




# Sustainable Value Report 2001/2002

Environment, Economy, Social Responsibility: Meeting the Future



#### **Additional information on the Internet**

The arrow symbol found throughout this report  signifies additional information available on the Internet. Links to the Sustainable Value Report 2001/2002 are summarized on the following Web page:

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**[www.bmwgroup.com/sustainability](http://www.bmwgroup.com/sustainability)**

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#### **Sustainable Value Report**

Since 1997, the BMW Group has kept the public informed about the latest ecological developments through an Environment Report published every two years. BMW has taken this a step further in 2001 with its first Sustainable Value Report. Based on the company's sustainability policy, this new report outlines BMW Group personnel policies and the company's sociopolitical commitments.

# BMW Group Key Figures

Econo

Socia

Enviro



		1996	1997	1998	1999	Change in %	2000
Revenues	Million euros	26,723	30,748	32,280	34,402	2.8	35,356
<b>Vehicle production</b>							
BMW automobiles	Units	639,433	672,238	706,426	755,547	10.5	834,519
Automobiles, total <sup>1)</sup>	Units	1,143,558	1,194,704	1,204,000	1,147,420	- 10.5	1,026,755
Motorcycles <sup>2)</sup>	Units	48,950	54,933	60,152	69,157	7.6	74,397
<b>Delivered vehicles</b>							
BMW automobiles	Units	644,107	675,076	699,378	751,272	9.4	822,181
Automobiles, total <sup>1)</sup>	Units	1,151,364	1,196,096	1,187,115	1,180,429	- 14.3	1,011,874
Motorcycles	Units	50,465	54,014	60,308	65,168	14.5	74,614
Investments	Million euros	1,958	2,311	2,179	2,155	- 0.8	2,138
Results of ordinary business activities	Million euros	849	1,293	1,061	1,111	49.7	1,663
Annual net profit/loss	Million euros	420	638	462	- 2,487 <sup>3)</sup>	n/a	1,026

1) Includes Rover Cars up until May 9, 2000 and Land Rover until June 30, 2000

2) Includes BMW F 650 assembly at Aprilia S.p.A. up until the end of 1999

3) Annual net profit prior to adjustments for one-time effects: €663 million

		1996	1997	1998	1999	2000
BMW Group employees at year's end <sup>1)</sup>		116,112	117,624	118,489	114,952	93,624
employees in Germany		64,236	65,426	67,661	68,848	68,905
employees outside of Germany		51,876	52,198	50,828	46,104	24,719
<b>BMW Group employees according to segment</b>						
BMW automobiles		70,510	72,020	74,664	77,723	81,913
Rover automobiles		39,407	39,172	36,821	29,884	-
BMW motorcycles		1,754	1,905	2,039	2,191	2,397
Financial services		1,051	1,234	1,339	1,561	1,671
Other <sup>2)</sup>		3,390	3,293	3,626	3,593	7,643
<b>BMW AG</b>						
Number of trainees		2,633	2,856	3,017	3,216	3,282
Employee seniority	Years	12.8	13.3	13.4	13.9	14.2

1) Figures since 1998 excl. inactive employees, semi-retired employees, low-income employees

2) For 2000, incl. Oxford, Hams Hall, and other UK companies

		1996	1997	1998	1999	2000
Energy consumption, total <sup>1)</sup>	MWh	2,517,758	2,527,577	2,517,528	2,581,423	2,636,565
Energy consumption per unit produced	MWh/U	3.94	3.76	3.56	3.42	3.16
Production process water input, total	m <sup>3</sup>	2,917,520	2,717,549	2,737,398	2,650,677	2,481,127
Production process water input, per unit produced	m <sup>3</sup> /U	4.56	4.04	3.87	3.51	2.97
Production process wastewater, total	m <sup>3</sup>	809,988	853,241	870,815	868,044	882,286
Production process wastewater, per unit produced	m <sup>3</sup> /U	1.27	1.27	1.23	1.15	1.06
Carbon dioxide (CO <sub>2</sub> ), total	tons	786,879	780,271	803,386	833,232	870,862
Carbon dioxide (CO <sub>2</sub> ), per unit produced	t/U	1.23	1.16	1.14	1.10	1.04
Waste, total	tons	218,374	219,298	259,000	278,232	291,082
Waste, per unit produced	kg/U	342	326	367	368	349

1) Figures for all BMW automobile production and assembly sites



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# Sustainable Value Report 2001/2002

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# Foreword



Prof. Joachim Milberg,  
Chairman of the Board, BMW AG

The success of a modern enterprise extends far beyond the purely economic aspects. Even more important is finding a balance between economic, environmental, and social goals. This triple bottom line of sustainability serves as the foundation for the long-term success of a company.

Sustainability provides the basis for future viability. This applies to the economy and society as much as it does to political decision-makers. It applies even more to an enterprise that is interested in actively positioning itself as a corporate citizen in society and gaining competitive strength. In order to remain profitable and viable for the future, companies have to offer solutions for the economic, social, and environmental challenges of today and tomorrow. Future viability creates value and principles. A premium manufacturer must offer these as well. This is why sustainability management is so important for the BMW Group. It also explains why the new report on our achievements is called the Sustainable Value Report.

Our corporate policy integrates the economic, social, and environmental aspects of our achievements. It leads to a long-term, viable basis for the company's values, as well as for its economic success. This is confirmed by the continuously positive development of our sales figures and BMW's share price. The strength of this strategy is also confirmed by the fact that, in 2000, BMW was once again rated in the Dow Jones Sustainability Group Index as the industry leader for sustainability management. BMW is



one of the few automobile manufacturers listed on the new Ethics Index FTSE4Good-Europe.

A successful enterprise actively helps shape the network of today's markets, politics, and society. Public-private partnerships, cooperation with social and economic associations, and joint partnerships with research institutions are an integral part of the BMW Group sustainability strategy. This is demonstrated by our membership in the United Nations Global Compact and our active involvement in the preparations for the World Summit 2002 in Johannesburg. It is also shown by our presence in the new "econsense" Forum, which was established in 2001 by 19 major German corporations and now has 21 members.

The creative potential of such networks is clearly shown by our vision of sustainable mobility on a global level based on the use of hydrogen as a fuel source. BMW created the technical prerequisites for introducing hydrogen-powered automobiles. This can only succeed with the support of business leaders and political decision-makers who are willing to ensure the industrial production and full-scale distribution of environmentally compatible hydrogen. The BMW CleanEnergy World Tour promoted the creation of a global public-private network for this purpose. The widespread endorsement motivates us to continue our work in this area.

