy guidelines apply for all employees worldwide. This is due to the conviction that the employees are the decisive factor for the Company's success. That is why the human resources policy supports the

**BMW Group employees at year end\***  
in thousand



\* figures exclude suspended contracts of employment, employees in the work and non-work phases of pre-retirement part-time arrangements and low income earners

employees' willingness to learn, their creativity, competence and dedication. The BMW Group's guidelines include respect for human rights, mutual esteem and intercultural thinking. In addition, the BMW Group supports the standards of international organisations and initiatives, such as the Global Compact on human rights and basic labour standards, the agreements of the International Labour Organisation (ILO) of the United Nations, the Guidelines for Multinational Enterprises of the OECD, and the Business Charter for Sustainable Development of the International Chamber of Commerce (ICC).

[www.unglobalcompact.org](http://www.unglobalcompact.org)

[www.ilo.org](http://www.ilo.org)

[www.oecd.org](http://www.oecd.org)

[www.iccwbo.org](http://www.iccwbo.org)

The BMW Group takes up these standards and develops them further. In the spring of 2005, upon the initiative of the works council, the Board of Management of BMW AG signed an internationally valid declaration on human rights and labour conditions together with the Chairman of the EURO works council of the BMW Group and the President of the International Metalworkers' Federation. The agreement includes, among other things, internal rules on putting the Global Compact into practice and follows the basic principles of the ILO.

- In the BMW Group, equal opportunities and equal treatment are guaranteed regardless of ethnic origin, skin colour, sex, religion, nationality, sexual orientation, social origin and political opinions, as far as these are based on democratic princi-



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above -- During the "Drive" programme for graduates and young professionals, young employees become acquainted with work in production.

below -- E-learning is used increasingly as a supplementary learning method in vocational training.



ples and tolerance towards people who think differently.

- The BMW Group is committed to the abolition of child and forced or compulsory labour on the basis of internationally recognised agreements, as well as the freedom of association and close cooperation with employees' representatives.
- In the BMW Group, health and safety at work are guaranteed at least within the framework of national provisions. Health and safety at work and the humane design of working conditions are prime elements of company policy.

Business partners and suppliers are encouraged to follow similar principles. EURO Forum, an international platform for the exchange of information between the BMW Group's European works councils and the company management, monitors the agreement's practical application.

In July 2005, a body of employees' representatives was formed at BMW Brilliance Automotive, China. These representatives, elected by the employees once a year, meet every week and have the task of supporting the employees in social issues and, in the event of differences of opinion, of mediating between company management and workforce. The activities take place both in the Shenyang plant and at the Beijing location and are financed by the Company.

## Ensuring attractiveness as employer

### Inspiring qualified young employees

The BMW Group's workforce has grown steadily since 2001. The number of employees in the BMW Group rose by around 12,300 worldwide, an increase of more than 13 percent. In 2004 alone, the BMW Group created more than 1,700 new jobs worldwide. Thus, the workforce increased by around 1.7 percent to around 106,000 employees within a year.

One of the main tasks of the BMW Group's human resources policy is to safeguard permanently the recruitment of young, qualified employees. With its commitment to research and universities, the BMW Group promotes the training of young



above -- Apprentices at the BMW Group centre -- Hands-on professional experience: participants in Girls' Day working on a clay model  
below -- Cooperation between university and Company: transfer between theory and practice



academics and can thus win talented graduates as employees. In Germany, for example, BMW Group supports the German National Computer Science Competition. And at international level, the Company invites young scientists to compete for one of the highest-paid prizes for research, the BMW Group Scientific Award.

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

[www.bmwgroup.com/scientific-award](http://www.bmwgroup.com/scientific-award)

In addition to measures to increase the qualifications of young academics, classic vocational training is the second pillar for ensuring the recruitment of young employees. At the end of 2004, the BMW Group employed 4,464 apprentices in more than 30 professions requiring special training, that is 3.7 percent up on the previous year. Worldwide, the BMW Group has created more than 600 additional apprenticeships in the last three years alone. In 2004, 1,250 new apprentices started their training, around 1,200 of them at 25 locations in Germany. The training quota of BMW AG in Germany, i.e. the share of apprentices in the total number of employees, is five percent.

The "Bridge" programme links vocational training and academic studies. The Company constantly keeps in touch with young people who are studying engineering sciences or information and communication technologies. During their basic studies, the selected students are in regular contact with the BMW Group and other participants through events and an information and communication platform. When they have completed their basic studies, they can be accepted for "Fastlane", the student support programme that accompanies participants until they take their finals. During this programme, students are helped, for example, in their search for internships or a suitable subject for their thesis.

The BMW Group copes with the shortage of suitable recruits, particularly with technical qualifications, for example by selectively approaching young women in order to arouse their interest in technical careers and engineering sciences and to win them for the Company. These measures include Girls' Day, which in 2005 attracted some 750 girls at seven locations. In 2001, the BMW Group was one of the first companies in Germany to introduce a Girls' Day. In addition to Girls' Day, a technology camp and internships reserved specially for young women

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provide an insight into the different career options available to them in the BMW Group.

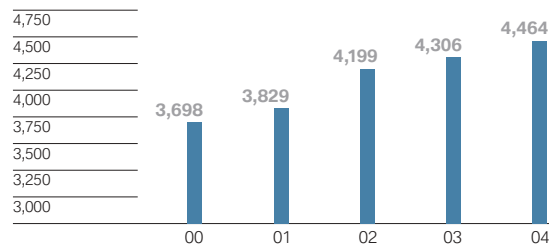
[www.girls-day.de](http://www.girls-day.de)

These measures have resulted in an increasing proportion of female employees. Women currently account for 13.2 percent of the employees in the BMW Group. However, their share is already far higher among apprentices in commercial and technical fields at 21.6 percent and among interns, undergraduates, postgraduates and young professionals at 29.4 percent. In cooperation with other companies, the BMW Group promotes talented female employees with Cross Mentoring. Here, experienced managers advise and help female employees from another company who have recently taken on a management position and support them in their careers.

#### Performance and reward

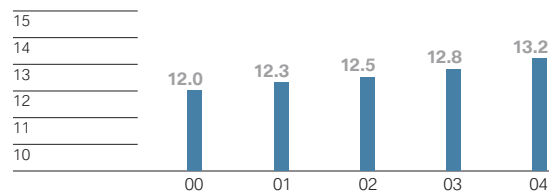
The employees' great dedication and their identification with the BMW Group reflect a corporate culture that strongly encourages employees to contribute to the Company's success. In this context, individual performance and results influence the level of reward on the part of the BMW Group. Additional components of remuneration include an individual bonus as well as a Christmas bonus and vacation pay. Depending on location, additional benefits include contributions to health and accident insurance schemes, pension scheme offers and low-cost vehicle programmes. The employees benefit from the Company's success. For example, under BMW AG's profit-share scheme, employees received a bonus of almost 156 percent of gross monthly remuneration for the Company's success in 2004. In a comparison with competitors in the automobile industry, remuneration at all BMW Group locations is generally in the top third. In 2004, personnel costs per employee amounted to around euro 73,500.

#### BMW Group apprentices



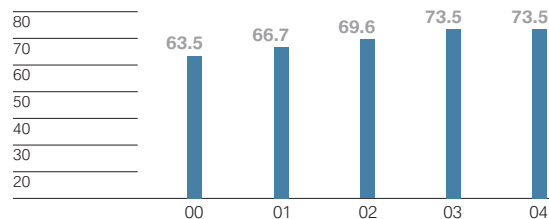
#### Share of women in the total workforce of BMW AG

in percent



#### BMW Group personnel costs per employee\*

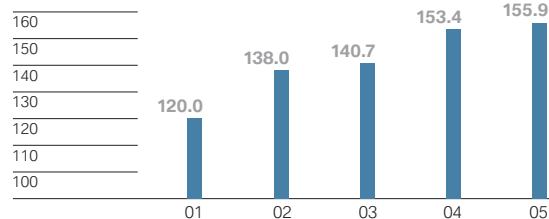
in euro thousand



\*figures exclude suspended contracts of employment, employees in the work and non-work phases of pre-retirement part-time arrangements and low income earners

#### Profit-share scheme of BMW AG in year of payment\*

in percent of monthly remuneration



\*New employees share fully in the Company's profit after four years of employment.

### **Popular among employees and applicants**

The employees are extremely satisfied with their employer and identify strongly with the BMW Group. This is reflected in the low fluctuation rate for many years, for example 1.9 percent in 2004, and the results of regular surveys worldwide. Another global survey of employees is being conducted in 2005.

The BMW Group is also attractive as potential employer. For years, the BMW Group has been one of the most popular employers among prospective engineers and economists of all kinds at German universities, and in recent years also increasingly among IT specialists. Mid-2004, the Berlin Trendence Institut for human resources marketing polled around 12,500 students who were nearing their finals at German universities. The BMW Group was their number one choice of employer for the third consecutive time. The Swedish market research organisation Universum obtained similar results mid-2005 when it polled more than 15,000 students at 100 European universities. The BMW Group is the most attractive employer for engineers and young scientists in Europe. And it ranks third among students of economic sciences Europe-wide. According to the results of the South African Magnet Graduate survey for 2004, the BMW Group also tops the list of possible employers for South African graduates.

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

Since 2004, the BMW Group no longer processes the large number of applications on a purely date- and position-related basis. Instead, the data are stored in a pool of applicants via the web-based Job Assistant. For applicants this means: even if their application for a particular job is rejected, they can update their data online and are informed by e-mail about suitable vacancies. In the meantime, around 82 percent of job-seekers apply online. As a result, the pool of applicants already contains around 40,000 applicants.