As a globally active automobile manufacturer, the BMW Group takes responsibility for the environment as well as for the social interests

of employees and society as a whole. With this new Sustainable Value Report 2001/2002, we make this commitment transparent to the public. This openness shared with our stakeholders – customers, employees, politicians, representatives of non-governmental organizations, the media, suppliers, and the local communities where BMW plants are located – is regarded by the company as a basic principle that justifies a sense of trust.

The new report goes beyond a representation of the company's environmental achievements. In contrast to our past environmental reports, the Sustainable Value Report is enhanced by key statements along with facts and figures pertaining to our economic development and social issues. Supplementing this new report, we have published information on the Internet to provide additional details on the individual topics. We are aware that BMW is (still) one of the few companies to offer such comprehensive information. One of our aims is to create a productive dialogue that will enable us all to learn for the future. We warmly welcome your comments and questions.

Munich, August 2001

  
Joachim Milberg

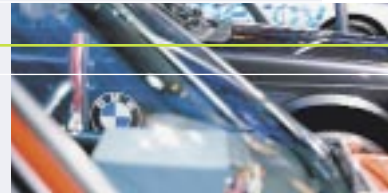
# BMW Sustainable Mobility: A visionary approach to the future



BMW CleanEnergy exhibition in Munich from June to October 2000

# Visio

The long-term, sustainable development of the enterprise is a key element of the BMW strategy. Despite prevailing industry trends, the BMW Group implemented this strategy to achieve continued growth in 2000. The medium-term production goal is to build one million automobiles each year. Production of the new MINI will add 25,000 vehicles to this number in 2001. In the following years, MINI production will be increased to 100,000 units annually. Beginning in 2004, production of the new 1-series BMW will be launched with 150,000 vehicles per year rolling off the assembly line in the initial phase. In comparison, 834,000 BMW automobiles were manufactured by the BMW Group in 2000. Success is not defined by sales figures alone. Some of the things that make the BMW Group one of the world's leading car manufacturers are the image of the MINI and BMW brand names as well as the company's practical approach to sustainability.



nary Ideas



**“Sustainability is evolving to become a primary approach to economical and social prosperity. It also facilitates the interaction between the market and democracy. The BMW Group will continue to pursue sustainable development as a principle corporate strategy.”**

BMW Executive Board resolution, February 21, 2000

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Link to Executive Board resolution, Public Affairs Letter from 4/2000, p. 5

**[www.bmwgroup.com](http://www.bmwgroup.com) ▶ [Public Affairs](#) ▶ [Publications](#) ▶ [Public Affairs Letter](#)**

Link to the respective models

**[www.bmw.de/auto/index.html](http://www.bmw.de/auto/index.html)**

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## Sustainability model

As a globally active enterprise, the BMW Group is oriented to a pioneering sustainability model. One important aspect in the implementation of this visionary approach is that all BMW production sites adhere to uniform environmental standards. All BMW Group manufacturing facilities are either certified according to the international DIN ISO 14001 standards for environmental management systems, or in full compliance with the European Eco-Management and Audit Scheme (EMAS). On the product side, the focus is on sustainable mobility. This concept developed by the BMW Group integrates environmental, economic, and social factors.

**Sustainable mobility must support quality of life and economic prosperity. At the same time, the potential damage to the environment associated with individual mobility must be kept to a minimum.**

In this respect, it is necessary to link together the relevant means of personal and public transportation in order to take full advantage of the strengths of each one. At the same time, the BMW Group focuses on advancing conventional technologies and developing alternative drive concepts for motor vehicles. This approach leads directly to carbon-free energy sources. The CleanEnergy project developed by the BMW Group concentrates on the cleanest possible fuel: hydrogen derived from renewable energy.

## Sustainability and the ultimate driving machine

BMW remains faithful to the ultimate driving machine philosophy. This is an integral aspect of the sustainable mobility concept. An environmentally compatible automobile must comply with today's standards of comfort, performance, utilization, and safety while paying close attention to consumer needs and preferences. This is the key to market success. Even when gas prices are relatively high, low fuel consumption alone does not provide a sufficient incentive to buy a new car.

The BMW Group follows two key objectives: Reducing average fuel consumption and developing competitive, sustainable products. For BMW, the prospects do not lie in developing vehicles that do not offer clear customer benefits, for example a car that uses only 3 liters per 100 km or a super-thrifty vehicle that travels 100 km on 1 liter of fuel. Electrically powered vehicles based on fuel cell technology do not offer a long-term alternative for BMW due to the disadvantages in the technical concept.

The BMW Group has already designed a series production car that combines environmental compatibility with maximum comfort and functionality. The BMW 750hL sedan runs on hydrogen power, which means that the car's exhaust emissions primarily consist of vaporized water.

## The BMW sustainable mobility model

Intelligent networking of various means of transportation

- Obtain maximum benefit from each carrier
- Reduce transportation costs and the space required for vehicles

Continuous reduction of average fuel consumption

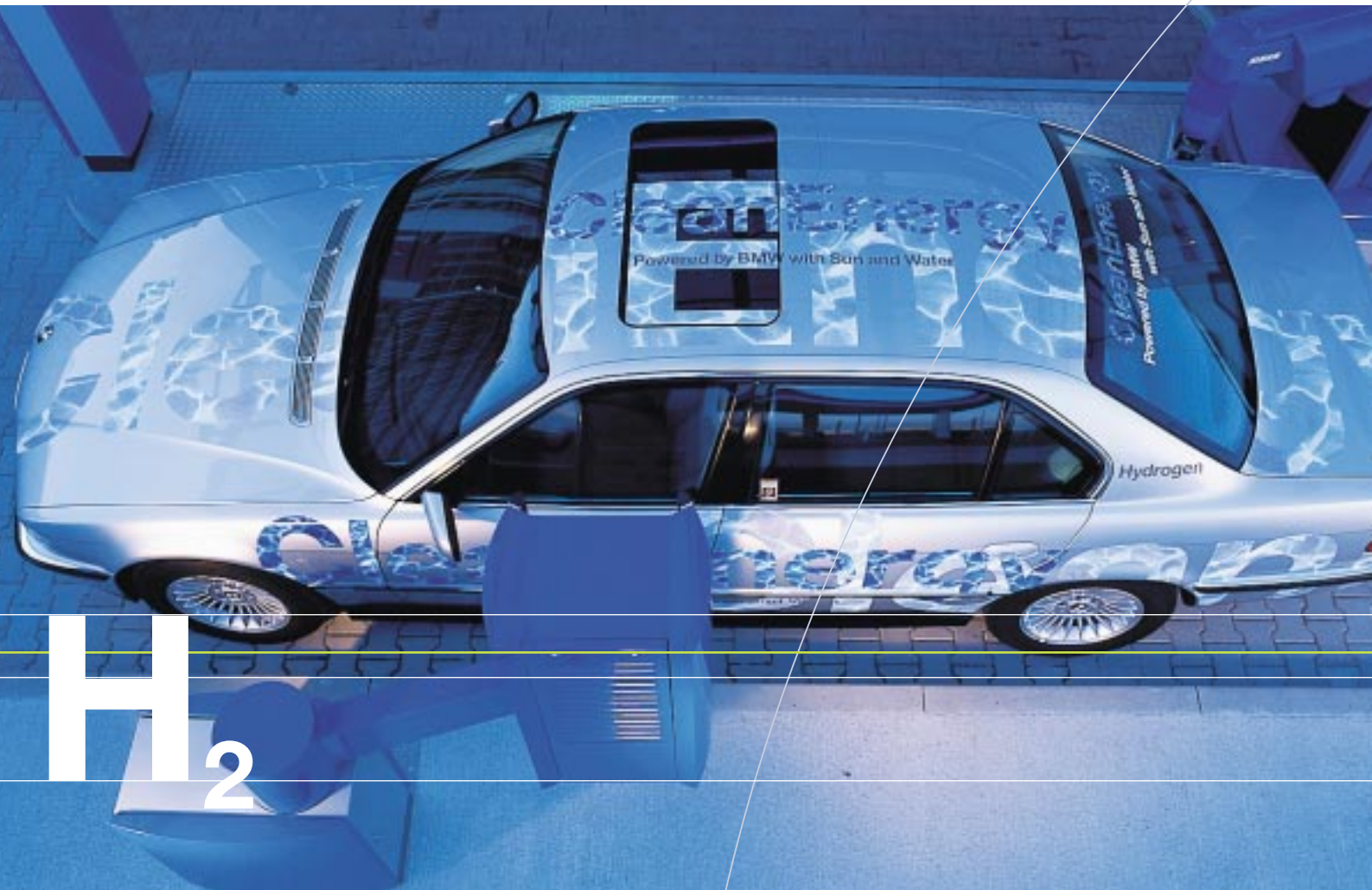
- Conserve natural resources
- Reduce vehicle exhaust emissions

Develop alternative drive concepts

- Long-term preservation of quality of life and economical use of personal transportation
- Promote global implementation of hydrogen and the vision of using hydrogen as a renewable energy source

Recyclable products and return/recycling of used vehicles

- Conserve natural resources
- Eliminate/reduce waste



## The BMW approach to hydrogen is confirmed

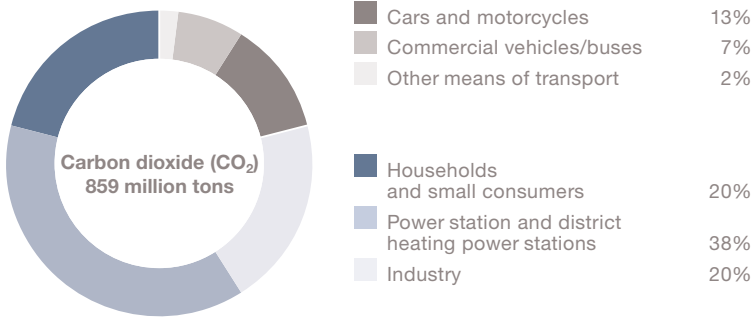
The decarbonized fuel concept developed by BMW has become widely recognized by the political and business communities. At the beginning of 2000, the Transport Energy Strategy (TES) project sponsored by BMW and other automobile manufacturers in conjunction with the energy industry under the auspices of the German Federal Ministry of Transportation, Construction and Housing (BMVBW), showed very promising results. In an overall assessment of alternative energy and drive concepts, the conventional internal combustion engine powered by hydrogen received very high ratings. The BMW 750hL is the world's first automobile to use this type of engine.

According to BMVBW, hydrogen created from renewable energy sources is the fuel that best meets long-range criteria in terms of availability and reduced CO<sub>2</sub> emissions. Thus the TES follows exactly the same approach the

German Federal Government transportation report  
[www.bmubw.de](http://www.bmubw.de)

Research project: "stadtfoköln" (Cologne City Information)  
[www.ifmo.de](http://www.ifmo.de)

**Share of anthropogenic CO<sub>2</sub> emissions in Germany, 1999**



**Changes in anthropogenic CO<sub>2</sub> emissions in Germany since 1990, in million tons**

	1990	1999	
	104	115	(+ 11%)
	46	59	(+ 28%)
	22	17	(- 23%)
<b>Traffic sector total</b>	<b>172</b>	<b>191</b>	<b>(+ 11%)</b>
	204	171	(- 16%)
	397	326	(- 18%)
	241	170	(- 29%)
<b>Total CO<sub>2</sub></b>	<b>1,014</b>	<b>859</b>	<b>(- 15%)</b>



Hydrogen service station near Munich airport



BMW Group has focused on in its sustainable mobility concept. But reality paints a different picture: The infrastructure problems related to the introduction of alternative fuels are immense. Although there are nearly 15,000 service stations in Germany alone, hydrogen fuel is only commercially available at one station located near Munich airport. This service point was set up with support from BMW. A self-service hydrogen station for fleet vehicles is currently in operation in Hamburg.

**Traffic networks: Untangling the knots**

Dealing with increasing traffic volume requires a more efficient infrastructure with more effective control of traffic flow. BMW operates its own mobility research institute in Berlin and supports the development of new technologies based on the principle of sustained mobility through traffic control.

**Model policies: First series of hydrogen-powered cars**

Advancements in environmental protection and achieving commercial success are by no means mutually exclusive concepts. BMW Group model policies are aimed at serving both of these objectives by consistently implementing a sustainable mobility concept. In the coming years, the company will focus on the development of advanced technologies designed to reduce average fuel consumption. Alternative drive concepts will be engineered for series production vehicles, and new market segments will be explored with innovative models introduced at the lower end of the market.

The latest BMW 3-series compact car with VALVETRONIC technology introduced a new era in gasoline powered engines. In the future, BMW engineers will continue to develop light-weight, low consumption vehicles. The BMW Group has already announced plans for a new, hydrogen-powered, BMW 7-series car.