[www.bmwgroup.com/career](http://www.bmwgroup.com/career)

### **Individual development of employees**

#### **Promoting training and further education**

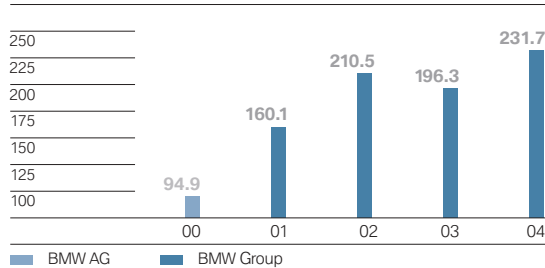
In order to find good employees, inspire their loyalty to the Company and develop their skills and abilities, the BMW Group interprets the principle of performance and reward not only in a material way, but also by offering its employees a large variety of measures for their further education and personal development. In doing so, the employees are not simply qualified for certain positions, but encouraged to develop their potentials and individual capabilities. In 2004, the BMW Group expanded its training and further education programmes for employees and invested euro 232 million, around 18 percent more than in the previous year. The Company used these funds to carry out more than 1,000 different training and further education programmes.

The BMW Group has elaborated a special programme for the development of its management staff. It has three components: strategic management qualification, strengthening and development of individual management skills, and strategic discussion of trends and developments. The BMW Group purposely developed its own management programme within the Company in order to better integrate corporate culture and case examples referring to the Company. Personnel development days and the selective qualification of employees with above-average potential complete the range of measures available.

In 2004, the BMW Group built a new 20,000-square-metre Sales and Aftersales Academy in Unterschleissheim near Munich for employees in its sales organisation. The Company invested euro 33 million in this truly unique academy. Designed like a large model service workshop, the academy's features include 70 technical training places for automobiles and motorcycles as well as a virtual reality room in which instructor and participants can deal with the vehicles with computer simulation. The academy has room to train up to 450 employees a day. Training focuses on practical work on the vehi-

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#### Capital expenditure on training and further education\* in euro million



\* The BMW Group's capital expenditure depends on current training and further education requirements and thus fluctuates from year to year.

cle, which accounts for 80 percent of the training contents. In addition to the Sales and Aftersales Academy, the BMW Group runs eight regional training centres in Germany and a total of 52 worldwide. The Company has supra-regional training centres in Dubai, Moscow, Kuala Lumpur and Beijing. In China, the BMW Group is expanding the further training programme it began ten years ago. In the spring of 2005, another company training centre was opened in the International Auto Oriental Plaza in Beijing. There, Chinese BMW dealers receive further training on sales and the use of IT solutions. More than 46 Chinese BMW dealers can hold five-day training courses at this 1,500-square-metre training centre each year. In recent years, the Chinese dealers have already taken top positions in quality competitions held within the BMW Group.

Human resources development faces special challenges in South Africa. For under the previous political system, broad sections of the population were denied access to high-quality schooling. That is why demand exists at the South African location not only for classic further education programmes, but also sometimes for measures to improve general education. BMW South Africa aims to provide its employees with the basics of the programme of the South African automobile industry, Automotive Manufacturing Industry Certificate (AMIC), which is recognised nation-wide. Training in accordance with the AMIC programme includes a basic knowledge

of English, reading, writing and arithmetic, as well as technical know-how and organisational skills. In a next stage, instruction includes quality, processes and safety at work in the respective company. Finally, employees receive training for their tasks in the company. For several years now, BMW South Africa has obliged its employees to take part in the AMIC programme. In the meantime, all employees at the BMW plant in Rosslyn have a good general education. BMW South Africa invests around ten percent of total wage and salary costs in the training and development of its employees.

#### Living integration

The BMW Group's employees come from many different cultures. In Germany alone, the BMW Group's workforce includes around 8,000 foreign employees from more than 90 countries. The BMW Group focuses on the human being and not on his nationality. That is why the BMW Group takes as much account as possible of the different cultural backgrounds. For example, the respective public holidays are included when planning shift schedules. The BMW Group also provides prayer rooms for individual religious groups at some locations. In 2005, for example, a new prayer room was opened for Moslem employees in the BMW plant in Munich. This can be used during relaxation allowances and line runner breaks. In 2004, the German-Turkish Friendship Federation (DTF) awarded the BMW Group the business prize for the Company's integration achievements.

The integration of employees with disabilities into various fields and work processes has been firmly anchored in the Company's human resources policy since 1973. The share of employees with disabilities increased from 3.4 percent in 2001 to 3.8 percent in 2004. In addition, work is outsourced to state-approved workshops for the disabled. The volume of orders grew from euro 23.4 million in 2001 to euro 29.2 million in 2004. In 2005, the Stiftung Pfennigparade, a charitable foundation whose aim is to integrate the physically disabled into work and society, awarded the BMW Group the Golden Pfennig for special achievements in relations with the disabled.



above -- Swivelling assembly enables employees to fit the tank while standing and thus reduces physical strain.  
below -- Height-adjustable workbenches in cable harness assembly relieve the strain on back and knees.



### Health and safety

The BMW Group promotes its employees' health, and thus productivity, by taking measures to prevent accidents at work and protect health. The Company's guidelines on health protection are based on the "Luxembourg Declaration on Workplace Health Promotion in the European Union". Certified management systems guarantee high standards of safety at the production locations worldwide. For example, the number of reportable industrial accidents at the German locations has dropped to one-third within ten years. After the number of reportable industrial accidents fell by more than 20 percent in 2003 compared with the previous year, this low level stabilised in 2004 at 308 reportable industrial accidents in BMW AG. The number of accidents at work was also reduced at international level. From 2000 to 2004, the number of reportable industrial accidents decreased by 20 percent. In 2004, the sickness rate was only 3.9 percent.

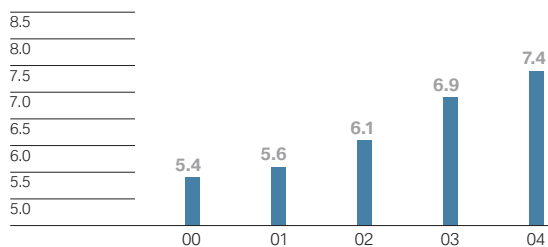
The BMW Group offers comprehensive medical services, training as well as regular education in safety at work and health risks. Sports programmes support these measures to increase the employees' awareness of health protection. For example, the "MoveUp" programme at all the locations guards against diseases of the muscular and skeletal system. The BMW Group's range of health measures also includes voluntary testing for intestinal cancer and special training for employees with cardiovascular and circulatory diseases. In 2004, the BMW Group received the Felix Burda Award in the category "Special Prize for Companies" for its intestinal cancer screening programme. In order to promote its employees' health, the BMW Group invests, for example, around euro 100,000 a year in maintaining fitness centres where the BMW employees can get the exercise they need as a balance to work.

Ergonomically designed workplaces ensure that physical strain is kept to a minimum. An example: Because of the rigid body, most wiring harness assembly work used to be done while bending, kneeling or sitting. However, since 2004 the BMW Group has made work easier for employees at the BMW plant in Munich: by installing height-adjustable

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#### Expenditure on work safety\* at BMW AG

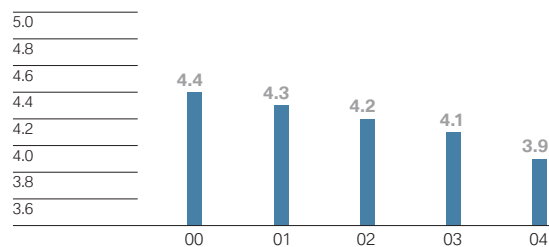
in euro million



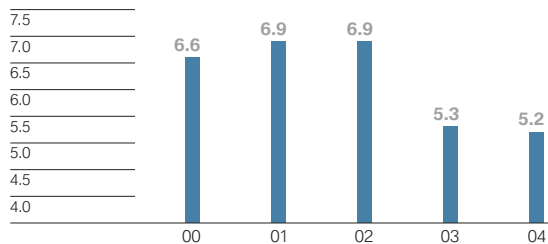
\*includes, for example, personnel, materials and room costs

#### Sickness rate at BMW AG

in percent



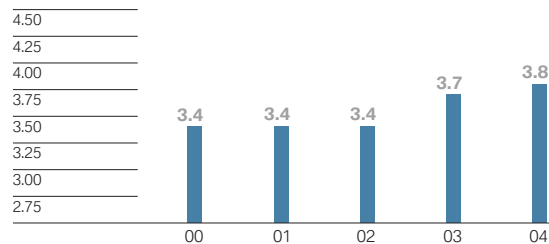
#### Accident frequency\* at BMW AG



\*number of reportable industrial accidents per one million man-hours

#### Employees with disabilities at BMW AG

in percent



workbenches in wiring harness assembly, the physical strain on back, knees and neck has been more than halved.

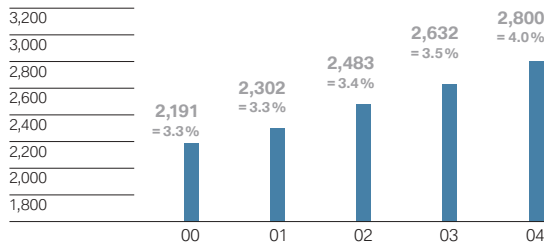
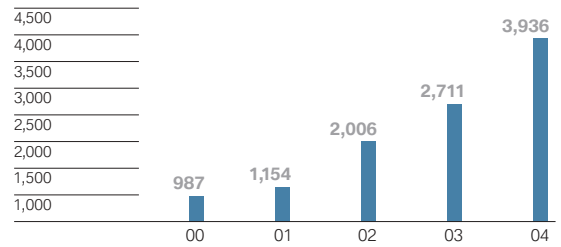
Health protection measures take account of local conditions at the individual locations. In South Africa, therefore, not only the company health protection programmes, but also the social commitment of BMW South Africa, focus on the fight against HIV/AIDS. The BMW Group is currently planning to transfer the successful programmes of BMW South Africa to other locations worldwide.

#### Employees' portal increases sense of own responsibility

Human resources planning and development has been supported by a web-based instrument since 2005. As part of the programme "Excellence in

Human Resources" (eHR), the BMW Group is optimising human resources processes and creating new channels of access to web-based applications and services for all employees. The associated standardised processes not only give managers more scope. The system also frees employees in Human Resources of administrative tasks and thus enables them to engage in more planning and advisor activities.

The employees' portal, Network, is an access channel to web-based applications of the eHR project which gives employees access to a comprehensive range of personalised information. For example, employees can look at their work time accounts, update their personal data or apply for their next vacation, call up information on private pension provisions or buy employee shares. They also find information on

**Part-time employees at BMW AG****Teleworking within BMW AG**

their work environment and the latest news on the Company and its various fields. By the end of 2004, as many as 64,000 employees were using Network.

All employees with a PC with Internet access can use Network. The BMW Group is installing Network terminals in the plants and retail outlets so that employees without a PC have access to the system, too. Thus, all the Company's employees will be able to "enter the net". By the summer of 2005, 675 Network terminals had been installed, first of all, in the German BMW plants and retail outlets.

## Arranging flexible work time

### Company and employees cooperate

Employees and Company benefit from flexible work time. Based on the good cooperation between employees' representatives and company management, the BMW Group has put more than 300 work time models into practice at its locations worldwide. The flexible work time models help employees to meet both professional requirements and private interests. This promotes satisfaction with their workplace and thus job motivation. And the work time models enable the Company to react quickly to changes in the market. The use of capacities in response to demand increases efficiency and safe-

guards jobs. The Company's flexible arrangements apply to work time per working day, week, month and year. They extend from flexi-time and part-time work through overlapping schedules to longer blocks of free time. Work time accounts are a proven instrument for regulating work time in production. They can be used to balance seasonal, cyclical and product-related fluctuations. Agreements between company management and works council regulate the build-up or reduction of time for the respective plants or areas.

Work time accounts proved successful, for example, during the modernisation of the production lines in the BMW plant in Munich in January 2004. Modernisation included reconstruction of the paint shop and vehicle assembly. During the course of extensive reconstruction work, the plant had to interrupt production in several areas for several weeks. Instead of taking vacation, the employees used the production-free period to reduce the time credits on their work time accounts.

Since 1986 more than half the employees in the Regensburg plant, who currently number around 10,000 in all, have worked two shifts for nine hours a day and an average of four days a week. However, the machines operate six days a week. The BMW Group and the works council introduced this model with work on Saturdays in order to utilise capacities and make machine operating time independent of



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above -- Network terminals offer easy access to the employees' portal in the Intranet.

below -- Break room in vehicle assembly at the BMW plant in Leipzig



the employees' individual work time. The capacity utilisation of plant and machinery is far higher than with normal two-shift operation. The employees benefit too: unlike with a conventional five-day week, the employees work significantly fewer days a year. After three weeks of shift work, they have a five-day block of free time. They work on Saturday every three weeks. Since three employees share two workplaces, this work time model also has a positive effect on the labour market. Innovative work time models such as these are only possible because the works council and company management cooperate so closely with one another.

**Organising work time on own responsibility**

Around 34,000 employees at all locations in Germany can organise their work time on their own responsibility according to flexitime arrangements, provided they coordinate it with their manager. This applies mainly to employees in research and development, planning and administration. The BMW Group goes one step further with managers to whom the collectively agreed pay scale does not apply. Their daily work time is no longer recorded. Priority is not given to attendance time, but to the agreed objectives. Own responsibility and individual scope for action are most marked in middle and senior management. These managers have "working time sovereignty" without any time recording. Nor are vacation accounts kept any longer. For this type of work time arrangement employees are required to be result-oriented and to manage the affairs of the Company.

**Concrete example --**

## Benefiting from the employees' experience.

Challenges of the demographic change in society.

People in industrial countries are living longer. At the same time, the birth rate is falling in numerous industrial countries. These two trends are changing the age structure of society. According to calculations by the Federal Statistical Office in Germany, by 2050 half the German population will be more than 48 years old and one-third will be over 60. While in 2001 there were only 44 people over the age of 60 to every 100 of working age from 20 to 59 years, this ratio – the so-called age quotient – will change significantly by 2050. Then there will be as many as 78 people over the age of 60 to every 100 of working age. These shifts in the age structure will reduce the supply of manpower at least in individual qualified fields and professional groups in the coming years. The German Institute for Population Research thus reaches the conclusion, "Workers will not only be in short supply, they will also be older".

[www.bib-demographie.de](http://www.bib-demographie.de)

The aging of society affects not only the social security systems, but also social coexistence in general and the business community. The development described can also be observed in the BMW Group.

**Safeguarding success with an experienced team**

These few facts alone show that the BMW Group will in future achieve its business success with a workforce that is older on average. With the experience and expertise they have gained over the years, older employees make a decisive contribution. In the

interest of the employees in particular, the objective of the BMW Group's human resources development and planning is to

- maintain dedication and proficiency;
- promote flexibility, motivation and innovative ability;
- offer opportunities to adapt expertise to new and increasingly high standards

throughout the employees' entire working life. At the same time, all the employees in the Company must develop an awareness of the social and economic changes. For example, they can make provisions for old age on their own responsibility – not only of a financial nature, but also to maintain health and competence.

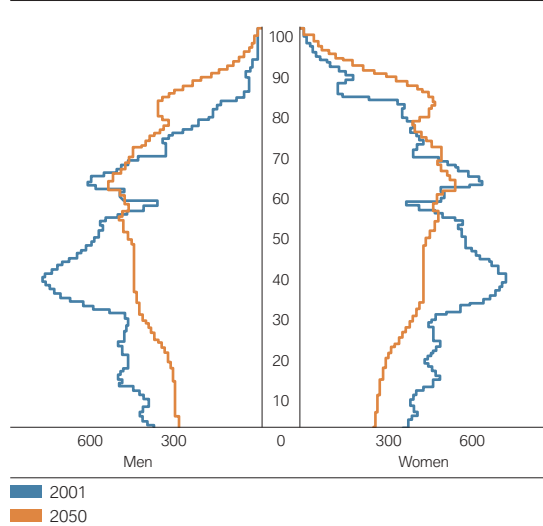
**Today for tomorrow: recognising and seizing opportunities**

The challenges of the future are well-known, the targets have been set. That is why the BMW Group launched the project "Today for tomorrow" in March 2004. It is to use the continuous demographic change as an opportunity for the Company. In this project, existing measures to protect and promote health are to be enhanced and new approaches developed.

Measures currently include the development of a "lifelong health programme" with specific health protection measures for every age group. Various pilot projects in the field of further education promote willingness and ability to learn throughout the employee's entire working life. They enable

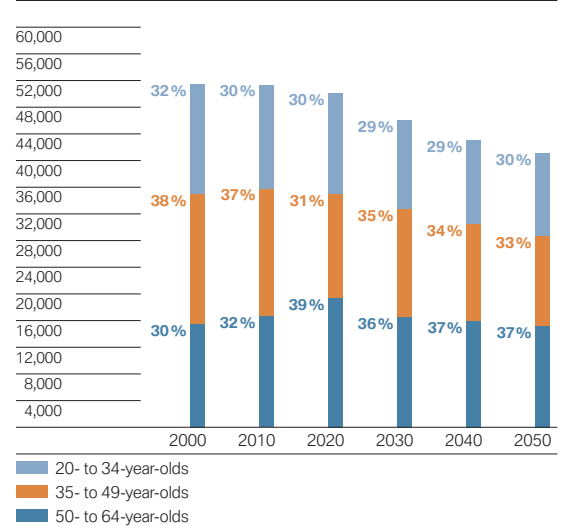
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**Comparison of the age pyramid in Germany 2001/2050**  
in thousand/Age in years



Source: Federal Statistical Office 2003

**Age structure of the working population in Germany**  
in thousand



Source: Federal Statistical Office 2003

employees to recognise their strengths and apply what they have learnt even more purposefully in their work.

By the end of the decade, the project also aims to develop new early retirement part-time working arrangements that will permit a flexible end of the work phase in future, because many employees like to retire from working life before reaching the statutory age for retirement. For years, the BMW Group has carried out measures to heighten awareness of demographic changes. For example, it informs its employees in internal communications about the demographic changes and encourages them to take responsibility for themselves by offering two private pension schemes: the deferred remuneration retirement scheme and the “Riester” deferred remuneration retirement scheme. With these, employees can supplement the statutory and company pension schemes and thus arrange their provisions for retirement more flexibly.

The project “Today for tomorrow” defines the relevant fields of action. In the following months, the measures will be developed and gradually put into practice. Afterwards, the BMW Group will turn the packages of measures into a programme for an unlimited period. For so much is certain: the change in the population and thus in society and industry will continue undiminished in the decades to come.



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## 5 Social responsibility – an aspect of sustainability

“We assume responsibility” – following this principle, the BMW Group strives to contribute actively to safeguarding and developing society at all its locations and beyond. A company’s success depends in no small way on a stable social environment. Therefore, the BMW Group helps to shape important conditions – to the benefit of everyone concerned – and integrates social programmes into its sustainability strategy. The BMW Group derives the core themes of its social commitment from its corporate objectives and its corporate culture, which combines success orientation, cosmopolitanism, trust and transparency. These themes are traffic safety, education, intercultural exchange, the fight against HIV/AIDS, particularly in South Africa, as well as art and culture. Our long-standing commitment not only promotes the employees’ identification with the Company, but also substantiates and strengthens society’s trust in the BMW Group as a reliable partner and thus enhances the Company’s reputation both within its ranks and among the public at large.