# CleanEnergy: The energy of the future will come from water and sunlight



Fully automatic fill-ups  
in less than five minutes





# CleanEnergy

Most cars manufactured over the past 100 years have been powered by internal combustion engines. Although this is not likely to change in the 21<sup>st</sup> century, the type of fuel will be different – and much cleaner: Hydrogen produced from renewable energy sources. The BMW Group vision of the future focuses on CO<sub>2</sub>-free hydrogen. Leading experts from the science and political communities clearly support this concept. CleanEnergy is less concerned with environmentally compatible automotive technology than it is with comprehensive, sustainable energy strategies for the future. Integrated into all BMW research activities, the objective of the CleanEnergy concept is to create a renewable energy cycle based on hydrogen.

## **h – The formula of the future**

The letter “h” stands for Hydrogen Power, the main focus of the BMW CleanEnergy strategy. This concept is currently demonstrated by the world’s first hydrogen powered car, the BMW 750hL sedan that was built in a limited series. The 12-cylinder hydrogen fueled engine in the 750hL produces over 200 horsepower. Until a network of hydrogen fuel stations becomes

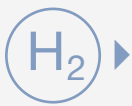
available, the bi-fuel internal combustion engine will be capable of running on either hydrogen or gasoline. Switching between fuels – even when the vehicle is in motion – is fully automatic or can be manually activated at the touch of a button. Hydrogen fuel extends the range of the BMW 750hL by around 350 kilometers. The hydrogen is stored in a 140-liter steel tank located behind the vehicle’s rear seat and maintained in a cryogenic, liquid state at a temperature of minus 253°C. This system is designed to meet the highest safety standards.

One of the key advantages of hydrogen technology is that the exhaust emissions primarily consist of vaporized water. When the liquid hydrogen fuel is produced from renewable energy sources, noxious emissions are reduced by a substantial 99.9 percent compared to conventional gasoline-powered vehicles.

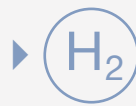
Road testing of fifteen BMW 750hL sedans was successfully completed in 2000. These cars were used for shuttle services provided at the Expo 2000 world exposition in Hanover and as part of the BMW CleanEnergy project in Munich. The hydrogen cars traveled over 100,000 kilometers on German roads without any problems.

## BMW 750hL Specifications

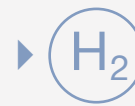
Power	150 kW/204 bhp
Displacement	5,379 ccm
Cylinders	12
Top speed	226 km/h
Acceleration 0 – 100 km/h	9.5 sec.
Fuel	liquid hydrogen/ high-octane gasoline
CO <sub>2</sub> emissions	0 g/km
Fuel consumption (average) Hydrogen	approx. 2.8 kg H <sub>2</sub> /100 km
Range	
Hydrogen power	350 km
Total range	950 km
Fuel cell output (electrical system)	5 kW/42 V



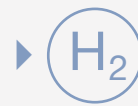
Generation of hydrogen  
from renewable energy  
sources



Distribution  
through service  
stations



Hydrogen use  
and technology



### Fuel cells as standard equipment

CleanEnergy also focuses on fuel cell technology – not as a drive unit, but as an Auxiliary Power Unit (APU) providing power for the electrical system. The compact fuel cell battery replaces the standard wet-cell lead battery in the 750hL. Producing 5 kilowatts at 42 volts – even when the engine is switched off – the APU far exceeds the performance of a conventional battery. The BMW Group is conducting advanced research on both gasoline and hydrogen (H<sub>2</sub>) fuel cells in order to develop this technology for series production vehicles.

### Phasing-in the automotive future of hydrogen

After developing the fifth-generation 750hL to an advanced level of technical maturity, the BMW Group has clearly defined the direction that hydrogen technology will be taking in the next few years. Current plans call for at least one hydrogen fuel station in each of the major EU cities by 2005. By 2010, a full network of service stations will be phased in. Parallel to

the establishment of a hydrogen infrastructure, the BMW Group plans to introduce the first series-production model based on the zero-emission technology. According to BMW Chairman of the Board Joachim Milberg: “The BMW Group will be the world’s first manufacturer to offer a series-production hydrogen car.” In other words, customers can look forward to seeing the “h” abbreviation on the pricelist for the new-generation 7-Series BMW.

Depending on the production method, the cost of producing liquid hydrogen is still somewhat higher than it is for gasoline. Therefore, the BMW Group would welcome government support in the initial phase. In this respect, one positive factor is that the political parties in Germany unanimously support the BMW CleanEnergy strategy. The exchange of information among 650 participants from the business, political, and science communities at the HYFORUM 2000 international hydrogen conference, which took place in September 2000 in Munich, raised public awareness on the issue. This hydrogen dialogue was actively supported by the BMW Group.

The BMW hydrogen initiative gained widespread political support during the CleanEnergy World Tour. Loyola de Palacio, Traffic and Energy Commissioner and Vice President of the European Commission, is hopeful that the use of hydrogen in the transportation sector will create a new market for renewable energies: "In this field, the technical innovations must actively contribute to securing sustainable mobility." According to Professor Klaus Töpfer, Director of the United Nations Environmental Program (UNEP) and an active supporter of the BMW initiative: "In light of the dramatic changes in the global climate, all major cities and towns should be sounding the alarm." In Dubai, Dr. Mohammed Bin Fahed, chairman of the commission responsible for issuing the world's most coveted environmental award, called for clean energy sources for today's motor vehicle traffic: "The efforts of the BMW Group are supported by environmental organizations and institutions worldwide. We must remain aware of the fact that the global supply of fossil fuels will not last forever."

Left: The BMW Group and the Deutsche Museum invested over \$5 million in the futuristic architecture of the world's first hydrogen exhibition  
Right: CleanEnergy World Tour in Dubai, Brussels, Milan



## CleanEnergy World Tour

The CleanEnergy exhibit at Expo 2000 in Munich presented by BMW in cooperation with the Deutsche Museum also attracted extensive public attention. Over 150,000 visitors, including school groups, politicians, and representatives of the science community reviewed the interactive exhibits and were introduced to comprehensive information on the future of hydrogen mobility.