## Taking responsibility, contributing to society

### Trust needs partners

Political, social and economic stability are based on trust. In this respect, it is decisive that companies, as part of society, take their social responsibility. In addition to responsibility for employees and shareholders, customers and business partners, social commitment plays an important role for the BMW Group. For decades, the Company has encouraged the establishment of permanent partnerships. The commitment focuses on children and youngsters all over the world as well as on people in the vicinity of the locations in order to shape social developments. In doing so, the BMW Group acts as commissioning body and initiator of these social projects. Its worldwide approach is to provide help for self-help for the people, groups, towns or communities concerned. In addition, the BMW Group supports selected international art and culture projects. In the last two years, the Company has spent an amount in the two-figure millions on the support and implementation of social, cultural and humanitarian projects all over the world. The commitment that employees worldwide contribute to the Company's social programmes and the use of the Group's various resources increase the value of the projects way beyond the amount invested.

[www.bmwgroup.com/socialcommitment](http://www.bmwgroup.com/socialcommitment)

### Tackling problems locally

Social responsibility always begins locally for the BMW Group. The political and cultural identity of the neighbours, but also social or economic problems create an individual environment at each location. With its neighbourhood activities the BMW Group

takes account of these different conditions at the individual locations and promotes social facilities or local events. In South Carolina, home of the Company's US plant in Spartanburg, for example, the BMW Group supports the "Call me MISTER" project of Clemson University. This project aims to raise the share of African American primary school teachers – currently only around one percent – so that it is more in line with the approximately 40 percent share of ethnic minorities in the population. Therefore, universities with a high proportion of African-American students are selectively promoting teacher training.

The spread of HIV/AIDS is a burning issue in South Africa. The social activities of BMW South Africa are thus particularly devoted to the fight against the immune deficiency disease. In the local health programme "AID for AIDS," the BMW Group supplies infected employees and their families, for example, with the drugs they need. The programme is completed by advice on diet and lifestyle, as well as health checks and psychological counselling. Twice a week a psychologist offers counselling in the Rosslyn plant and, upon request, with the families of those infected with HIV. Almost nine out of ten employees have taken part in voluntary HIV screening and counselling.

Although the measures of BMW South Africa are successful, a far broader commitment is required in order to fight the immune deficiency disease effectively. That is why the BMW Group also includes the subject of HIV/AIDS in projects that primarily pursue other objectives. SEED, the Schools Environmental Education Development project, is one such example. BMW South Africa supports more than 60 South African schools where children learn a responsible approach to the environment and the basics about a healthy diet. In South Africa, the fight against HIV/AIDS is an integral part of the Company's social commitment and its health protection pro-

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above -- Learning environmental and health awareness with ease: children in the SEED project  
 below -- The MINI Child Traffic Safety Training School in Ravensburg



gramme. The BMW Group is currently planning to transfer BMW South Africa's successful programmes to its locations in China, Russia and Thailand.

Employees at other BMW Group locations support their South African colleagues' commitment. For example, the BMW retail outlets in the USA, Great Britain, Germany, Australia and New Zealand took part in the fund-raising campaign in honour of the tenth anniversary of democracy in South Africa and also collected for the Nelson Mandela Children's Fund. To mark the occasion, BMW South Africa had produced and auctioned off a limited edition of ten BMW 3 Series automobiles. The proceeds were used for the fight against HIV/AIDS. The BMW Group also supports AIDS sufferers in Thailand. There it provides the patients of an AIDS hospital with drugs, clothing and food. The range of activities at the individual locations is complemented by the Company's support of global initiatives against the immune deficiency disease. For the fifth time, the BMW Group supported the Viennese Life Ball, one of the world's most important charity events for the fight against the immune deficiency disease. In 2005, the fashion house Versace designed a MINI Cooper Convertible for the Life Ball.

[www.bmw.co.za](http://www.bmw.co.za)

[www.lifeball.org](http://www.lifeball.org)

**Increasing traffic safety**

Increasing traffic safety is a primary task and concern for a manufacturer of automobiles and motorcycles. The BMW Group increases not only the active and passive safety of its products, but also assumes responsibility for road users in general. Together with external partners it develops and carries out traffic safety projects. Its programmes target, first and foremost, children, youngsters and young licence-holders.



above -- The model project "Schools in society" combines practical work experience and school teaching.  
 centre -- "Tatfunk" on air  
 below -- Numerous projects promote traffic education for children and youngsters all over the world.

Children are particularly exposed to the dangers of road traffic. With the first MINI Child Traffic Safety Training School, which opened in the spring of 2004, the BMW Group enables children to learn with ease how to behave correctly in road traffic. The BMW Group has provided 34 electric MINI automobiles for training on the safety track at the Ravensburg Playland on Lake Constance. Here children from primary school age learn the most important traffic regulations in theory and in practice.

In contrast, the campaign "School route maps for infants", initiated by the BMW Group in 1995, is for children in their very first year at school. More than 600 primary schools in Berlin and Munich now take part in this programme in which each child is given its own school route map to ensure that it can safely get to school and back home again. The traffic safety organisation "Verkehrswacht", parents' associations and the police all cooperate on this programme.

The project "Ability through experience" offers new licence-holders practical courses on vehicle handling and tips to increase safety in road traffic. Together with the traffic safety organisation "Verkehrswacht", the BMW Group offers free safety training for young drivers in Bavaria. The result: Young people who take part in the course cause one-third fewer road accidents than other drivers of the same age group. The BMW Group has offered driver safety training courses of different levels since 1977. While the compact training units address drivers between the ages of 18 and 25, advanced training courses are for experienced drivers, and intensive or perfection training focuses on driving at motorway speeds. Around 15,000 drivers in 13 countries now take part in the BMW Group's driver training events each year.

Projects to increase traffic safety extend beyond the German frontiers. In Argentina, for example, the BMW Group organises lectures on road safety at high schools. Argentina has around 1,000 road





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deaths a year and thus significantly more than comparable countries. The accidents are caused mainly by negligence, fatigue and alcohol consumption. Young drivers in particular underestimate the dangers of road traffic. Thus, almost 20 percent of the road fatalities are young people between the ages of 16 and 24. The lectures at the schools aim to inform young drivers about safety regulations and the dangers of road traffic.

In China, the BMW Group is carrying out a similar project to draw children's attention to the dangers of road traffic, for more than 70 children are involved in serious accidents on Chinese roads every day. In this project, launched in 2005, the Company cooperates closely with the education departments of various Chinese metropolises in order to offer more than 400 kindergartens and primary schools traffic education events each year. In its programme "Slow-ing down for children," and with the support of the traffic police, the BMW Group teaches children how to behave correctly in road traffic. The cartoon figure "A Bao" indicates the most dangerous situations in road traffic and gives tips on how to avoid them. This playful element holds the children's attention and their interest in the traffic education programme.

### **Education: strengthening key qualifications**

By taking its responsibility in the field of education, the BMW Group contributes to a competitive society that thinks sustainably. Ultimately, the Company also benefits from this as it requires well qualified employees and depends on a productive society in general. As in its traffic education projects, the BMW Group cooperates with external partners from science and practice in its education projects for young people. In China, demand for a basic general education is strong, particularly for weaker groups of society. The BMW Group has cooperated with the China Youth Development Foundation in this field since 2005 so that migrants' children can continue

schooling after they move to the capital Beijing. In contrast, in industrial nations, the BMW Group's objective is to impart technical knowledge and, at the same time, to promote key social skills for working life.

The model project "Schools in society" combines school teaching and practical work experience and brings real working life into the classroom. As external experts, employees of the BMW Group are involved in classes, some of which are held in the training halls at BMW plants. One secondary school each took part in this project at the Regensburg, Dingolfing, Landshut, Munich and Berlin production plants. The BMW Group initiated the project and implemented it together with the Free University (FU) Berlin and the Bavarian Ministry of Education. In the spring of 2005, the project came to an end and was evaluated jointly.

The idea of involving external experts in classes was taken up in a school project called "Tatfunk". This journalism project aims to develop key social skills for the working world, such as team and communication ability and willingness to shoulder responsibility, among pupils in their final years at high school. Initially promoted as a model project, these practical "Tatfunk" classes are now held, on the pupils' own responsibility, at 20 schools throughout Germany. Within a year, the pupils in the top class produce complete radio programmes in an independent course. Supported by an editor, the youngsters work as a radio editorial team and learn the fundamentals of journalism. At the end of the year, radio experts assess the programmes produced and give the up-and-coming journalists feedback. The partners of the BMW Group and the Eberhard von Kuenheim Foundation in the "Tatfunk" project include the Bavarian Broadcasting Corporation (BR) and the Bavarian Ministry of Education.

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

The BMW Group compiled interdisciplinary teaching materials on the “Fascination of automotive engineering” and materials on the hydrogen technology project “H<sub>2</sub> – Mobility of the future” in cooperation with educational institutes. Both collections of materials are available in German and English. The information in the folder on “Hydrogen expertise” is suitable for teaching at Chinese universities. The materials take account of hydrogen-related issues that are specific to China and are written in Mandarin Chinese. The Chinese website on BMW CleanEnergy provides additional information. The folder of teaching materials entitled “Energy moves us” is also devoted to hydrogen and the use of energy. Here the BMW Group addresses 8- to 11-year-old pupils and introduces them to the problems of using fossil fuels as a source of energy. In addition to providing a grounding in the subject, the folder contains information that promotes greater awareness of energy use in daily life.

In Great Britain, the BMW Group has won awards for its online education programmes that inform pupils and teachers about subjects such as traffic safety and BMW CleanEnergy. In 2003, the website, which at peak times records 1.4 million visits a month, received the International Visual Communications Award in Gold for its innovative CleanEnergy education programme. The website for education programmes also achieved the highest level when applying the standards set by the World Wide Web Consortium (W3C) for the accessibility of website services for disabled people.

[www.bmweducation.co.uk](http://www.bmweducation.co.uk)

The BMW Group promotes up-and-coming scientists, for example with the Scientific Award. Every two years this prize is awarded to graduates who have written a groundbreaking dissertation. It was first awarded in 1991 and, with prize money of euro 70,000, it is one of the highest-paid research prizes in the world. In 2005, some 230 aspiring scientists from 26 countries took part in the competition. Theses were submitted from 24 disciplines ranging from mechanical engineering through computer sciences and electrical engineering to medicine, architecture, law and cultural sciences. In this competition with the motto “Passion for Innovation”, three prizes were awarded for doctor’s theses and three for master’s or bachelor’s theses. Researchers can usually only turn their results into successful products and processes if they have access to suitable networks. Thus, young scientists also see the Scientific Award as an opportunity to exchange views with other researchers and representatives from industry and science. The BMW Group organises regular gatherings of alumni and their professors so they can deepen contacts with one another. In 2005, the prize was awarded at the BMW plant in Leipzig.

[www.bmwgroup.com/scientific-award](http://www.bmwgroup.com/scientific-award)

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above -- Learning from one another is fun: pupils of Kapellen-Volksschule in Augsburg at the BMW Group Award for Intercultural Learning in 2005

below -- Professor Anand Kumar, Jawaharlal Nehru University, New Delhi, India, explains the Global Studies Programme. In this intercultural learning project, 30 participants from 18 different nations study globalisation from a social sciences perspective.



### Intercultural learning for understanding and tolerance

Understanding and openness towards other cultures, while maintaining one's own cultural identity, are increasingly important at a time of transition from national to global societies. The BMW Group operates in more than 130 countries and has employees from more than 90 nations in Germany alone. Against this background, intercultural understanding is not only a moral obligation but also an economic necessity for the BMW Group. That is why the Company initiated projects and programmes to counter racism, intolerance and violence and thus create an atmosphere of acceptance and equal treatment of cultures both within and outside the Company.

The BMW Group first became actively involved in this area 25 years ago with an exchange programme for employees' children. Today, projects range from media packages and online services through theatre performances and teaching materials to international prizes for scientific work and practical projects. In 2005, the BMW Group Award for Intercultural Learning was presented for the eighth time. The University of Bremen received the award for the pilot study "The Culture of the Intercultural", while the Albert-Ludwigs-University of Freiburg, the University of KwaZulu-Natal in Durban, South Africa, and the Jawaharlal Nehru University in New Delhi, India, were awarded for their two-year Global Studies Programme leading to a master's degree. In previous years numerous international projects from the school and pre-school sector had won the award. The BMW Group has itself been honoured for its intercultural commitment. In 2004 it received the German-Turkish Friendship Prize.

[www.bmwgroup.com/award-life](http://www.bmwgroup.com/award-life)

## Worldwide commitment to cultural variety

### Preserving uniqueness

The BMW Group has been committed to art and culture for more than three decades. The Company promotes around 100 high-quality projects all over the world and thus supports exchange with its cultural environment at both local and global level. Both the Company's employees and interested members of the public take part in this exchange. The BMW Group's Cultural Communications support performing and fine arts, music and discussion forums. It also initiates numerous programmes for culture in the Company. While the BMW Group encourages permanent partnerships for its cultural projects, it also ensures, by way of principle, that art and culture retain their independence. After all, freedom is just as important for groundbreaking work in the arts as it is for major innovations in successful companies. The BMW Group aims to promote projects that express a country's cultural uniqueness. Thus, its cultural programme includes the ideas of its employees worldwide.

### International cultural events

In 2003, Federation Square opened in the heart of Melbourne, Australia. The ultramodern centre for cultural and other events houses cafés, cinemas, restaurants and the BMW Edge at Federation Square – an amphitheatre for 450 spectators. Many events promoted by the BMW Group are held in this futuristic theatre made of steel, zinc and glass. These include the BMW Youth Music Blast: The winners of the youth competition "Generations of Jazz in Mount Gambier" have an opportunity to appear here with the legendary jazz musician, James Morrison.

[www.bmw.com.au](http://www.bmw.com.au)

The European Music Summer Berlin, young.euro.classic, has been held with the BMW Group as "first partner" since the year 2000. This yearly festival in the Konzerthaus on Berlin's Gendarmenmarkt brings together youth orchestras from all over Europe. In 2004, the campus project proved a real highlight. For a week, two orchestras from Latvia and Spain teamed up and regrouped to rehearse together works by Ludwig van Beethoven, Arvo Pärt and Gustav Mahler. They then gave 15 concerts to a total of 21,500 people.

[www.young-euro-classic.de](http://www.young-euro-classic.de)

The BMW Group promotes the Concours d'Architecture as cooperation partner. Launched in 1998, the competition on mobility-related themes is usually held every two years and all of France's 24 academies of architecture take part. In 2003, competitors had to design a tram station. An international jury assessed the 250 entries before they were presented to the public in a four- to six-week exhibition. Entrants in the Concours d'Architecture 2005/06 have to submit a design for a residential building that includes accommodation for the disabled. The students have the task of designing a building in a high-quality environment that meets the mobility requirements of people with disabilities.

[www.bmw.fr](http://www.bmw.fr)

With the support of the BMW Group, Opera Ireland stages its programme in Dublin's Gaiety Theatre for a week in spring and autumn. Founded in 1941, the opera house has been Ireland's largest national opera company since the mid-1990s. The SMS Summer Opera School focuses on the promotion of young musicians. Once a year, the opera master classes bring together students from all over the world. Supported by the BMW Group and the Irish Times, Opera Ireland also organises a series of public lectures on opera-related themes.

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

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above -- "Opera for all" in Munich: free admission to an open-air treat for music-lovers  
 centre -- More than 1,300 artists regularly take part in the Festival de México, which is held all over Mexico City.  
 below -- The orchestra of the Conservatory of Music Beijing opens the young.euro.classic festival in Berlin 2005.

The BMW Group has been a partner of the Festival de México in Mexico City since 1996. More than 1,300 artists take part in this international festival, which regularly attracts more than one million visitors. Most of the music, theatre, dance, cinema and fine arts events are held in the open air on the squares and boulevards of the Mexican metropolis. The BMW Group's support is mainly for opera and music at the festival.

In China, the BMW Group focuses on promoting young, talented artists from the fields of contemporary art, theatre and music. For example, in 2004 the Conservatory of Music Beijing, which is assisted by the BMW Group, played in the Sun Yat-sen concert hall in Beijing. The Company also supports co-operation between the Conservatory and the International Beethovenfest in Bonn. Festivals have been held with both partners since 1999. In 2005, the BMW Group enabled the youth orchestra of the Conservatory of Music Beijing to take part in the young.euro.classic festival in Berlin. Another project helped the young Chinese director Cao Kefei, who studied stage management in Germany and Switzerland, to have her play "Terminal Beijing" performed in Beijing. In the field of fine arts, the BMW Group supported an exhibition of photographs by the famous German film director Wim Wenders, which was shown in Beijing, Shanghai and Guangzhou. [www.bmwgroup.com/culture](http://www.bmwgroup.com/culture)



**Concrete example --**

## Commitment with heart and mind.

### Low HIV infection rate due to prevention and information programme at BMW South Africa

Politicians and VIPs recommend the life-saving use of condoms on huge billboards along the motorway from Johannesburg to Pretoria, on television and on the radio. At the BMW plant in Rosslyn, not far from the South African capital Pretoria, free condoms in the washrooms have long been the norm. Life is saved in these rooms, or rather people save their own lives here. Thanks to years of information campaigns, after washing their hands employees automatically reach twice into the red and blue metal box next to the towel holder where they simply cannot miss “BMW cares – do you?”. The first time they pull out a tiny silver-grey plastic bag with a red ribbon with “Not for sale” and the “AIDS helpline” printed on it. And the second time they get a small brochure, “Why and how you should use condoms”. Instructions for survival.

Condom dispensers in the washrooms are just one part, but perhaps the most common and, at the same time, most striking part of the comprehensive anti-HIV/AIDS programme with which BMW South Africa has been fighting the further spread of the epidemic in South Africa for the last four-and-a-half years. In terms of total population, the country has the highest number of infected people in the world. Around 5.6 million of the 45 million South Africans are infected – that is every eighth person. Forty per cent of deaths among adults are due to AIDS; each year around 600,000 people become infected with the virus. Well over half a million AIDS orphans live in South Africa; by 2010 they will number around two million.

The HIV/AIDS Workplace Programme at BMW South Africa focuses on voluntary HIV testing, along with information campaigns, counselling, a company health insurance, a women’s forum – three out of ten South African women are victims of sexual abuse – and, if necessary, the treatment of HIV and AIDS patients. The peer educators are particularly important

for the programme’s success. These are employees who even in their free time motivate their colleagues and their colleagues’ families and friends to be tested and counselled.

The programme extends not only to the 3,000 or so employees in Rosslyn, but also, as demanded by AIDS activists, to their family members and in future to the BMW dealership organisation and suppliers. BMW South Africa plays a pioneering role in the Cape. If necessary, BMW South Africa also meets the costs of drugs for family members of up to rand 1,200 (almost euro 150) per month; since drug prices have fallen this is sufficient cover.