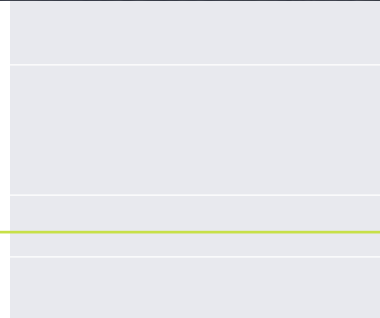
In order to publicize the future vision of "mobility based on sun and water," the CleanEnergy WorldTour is taking place from January to November 2001. Featuring a series of events for politicians, scientists, and media representatives, the tour was launched in Dubai in January and will continue on to Milan, Brussels, Tokyo, and Los Angeles before returning to Berlin. Each stop on the tour highlights a different aspect of CleanEnergy. In Dubai the main theme was the production of hydrogen with solar energy. In Brussels, the focus was on political strategies for implementation. The hydrogen infrastructure was the key theme in Milan, and in Tokyo it was the development of

urban traffic systems. In Los Angeles, the presentation concentrated on the strict Californian emission laws.

At the CleanEnergy exhibition presented in Brussels at the beginning of March 2001, BMW Chairman of the Board Joachim Milberg introduced a four-point program to the public and the political decision makers present at the event. This concept is designed to help hydrogen technology achieve a market breakthrough. The initial idea is to firmly establish the notion of a hydrogen-powered civilization among a wide audience. Another key issue is the establishment of a sound political and economic foundation, for example, to gain acceptance for hydrogen-based technologies. BMW is hopeful that hydrogen technology will be suitably addressed in the in 6th Research Program sponsored by the European Union. Milberg emphasized that the use of hydrogen as fuel source should not be subjected to taxation in the initial phases.

# Sustain

BMW: Sustainable growth  
is the key to long-term success



# ability

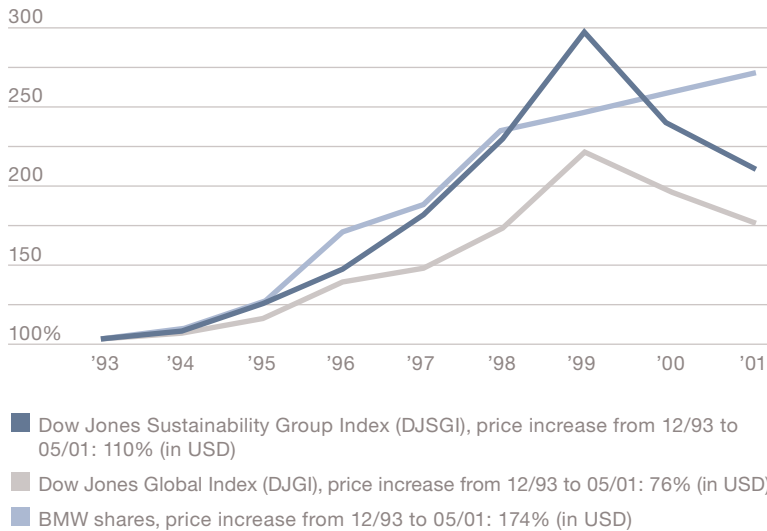
A responsible commitment to the environment, to human concerns, to our society and to our employees, conscientiously observing the needs of our company's stakeholders and today's consumer interest groups: Sustainable growth demands versatile thought and action. As a worldwide corporation committed to long-term expansion, the BMW Group is an active member of the global community. This leads to far-reaching responsibilities. At the BMW Group, the pioneering concept of sustainability is regarded as a synthesis of added value and the strategic integration of economic, environmental, and social factors. The fact that this complex, future-oriented approach to business administration pays off was confirmed in a recent study: 82 percent of managers agreed that sustainable growth increases a company's economic value. This information is based on the result of a survey conducted by Arthur D. Little Consulting of 481 board members and CEOs from European and North American companies.





## BMW: Automotive Industry leader in corporate sustainability

Development of the DJSGI, DJGI and BMW shares from December 1993 to May 2001



The success of the BMW Group substantiates the information obtained from the A.D. Little survey. In both 1999 and 2000, BMW was listed at the top of the Dow Jones Sustainability Group Index (DJSGI) as the world's automobile industry leader in sustainable growth. The increase in the value of companies listed on the DJSGI clearly exceeded the Dow Jones Global Index. While the values in the C-DAX Automobile index declined by 21 percent in 2000, BMW share prices increased by 13.4 percent in the same period.

Created by Dow Jones in cooperation with the Swiss investment agency SAM Sustainability Group, the DJSGI lists over 200 enterprises from 27 countries representing a market value of nearly \$5 trillion (end of July 2000). Only companies that successfully use the shareholder value and sustainable management concepts are included.

**"We regard our leadership position as a commitment to increasing the economic, environmental, and social value of our company."**

Prof. Joachim Milberg, BMW Group Chairman of the Board

**"Following the guidelines of sustainable development, our company strives to improve the quality of life without endangering the natural resources that are so vital to future generations."**

BMW Executive Board resolution, February 21, 2000

DJSGI development  
[www.sustainability-index.com](http://www.sustainability-index.com)

SAM Sustainability Group  
[www.sam-group.com](http://www.sam-group.com)

Corporate Responsibility Rating, Oekom Research AG  
[www.oekom.de](http://www.oekom.de)

Mozambique BMW responds to crisis  
[www.bmwgroup.com/sustainability](http://www.bmwgroup.com/sustainability) ▶ Sustainable Growth  
▶ Discussing the Future

In the 2000 rating, the SAM analysts gave high marks to the BMW sustainable mobility concept and the development of hydrogen technology. Other highlights included the company's pioneering role in the introduction of powder coating technology, the expanded range of models in the compact car segment, and the company's "outstanding programs focusing on training, employee incentives, and profit-sharing." Also contributing to the analysts' high rating of the BMW Group was the fact that BMW has improved fuel efficiency by over 30 percent since 1979. BMW was also the world's first car manufacturer to introduce mandatory recycling standards and guidelines for recycling-oriented product development.

### **Commitment is the key to success...**

The Dow Jones index is a clear indicator: Companies that go beyond economic factors to integrate environmental and social criteria into their management policies are more successful than their competitors. In other words, environmental protection, social commitment, employee orientation, and a commitment to investors and governments are not cost factors, they are keys to long-term success. The BMW approach to sustainability also ranked high in the Corporate Responsibility Rating published

in September 2000 by Oekom Research AG in Munich. Social, cultural, and environmental criteria were included in the evaluation of 19 automobile industry companies. The result: "BMW was the only company to earn a positive overall rating." Once again, the BMW Group was rated as an industry leader.

### **...at BMW plants worldwide**

Social and environmental responsibility is defined by the BMW Group on both global and local levels for all BMW operations worldwide. The BMW assembly plant opened in May 2000 in Amata City, Thailand is a good example. Social benefits including health insurance plans, a pension fund, and a medical treatment facility were introduced for the plant's projected workforce of 700 employees. A shuttle bus system transporting workers to the plant and a Buddhist temple located on-site were also set up for the local workforce. Industrial safety standards at the Amata City plant comply with the guidelines set by BMW for its production operations worldwide. BMW is also fully committed to its new location in Kaliningrad, Russia where nearly 500 jobs were created for assembly workers and sales personnel.