Wolfgang Stadler, President of BMW South Africa, refers with some pride to the success of the programme, which is based on what he calls a “culture of trust”. He says around 86 percent of the employees have already undergone voluntary testing, the BMW employees’ problem awareness and knowledge are way above the national average and the number of new infections thus well below it. Stadler has no problems admitting that it is not only a company’s duty to care for its employees that drives BMW South Africa to fight against HIV/AIDS, but also level-headed economic reason. Stadler says the new South Africa is “on the right path” and the location is promising. Of course long absences of employees infected with HIV or suffering from AIDS should be avoided; after all, the Company has paid good money to train them. From this point of view, social commitment is not just a matter of the heart but also of the mind, which is why managers talk of “social investment”.

Ernst Baumann, BMW Group Board Member for Human Resources, goes one step further. He no longer sees social investment as a soft factor. BMW is not just the most popular company in South Africa because of the quality of its vehicles. “A large part of our success is due to our focus on society,” says

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01 -- The employees of the BMW plant in Rosslyn show their solidarity against AIDS.

01

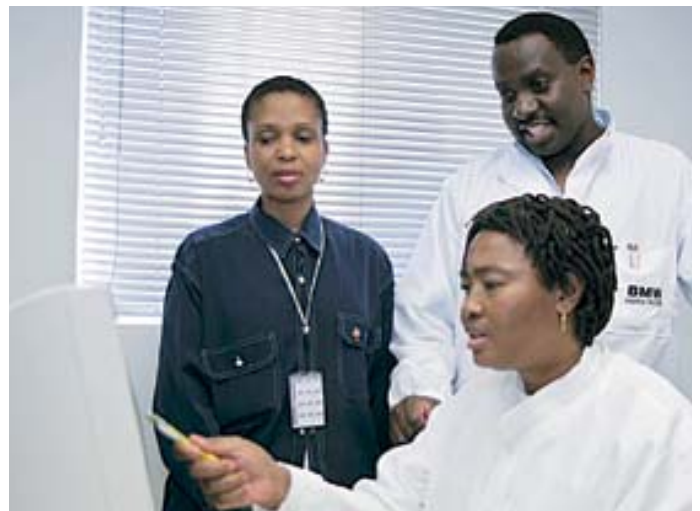
02 -- The Multi-Purpose Health & Wellness Center in Soshanguve

03 -- Personal counselling is just one of the many health programme options at BMW South Africa.

02



03



the 57-year-old who was himself Plant Director of BMW South Africa at the beginning of the 1990s. In a world – not just in South Africa – in which social cohesion is eroding increasingly, it is not enough for companies simply to offer convincing products, “They must also be accepted as companies.” Baumann warns companies against cutting social investment first when times are difficult. “If you do that you lose acceptance – and revenues.”

In the eyes of South African AIDS activists, such as the Treatment Action Campaign (TAC), BMW South Africa is in the vanguard in South Africa’s fight against HIV/AIDS. In a debate between TAC activists and government representatives in Pretoria, organised by BMW South Africa, hope spread that the national unity required to fight this fatal immune deficiency disease would evolve.

However, the South African government has not yet taken the leading role in the fight against HIV/AIDS. This makes industry’s commitment all the more important. That is why BMW South Africa, together with other companies, supports the South African Business Coalition against HIV/AIDS (Sabcoha). The organisation coordinates the companies’ anti-AIDS programmes, heightens public awareness of the problem with campaigns and acts as a pressure group on the government. According to Sabcoha spokesman Brad Mears, there is still a long way to go, “The fight against AIDS is not a 100 metre sprint, but a marathon. So it is really helpful when several companies take over the leadership tasks – like BMW.”

These leadership tasks include social investment beyond a company’s own horizons, if the fight against AIDS is to be successful. BMW South Africa realised this and extended its commitment to its employees’ communities. This does not always involve money. It is sometimes far more effective to contribute its know-how. For example, at the end of April 2005 a health and wellness centre was opened in Soshanguve, home of every fifth employee at the Rosslyn plant. BMW South Africa was responsible for project management. Up to 5,000 people a month now stream to the centre. In the early morning, a queue of people already winds round the flat brick

building, which houses treatment, computer and community rooms all under one roof. As part of the project, the locals grow vegetables around the community centre. Nearby, vegetables are also grown in the SEED schools (School Environmental Education Development project, supported by BMW South Africa), where environmental awareness is integrated into the syllabus. This is a major contribution to both self-sufficiency and a healthy diet, which is of paramount importance for people with HIV.

The Multi-Purpose Health & Wellness Center in Soshanguve, as it is called officially, is far more than a health centre – it is a social centre. A place where people meet and help one another, and where AIDS information and counselling brochures are, of course, always available.

BMW Group Board Member Ernst Baumann came specially to Soshanguve for the centre’s inauguration, but it was also Dr. Natalie Mayet’s big day. She is described by her colleagues as a stroke of luck for the Company. Dr. Natalie Mayet runs BMW South Africa’s health service and is thus responsible for the anti-HIV/AIDS programme. She is the driving force behind the social investment – and at the same time its face. And she is the one who had to tell 189 men and women, around six percent of the BMW employees, that they were HIV-positive. Only she and her staff know the names, infected employees remain anonymous to their colleagues and superiors. That is the basis of a culture of trust.

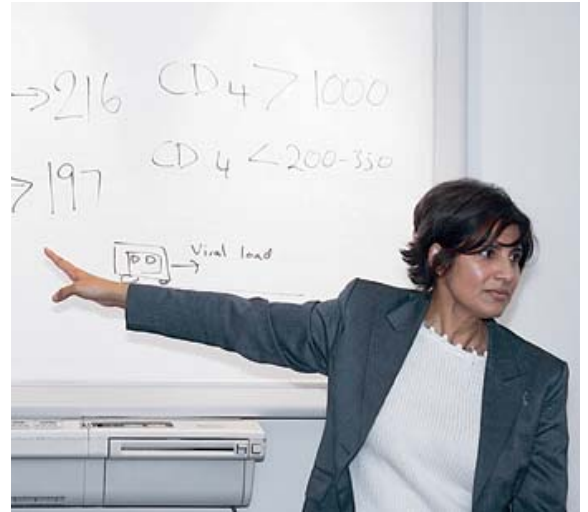
When she talks to patients with HIV-positive test results, Dr. Mayet explains, she tries to point out that it often takes years before AIDS breaks out, that a change of lifestyle, healthier diet, less alcohol can help to delay the outbreak, as can drugs, that those affected can still work, still look after their families, in short: that they can still live. Before the days of information and counselling campaigns, the BMW employees would have understood the diagnosis “HIV-positive” as a death sentence. “I’ll buy myself a coffin and wait for death” was the general attitude. Today that has all changed. “The people know that they can be helped – they know that they have a perspective.”



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01



02

01 -- Information and counselling are decisive in the fight against HIV/AIDS.

02 -- Dr. Natalie Mayet, Head of the Health Service, explains how people infected with HIV can be helped with drugs and the right diet.

03 -- Final preparations for the official opening of the Multi-Purpose Health & Wellness Center in Soshanguve

03



<b>BMW Group key figures<sup>1)</sup></b>		2000	2001	2002	2003	2004
<b>Vehicle production</b>						
Automobiles <sup>2)</sup>	units	834,519	904,335	1,090,258	1,118,940	1,250,345
Employees in production <sup>3)</sup>	number	52,254	58,286	60,294	62,354	63,731
Complaints from local residents <sup>4)</sup>	number	74	159	146	102	58
Land development <sup>5)</sup>	%	–	20.4	–	21.5	–
Property area	m <sup>2</sup>	–	15,301,975	–	15,746,127	–
<b>Energy consumption</b>						
Energy consumption, total	MWh	2,636,565	2,788,126	3,503,102	3,295,277	3,672,212
Energy consumption per unit produced	MWh/unit	3.16	3.08	3.21 <sup>6)</sup>	2.94	2.94
Electricity (outside source)	MWh	1,163,233	1,262,232	1,180,217	1,501,045	1,586,457
Electricity (produced internally)	MWh	94,757	83,331	95,057	115,323	127,981
Heating oil	MWh	23,729	21,727	27,536	22,237	17,008
Coal	MWh	0	0	0	0	0
Community heating	MWh	117,896	297,025	166,159	209,677	187,418
Mineral oil	MWh	0	0	0	0	0
Natural gas	MWh	1,236,950	1,207,142	2,129,190	1,562,309	1,881,329

1) BMW Group key figures include the following automobile and engine production plants worldwide: automobile production, Dingolfing; component assembly, Landshut; automobile and engine production, Munich; automobile production, Regensburg; automobile production, Rosslyn, South Africa; automobile production, Spartanburg, USA; engine production, Steyr, Austria; from 2002 MINI production, Oxford, UK, and from 2003 engine production, Hams Hall, UK.

2) 2000 and 2001 only BMW automobiles included due to start-up of MINI production in 2001

3) figures for automobile production excluding apprentices

4) increase since 1998 due to outdated CDP dryer in Munich paint shop/completion of new building for pre-treatment by 2002

5) proportion of developed to undeveloped area. Survey conducted every two years.

6) higher energy intensity due to continuing conversion to environmentally friendly water-based and powder-based painting technology.

<b>BMW Group key figures</b> <sup>1]</sup>		2000	2001	2002	2003	2004
<b>Capital expenditure</b> <sup>2]</sup>						
Investment in environmental protection (excl. large-scale investment)	euro million	15.8	15.9	20.7	25.3	34.2
Ongoing expenditure on the environment	euro million	31.5	32.1	33.2	33.5	40.5 <sup>3]</sup>
<b>Emissions</b>						
Carbon dioxide (CO <sub>2</sub> ), total <sup>4]</sup>	t	870,862	897,507	1,068,690	1,125,939	1,169,786
CO <sub>2</sub> per unit produced	t/unit	1.04	0.99	0.98	1.00	0.94
Nitrogen oxide (NO <sub>x</sub> )	t	476	404	481	533	559
Sulphur dioxide (SO <sub>2</sub> )	t	6	6	7	10	10
Carbon monoxide (CO)	t	244	277	283	315	399
Volatile organic compounds (VOC)	t	2,679	2,780	3,521	3,219	2,817
VOC per unit produced	kg/unit	3.21	3.07	3.23 <sup>5]</sup>	2.88	2.26
Particulate, dust	t	37	34	28	38	43
<b>Water</b>						
Wastewater, total	m <sup>3</sup>	2,206,733	2,085,809	2,324,655	2,419,775	2,239,646
Water consumption/Water input	m <sup>3</sup>	3,344,939	3,391,628	3,618,995	3,633,135	3,789,703
Process water input for production, total	m <sup>3</sup>	2,481,127	2,277,757	2,293,257	2,105,625	2,469,001
Process wastewater	m <sup>3</sup>	882,286	971,938	998,917	1,101,988	1,041,526
Process wastewater for production per unit produced	m <sup>3</sup> /unit	1.06	1.07	0.92	0.98	0.83
Total heavy metals and heavy metal compounds	kg	318	318	347	412	439
<b>Waste</b>						
Waste, total	t	291,082	305,634	317,129	399,876	397,151
Waste, total per unit produced	kg/unit	349	354	291	357	318
Materials for recycling	t	268,998	279,492	295,275	372,268	375,924
Waste for removal	t	22,084	26,141	21,854	27,301	21,227
Scrap	t	297,838	317,920	326,364	315,222	344,746

1] BMW Group key figures include the following automobile and engine production plants worldwide: automobile production, Dingolfing; component assembly, Landshut; automobile and engine production, Munich; automobile production, Regensburg; automobile production, Rosslyn, South Africa; automobile production, Spartanburg, USA; engine production, Steyr, Austria; from 2002 MINI production, Oxford, UK, and from 2003 engine production, Hams Hall, UK.

2] figures for the German production plants

3] from 2004 including Leipzig plant

4] including CO<sub>2</sub> emissions from external power generation

5] structural increase in 2002 due to new method of calculation in accordance with the VOC Regulation (31st Regulation on the Implementation of the Federal Immission Control Act)

**A****ACEA**

European Automobile Manufacturers Association (Association des Constructeurs Européens d'Automobiles).

**Audit**

Assessment of a company's environmental management system.

**Auxiliary Power Unit (APU)**

Supplies electrical power for vehicle's on-board network.

**B****BMW CleanEnergy**

The BMW Group's initiative for a sustainable energy strategy that aims to develop products that are in keeping with the idea of sustainability and meet responsibility for the future. The BMW Group therefore promotes the use of hydrogen as fuel of the future. In doing so, the Company favours the hydrogen-powered combustion engine because it best meets its customers' requirements in terms of power, dynamic performance, costs and sophistication.

**C****Carbon dioxide (CO<sub>2</sub>)**

Results mainly from burning fossil fuels, such as coal, oil and natural gas. CO<sub>2</sub> is a primary contributor to global warming.

**Clean Energy Partnership (CEP)**

CEP is part of the German Federal Government's sustainability strategy that aims to develop the infrastructure required to generate, and fill up with, hydrogen as well as to test corresponding vehicles under routine driving conditions. The BMW Group is participating in the five-year project in cooperation with federal ministries and various other companies.

**Cleaner Production**

Declaration of the United Nations Environment Programme (UNEP). In September 2001, the BMW Group signed the declaration, thereby reinforcing its commitment to environmentally responsible production.

**ConnectedDrive**

The BMW Group uses this term to describe the interaction of driver, vehicle and other traffic and conditions on the road. The aim is to collect as much information as the driver needs and wants as individually and as ergonomically as possible. The three elements of ConnectedDrive – telematics, online services and driver assistance systems – make driving safer, more efficient and pleasanter.

**Customer-oriented Sales and Production Process**

The overriding objective of the customer-oriented sales and production process is to give customers their individual automobile on the agreed date.

**D****DIN EN ISO 14001**

A series of standards for environmental management systems for use in all types of companies worldwide. Includes guidelines for environmental audits, which in contrast to the EU Eco Audit do not have to be published. Since April 1997 it has been possible to link the ISO 14000 standards with the EU Eco Audit.

**DJSI World**

Dow Jones Sustainability World Index, index family created by Dow Jones and the Swiss agency SAM Sustainable Asset Management for companies with strategies based on a sustainability concept. The BMW Group has been one of the leading companies in the Dow Jones Sustainability indexes since 1999.

**E****Econsense**

Forum for Sustainable Development, initiated by the Federation of German Industries (BDI), but with its own legal personality. The BMW Group is one of the founder members of this organisation, which was established in the summer of 2000.

**EMAS**

Eco Management and Audit Scheme, a management tool that allows companies and organisations to evaluate, report on and improve their environmental performance.

**F****FIZ**

The German acronym for the BMW Group's Research and Innovation Centre in Munich. Serves as a link between research and series production.

**Fleet consumption**

Weighted average fuel consumption of the new vehicles of a single manufacturer or of the entire automobile industry registered in the reporting period.

**FTSE4Good-Index**

Share index of Financial Times and London Stock Exchange, in which the BMW Group has been included. FTSE4Good listings depend on adherence to environmental and ethical criteria (environmental compatibility, stakeholder relations, observance and promotion of human rights).

**Fuel cell**

An electro-chemical energy converter that combines hydrogen and oxygen to produce water ("cold combustion"), thereby generating electrical power with a high efficiency factor.

**L****Lightweight engineering**

A key technology for reducing fuel consumption. Lowering vehicle weight by 100 kg can save up to 0.3 litres per 100 km.

**M****Methane (CH<sub>4</sub>)**

Gaseous hydrocarbon; main component of natural gas. Forms, for example, when fossil fuels are not completely burned or as a result of fermentation processes (biogas). Not toxic to humans, but a contributor to global warming.

**O****Online ordering**

Online ordering helps to significantly increase flexibility in modifying individual customer orders, speeds up order processing and permits, at the time of ordering, confirmation that the vehicle can be completed as required and delivered on the agreed date. An important component of the customer-oriented sales and production process.

**P****Production network**

The BMW Group production network comprises 16 plants and eight assembly plants worldwide. The network is characterised by the mutual supply of systems and components as well as productivity and flexibility.

**Powder-based clear paint**

Clear paint is the top coat to be applied to the car body. The BMW Group was the first car manufacturer worldwide to use powder-based clear paint in series production. Powder-based clear paint is emission-free and up to 99 percent recyclable.

**R****Recycling and Dismantling Centre**

In 1990, the BMW Group was the first car manufacturer to establish its own dismantling facilities, as a pilot project, at its Landshut plant. The facilities were developed and then re-opened as the Recycling and Dismantling Centre in Unterschleissheim near Munich in 1994. The recycling centre has been certified in compliance with the German "Altauto-Verordnung" since 1998.

**Renewable resources**

Organic substances of vegetable or animal origin used as raw materials for industry or as energy sources. In contrast to fossil raw materials (e.g. petroleum), these resources are renewed annually or over a reasonable period of time. Applications in the automobile industry include seat upholstery, textiles, rear shelves and insulating materials in doors.

**Resources**

The goals of sustainable resource management include, in particular, the conservation of resources which are not renewable. These resources are primarily fossil organic substances (e.g. petroleum and natural gas) and inorganic substances (e.g. metals, metal ores and rare minerals).

**Risk management**

An integral component of all business processes. Following enactment of the Law on Control and Transparency within Businesses (KonTraG), all companies listed on a stock exchange in Germany are required to set up a risk management system. The purpose of this system is to identify risks at an early stage, which could significantly affect the assets, liabilities, financial position and results of operations and endanger the continued existence of the company. The Board of Management is required to set up such a system, to document it and monitor it regularly with the aid of the internal audit department.

**S****Stakeholders**

Groups with a vested interest in a company. For the BMW Group, these are primarily customers, employees, shareholders and special interest groups, as well as municipalities worldwide where the BMW Group operates.

**Sustainability**

Sustainability or sustainable development takes equal account of environmental, social and economic development. In 1987, the UN Commission on Environment and Development defined sustainability as a development that satisfies the needs of the present generation without endangering the bases for life of future generations. For the BMW Group, the economic relevance of sustainability is seen in three elements: resources, reputation and risks.

**T****Telematics**

Products and services designed to enhance mobility and traffic safety through advanced telecommunications and satellite-based positioning systems (GPS).

**TES**

Transport Energy Strategy. An initiative of leading car manufacturers and energy suppliers with the Federal Ministry of Transport acting as coordinator. Its aim is to assess the potential of all alternative fuels. Current status: hydrogen is the fuel with the greatest potential.

**U****UNEP**

United Nations Environment Programme, established in 1972.

**V****VALVETRONIC**

Thanks to its operating principle, VALVETRONIC permits fully variable valve stroke. It takes over the task of the throttle valve, which is no longer needed. The result is an engine that can breathe freely and thus offers drivers the prospect of lower fuel consumption.