The BMW commitment in South Africa over the past 30 years has become somewhat of a

Executive Board resolution, Public Affairs Letter from April 2000, No. 22, p. 5

[www.bmwgroup.com](http://www.bmwgroup.com) ▶ [Public Affairs](#) ▶ [Publications](#) ▶ [Public Affairs Letter](#)

Explanation of the Capital City Talks: Public Affairs Letter from December 2000, No. 26, p. 10

[www.bmwgroup.com](http://www.bmwgroup.com) ▶ [Public Affairs](#) ▶ [Publications](#) ▶ [Public Affairs Letter](#)

Information on the Herbert Quandt Foundation

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

Brochure: Taking Responsibility

[www.bmwgroup.com](http://www.bmwgroup.com) ▶ [Public Affairs](#) ▶ [Publications](#) ▶ [Sustainable development](#)



Above: Capital City Talks held in Berlin in September 2000 with Jean-Paul Picaper, German correspondent for the French daily "Le Figaro", former CDU party chairman Wolfgang Schäuble, newspaper editor Hans Werner Kitz of the Süddeutsche Zeitung, Foreign Minister Joschka Fischer (Bündnis90/Die Grünen), and Political and Science Foundation director Christoph Bertram (from left to right)  
Left: The BMW 750hL fleet in front of the historic Brandenburger Gate in Berlin



tradition. This is where a comprehensive network of social projects focusing on education, science and technology, sports, environmental protection, and community support has been developed. In 2000 alone, the BMW Group invested over ZAR 4 million in a new hospital and school in the province of East Cape. A BMW-sponsored program promoting environmental awareness has been successful in over 100 South African schools since 1996.

### Discussions create the future

The BMW concept of sustainable mobility and the company's environmental management system has attracted an inquisitive audience. Presented in a number of BMW showrooms in 1999 and 2000, the BMW Group Environmental Exhibition focused on the company's environmental commitment. The corporate brochure "Taking Responsibility" published in December 2000 provides an overview of the BMW Group sustainability strategy and the company's social, environmental, and economic activities.

### Establishing an effective dialogue

A company focusing on sustainable economic growth has a responsibility to provide comprehensive information and establish an effective dialogue with the public. This extends far beyond the latest financial figures and product developments. It concerns the clear delineation of social policy and environmental responsibility. The BMW Group organizes this dialogue based on a company-wide commitment. One important element of this dialogue is the series of policy letters published by BMW since 1995. These memoranda focus on current topics from the social, economic, and political arenas. Another effective instrument has been the Capital City Talks held in Berlin with social and political leaders. This international forum organized by the BMW Group in cooperation with the Free University of Berlin and the *Süddeutsche Zeitung* (newspaper) takes place regularly in Germany's capital city. Focusing on transatlantic, European, and Eurasian dialogue since 1970, the Herbert Quandt Foundation aims at intensifying the social and political understanding. The organization sponsors regularly-scheduled expert roundtable discussions focusing on globalization, mobility, and the environment.

BMW plants in Spartanburg, South Carolina and Rosslyn, South Africa



### Helping the handicapped in South Africa

The BMW plant in South Africa supports physically and mentally impaired citizens in many different ways. In addition to providing clothing, toys, and educational material to local schools, the company sponsors the Soshanguwe project for mentally ill children. This gives them the opportunity to learn special skills like sewing or carpentry and earn their own livelihood in the future.

### BMW focuses on cultural communication

Expanding horizons, transcending cultural borders, and looking beyond everyday work

situations: These are the goals of the BMW Cultural Communication program aimed at the BMW workforce and local citizens. This comprehensive program includes the Culture Mobile in Munich, a calendar of free or discount-priced cultural events published quarterly for BMW employees, and "Opera for Everyone", a series of free concerts sponsored by BMW since 1997. BMW also sponsors a variety of international art exhibitions and concerts along with the work of upcoming artists. Honoring over 30 years of international cultural support, the BMW Group received the 1999 Angel Award presented by the International Society for the Performing Arts in Vancouver.

BMW Chairman Joachim Milberg with South African President Thabo Mbeki at the BMW plant in Rosslyn, South Africa



# The environment: Dialogue and management

# Stakehol



**An open dialogue with stakeholders is an integral part of the BMW sustainability strategy. The stakeholder concept is consistently pursued. Before making decisions, the BMW Group routinely considers the impact its actions and products will have on society. BMW Group stakeholders include customers, employees and their families, shareholders, communities, trade unions, suppliers, the general public as well as social, environmental, and cultural organizations. Stakeholders are regarded by the BMW Group as business partners whose trust and confidence serve as the basis for the successful international positioning of the company. In order to inform stakeholders about decisions and directly involve them in the decision-making process, regular discussions are held with various community interest groups at BMW business sites.**

# ders

# Responsibility

## Regional support

Fulfilling its responsibilities as one of the world's leading car manufacturers and employers, the BMW Group is actively involved on regional, national, and international levels. On a regional level, BMW is a member of the Bavarian Environmental Pact II involving nearly 900 companies that are firmly committed to environmental projects in the coming years. Another BMW regional commitment is based at the BMW Spartanburg plant opened in 1994. The BMW Manufacturing Corp. recently joined 110 other American companies as a member of the new National Environmental Achievement Track sponsored by the US Environmental Protection Agency (EPA). In order to qualify for this new program, a company must be effectively engaged in environmental protection and consistently maintain an excellent relationship with the local community. The BMW commitment was acclaimed by the EPA as exemplary for other companies striving for admission into the program. For the BMW plant in Spartanburg, the path to sustainable environmental management and effective communication with stakeholders is nothing new. The BMW Manufacturing Corp. in South Carolina has already been honored with the Governor's Pollution Prevention Award and

is a member of the South Carolina Environmental Excellence Program. Launched in 1997, this project is sponsored by the state government and regional industry.