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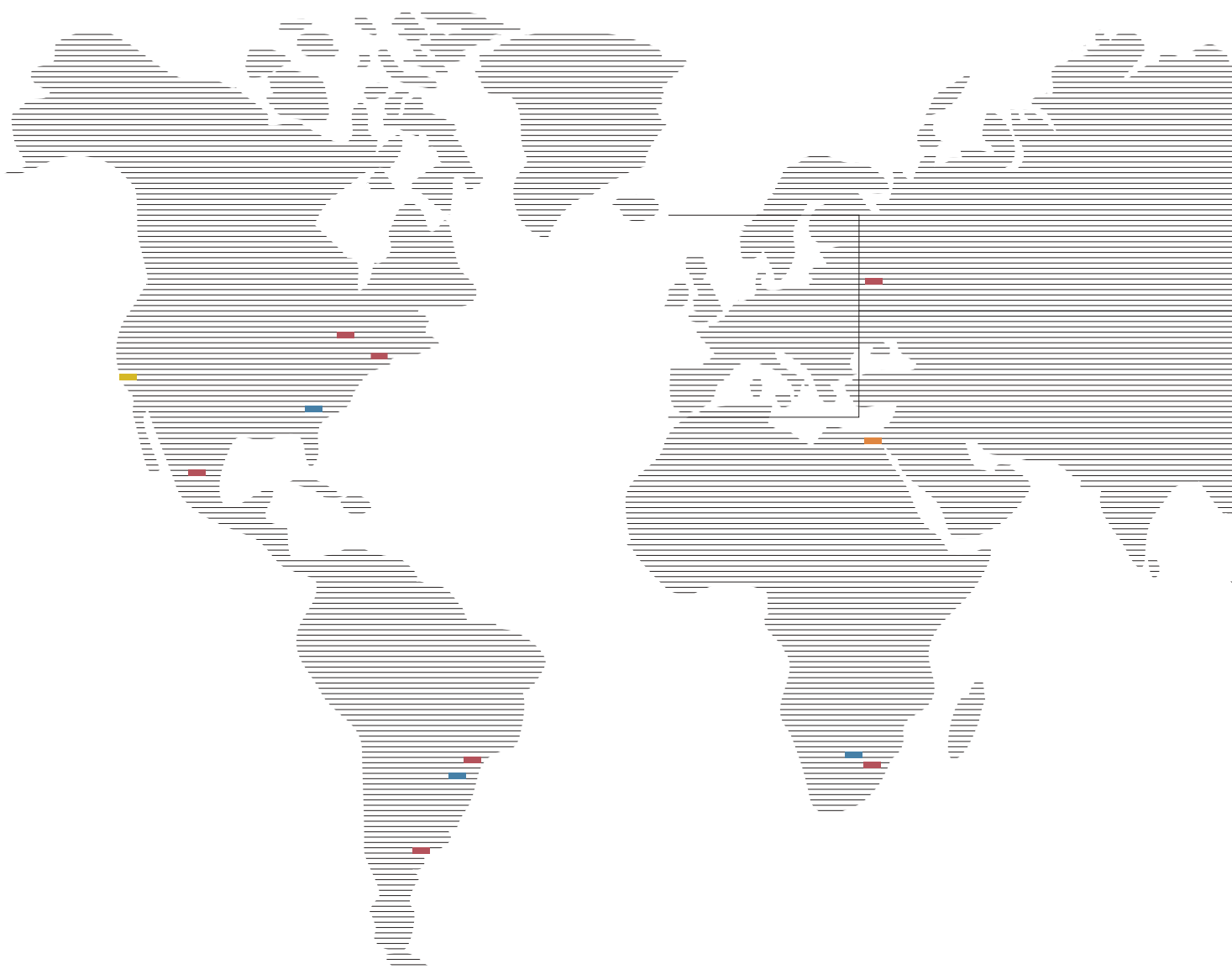
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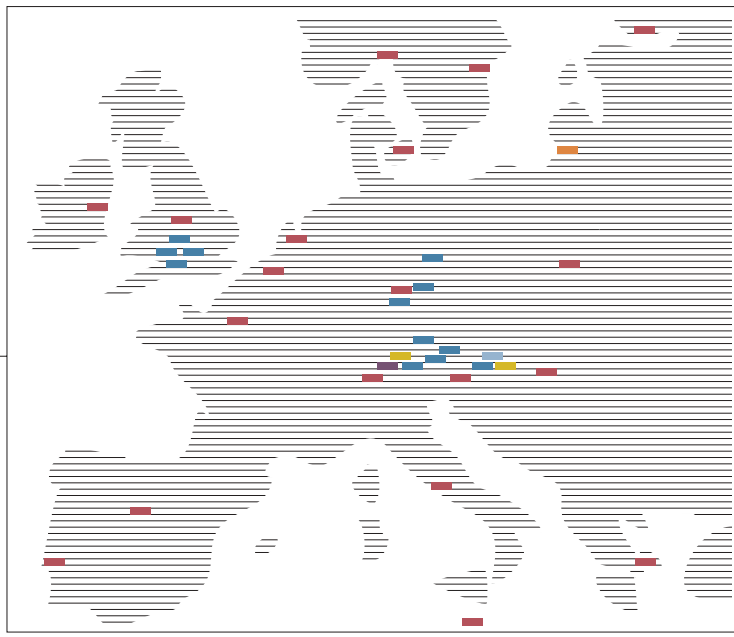
The BMW Group brands on the Internet  
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[www.mini.com](http://www.mini.com)  
[www.rolls-roycemotorcars.com](http://www.rolls-roycemotorcars.com)

## BMW Group locations



Plant	Environmental certification systems	Certifying body	Date of certification	Review of certification*
Berlin, Germany	EMAS/ISO 14001	Gerling Cert	5/1997	2006
Munich, Germany	EMAS/ISO 14001	TÜV	3/1997	2006
Dingolfing, Germany	EMAS/ISO 14001	TÜV	5/1999	2007
Steyr, Austria	EMAS/ISO 14001	TÜV	1/1998	2006
Rossllyn, South Africa	ISO 14001/BS 8800	TÜV SA	11/1999	2005
Regensburg, Germany	EMAS/ISO 14001	TÜV	9/1997	2005
Spartanburg, USA	ISO 14001	TÜV NA	8/1997	2006
Oxford, UK	ISO 14001	TÜV, in future TÜV	9/1997	2007
Hams Hall, UK	ISO 14001	TÜV	7/2001	2007
Landshut, Germany	EMAS/ISO 14001	TÜV	6/1997	2006
Goodwood, UK	ISO 14001	TÜV	4/2003	2005
Eisenach, Germany	EMAS/ISO 14001	TÜV	11/2002	2005
Swindon, UK	ISO 14001	VCA, in future TÜV	1996	2007
Leipzig, Germany	EMAS/ISO 14001	TÜV	3/2005	2007
Rayong, Thailand	ISO 14001	TÜV	11/2004	2005

\* annual review with internal audits



- Headquarters**
- Research and Development**  
 BMW Group Research and Innovation Centre (FIZ), Munich  
 BMW Group Forschung und Technik, Munich  
 BMW Group Car IT, Munich  
 BMW Group Designworks, Newbury Park, USA  
 BMW Motoren Steyr, Austria
- Production**  
 Berlin plant  
 Dingolfing plant  
 Eisenach plant  
 Goodwood plant, UK (headquarters of Rolls-Royce Motor Cars Limited)  
 Hams Hall plant, UK  
 Landshut plant  
 Leipzig plant  
 Munich plant  
 Oxford plant, UK  
 Regensburg plant (including Wackersdorf)  
 Rosslyn plant, South Africa  
 BMW Brilliance Automotive Ltd., Shenyang, China (joint venture with Brilliance China Automotive Holdings)  
 Spartanburg plant, USA  
 Steyr plant, Austria  
 Swindon plant, UK  
 TRITEC Motors Ltda., Curitiba, Brazil (joint venture with DaimlerChrysler)
- Contract production**  
 Magna Steyr Fahrzeugtechnik, Austria
- Assembly plants**  
 CKD production Cairo, Egypt  
 CKD production Jakarta, Indonesia  
 CKD production Kaliningrad, Russia  
 CKD production Kuala Lumpur, Malaysia  
 CKD production Rayong, Thailand
- Sales subsidiary markets**  
 Argentina  
 Australia  
 Austria  
 Belgium  
 Brazil  
 Canada  
 Denmark  
 Finland  
 France  
 Germany  
 Great Britain  
 Greece  
 Hungary  
 Indonesia  
 Ireland  
 Italy  
 Japan  
 Malaysia  
 Malta  
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 Netherlands  
 New Zealand  
 Norway  
 Philippines  
 Poland  
 Portugal  
 Russia  
 South Africa  
 South Korea  
 Spain  
 Sweden  
 Switzerland  
 Thailand  
 USA

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**As of**  
August 2005

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will be published in 2007.

# ENW Group Sustainability Report 2005/2006

## Invitation

You are cordially invited to take part in a guided tour of the Munich plant, focusing on sustainability, on one of the dates below. The guided tour lasts about 2.5 hours.

### Reply

I would like to take part in a guided tour of the Munich plant, focusing on sustainability.

I will be accompanied by \_\_\_\_\_ person(s).

**Dates** (please tick your choice):

- Wednesday 18 January 2006, at 9:00
- Thursday 23 February 2006, at 13:00
- Monday 20 March 2006, at 9:30
- Friday 21 April 2006, at 10:00
- Tuesday 2 May 2006, at 14:00

- Please note: only a limited number of places are available for each tour of the plant.
- You will receive confirmation.
- Meeting point for all guided tours: "Werkstor 1" of the BMW plant in Dostlerstrasse, Munich.

## Detailed information is available on the following:

- Recycling  Parking, an aspect of mobility
- BMW hydrogen drive  Flexible working hours at the BMW Group
- Sustained use of water
- Renewable raw materials  Long-term human resources policy
- Environmentally compatible vehicles  Women's and family policy
- Mobility  "We at BMW" – the associate and leadership model of the BMW Group
- ConnectedDrive

### Other publications

- Environmental declaration of the locations \_\_\_\_\_
- Brochure on the World Summit in Johannesburg 2002, "Sustainability. It can be done."
- Social responsibility. A commitment to society.
- Annual Report
- I am interested in receiving your next Sustainable Value Report.

Further information and publications are available at

[www.bmwgroup.com/responsibility](http://www.bmwgroup.com/responsibility)

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