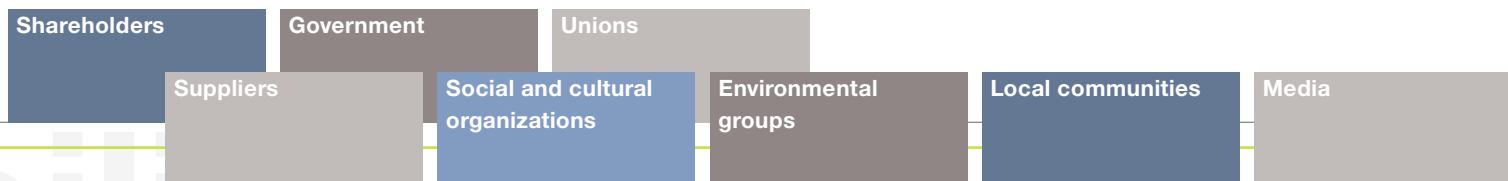
## Advocating added sustainability

In Germany, the BMW Group is a charter member of "econsense," a forum dedicated to sustainable development. Initiated in 2000 by the German Industry Association (BDI), this organization is a network of leading companies working on the development of advanced environmental and economic solutions. The BMW Group adds emphasis to this theme with its prominent presence in the Sustainability Forum: BMW Chairman of the Board Joachim Milberg is a member of the advisory committee, and BMW Director of Environmental Affairs Manfred Heller represents the company on the forum steering committee.

As a traditional enterprise deeply rooted in Germany, the BMW Group is also committed to its responsibilities from a historical perspective. As a charter member of the Remembrance, Responsibility and Future Foundation, BMW actively supports legislation to provide compensation for the people subjected to forced labor during the Nazi period.



Discussion at the Spartanburg plant



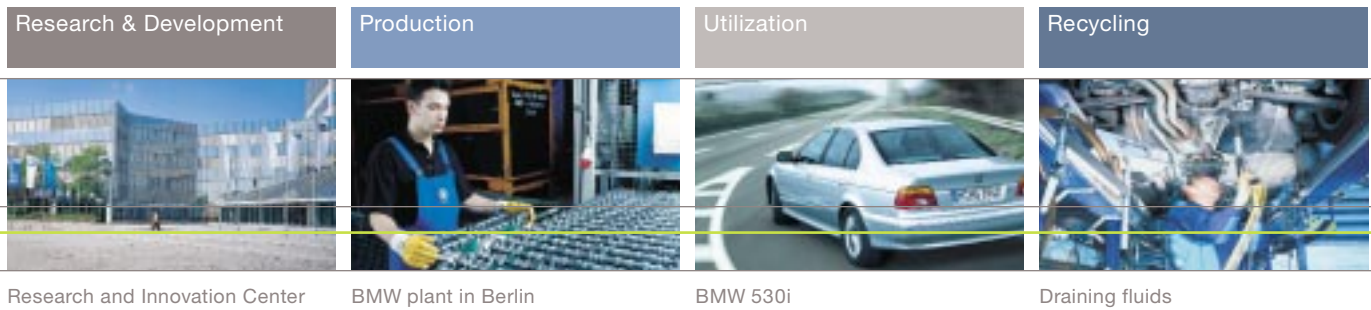
### Global initiative for sustainable growth

The BMW Group has joined 400 other international companies in supporting the United Nations Global Compact proposed by Secretary General Kofi Annan. BMW has made a commitment to ensure that its business activities conform with UN guidelines and to plan and implement sustainable growth, respect human rights, and adhere to worldwide social and environmental standards. One example of the BMW commitment is its support of the “Johannesburg World Summit 2002 on Sustainable Development”, a United Nations global sustainability strategy. BMW actively participates as a member of the relevant committees including the UNEP DTIE Mobility Forum, which plays a leading role in preparing the Johannesburg World Summit 2002. This conference will adopt a new charter that will serve as a basis for the sustainability policy in the respective countries. As part of the Johannesburg World Summit 2002 activities, the BMW Group will be presenting themes ranging from CleanEnergy to foreign investment, environmental best practice, joint ventures, environmental supply chain management, and social programs.

### Voluntary agreements vs. government control

The BMW Group actively helps create the basic conditions for the environmental policy that determines the company’s core activities. In general, the BMW Group supports the concept of voluntary agreements as opposed to government regulations. One example of a voluntary corporate management tool is the standardized BMW environmental management system. Examples of voluntary actions include the use of sulfur-free fuel in all BMW fleet vehicles and the recycling of used cars. The company’s years of experience will minimize the financial risk for the BMW Group when the EU guidelines on end-of-life vehicles go into effect. BMW already complies with the targeted recycling quota of 85 percent specified for 2005. This is a result of a comprehensive network of recycling firms organized in the European Union since 1991. BMW is currently the only car manufacturer to assign recycling tasks exclusively to certified contract partners.

## Integrated Product Policy (IPP)



### Integrated product policy: Networked approach

In the framework of the new Bavarian Environmental Pact II, BMW is working on the IPP pilot project for product-related environmental management for motor vehicles. Integrated product policies (IPP) are aimed at improving products throughout their entire lifecycle to minimize negative effects on humanity and the environment. For highly complex products like automobiles, this concept offers a huge potential for minimizing environmental impact. One of the key advantages of IPP is the networked approach to the product lifecycle. This strategy involves research & development, manufacturing, sales, utilization, and final disposal.

**Lightweight construction:** The use of aluminum reduces overall vehicle weight and significantly improves fuel economy. However, producing aluminum requires five times as much energy as steel production. Consequently, it is important to determine whether the additional energy used to make aluminum can be saved through lower fuel consumption and longer vehicle life. This is why the BMW Group focuses on intelligent lightweight construction. The IPP concept for BMW models directly involves the company's

research and innovation center with its 6,000 employees as well as the recycling and disassembly center. Other key themes for discussion include the energy and CO<sub>2</sub> strategy, i.e. CleanEnergy, along with the implementation of the Transport Energy Strategy (TES).

### Environmental management on an international level

The BMW Group also responds to the requirements of a sustainable economic approach on an organizational level: All BMW production sites worldwide are validated according to the European Eco-Management and Audit Scheme (EMAS) or certified in compliance with DIN EN ISO 14001 standards. This means that the entire BMW Group adheres to a uniform environmental management system.

The objectives of EMAS and DIN EN ISO 14001 are integrated into the corporate structure by an international team of auditors. Approximately 70 employees are directly involved in BMW environmental management. Environmental audit updates are conducted annually at each of the company's sites. An input/output balance report listing the materials used at the production plants is also prepared annually. Statements

International BMW Group environmental guidelines

[www.bmwgroup.com/sustainability](http://www.bmwgroup.com/sustainability) ▶ [International Environmental Guidelines](#)

Integrated Product Policy IPP

[www.ipp-bayern.de](http://www.ipp-bayern.de)



# Management



Spartanburg plant: Documentation of chemicals

issued by the plants provide detailed information on environment-related data and outline site-specific environmental goals. In addition to continuous monitoring of environmental management objectives, BMW has specified minimum technical requirements for all environmentally relevant areas. Directly involved in the implementation of the environmental protection plans, suppliers are required to comply with international environmental guidelines as well as with BMW procurement regulations. In this area, special attention is paid to the BMW Group rules pertaining to the environmental compatibility of products.

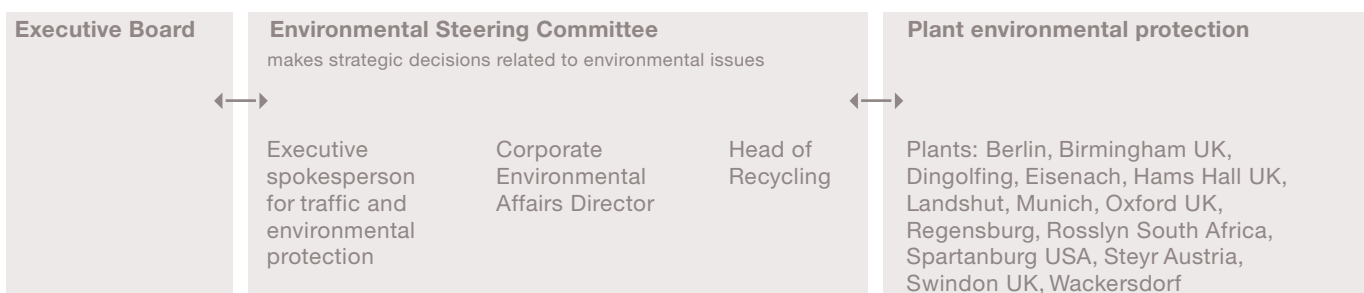
## Information promotes involvement

One of the keys to successful implementation of the environmental management system is keeping BMW employees informed. The workers have direct access to a pool of comprehensive information. Environmental topics are addressed regularly in the BMW Group newspaper as well as in the management memos for upper-level supervisors and the leaders' briefing documentation for team leaders. Special update leaflets are published for insertion into the BMW Current Factbook (ALex). Information

available on the BMW Intranet and the ZEUS information system enables employees to select only environmentally-compatible materials for use in their work areas and ensures proper handling of hazardous materials. Maintained by experts and available company-wide, the ZEUS database contains complete information on environmental as well as occupational health & safety relevant materials.

The spectrum of environmental information is supplemented by regular training. Environmental themes are integrated into the different seminars offered to BMW employees with special workshops focusing on environmental and occupational health & safety themes. Training topics include dangerous material handling, waste material separation and recycling, environmental protection regulations, and other legal restrictions. External contractors responsible for end-of-life vehicle recycling receive regular training in two-day workshops held at the BMW recycling and disassembly center. The goal is to keep participants up to date on environmental and technical progress as well as provide information on new laws and directives.

## Organization of environmental management on the corporate level



# The ultimate driving machine: Design for the environment



# Automo





The automobile is regarded as an environmentally significant product. Its use has a fundamental impact on people and the environment. In Germany, the anthropogenic proportion of CO<sub>2</sub> emissions from cars and motorcycles is around 13 percent. Globally, this share is much lower. In order to reduce emissions and secure the future of the automobile as a quality of life factor and an important source of economic prosperity, the BMW Group is working on concepts to ensure the sustainability of personal transportation. Essentially, we are working for the future of the automobile.

# biles

The environmental impact of an automobile must be taken into consideration throughout its entire lifecycle. BMW consistently pursues comparative lifecycle analysis (eco-balance) for components as continuous optimization process within the product development phase. The goal is to design environment-friendly products. Lifecycle-analysis of components includes design and engineering operations, as much as it does manufacturing and assembly, sales & service, and final recycling of end-of-life vehicles.

In compliance with ISO 14040 eco-balance guidelines, a detailed analysis is made of the potential environmental impact of each product. This leads to further improvements and recommendations. From the very beginning of the product development process, this analysis is consistently applied in designing BMW parts. Within the framework of this approach, a careful assessment is made to determine, for example, whether steel should be replaced with other materials, e.g. aluminum, magnesium, or plastics, to reduce vehicle weight and lower fuel consumption as well as exhaust emissions.

## VALVETRONIC: Revolutionary engine design

During the entire lifecycle of an automobile, the environmental impact is highest during the use phase. BMW product planning and development is aimed at reducing environmental impact for the total lifecycle of the product. In addition to air pollution, negative environmental effects include noise emissions and the results of traffic accidents.

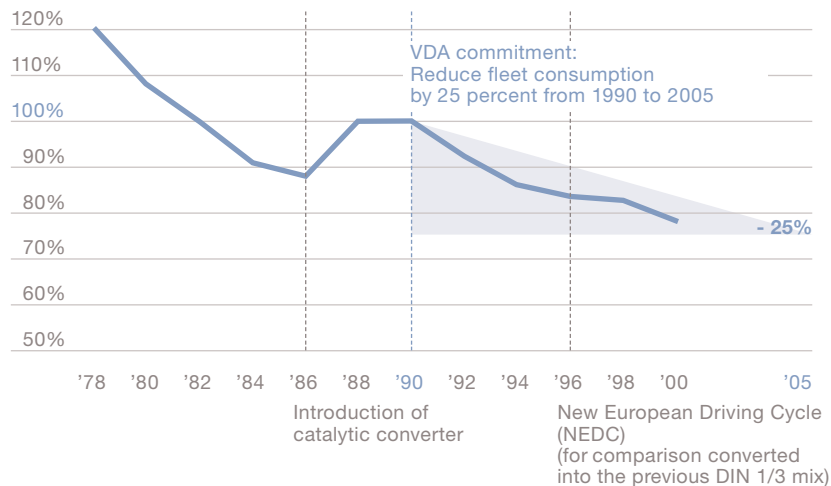
The BMW Group concentrates on continuously lowering average fleet consumption to meet the voluntary German/European automobile industry commitments. For example, the VDA (Association of the German Automotive Industry) agreed to reduce 2005 fleet consumption by 25 percent compared to 1990 figures. In 2000, BMW average fleet consumption was nearly 22 percent lower than 1990. The ACEA (European Automobile Manufacturers Association) and the EU Commission have endorsed the goal of reducing CO<sub>2</sub> emissions in the European fleet to 140g/km (approx. 25%) between 1995 and 2008. This progress is supported by

The goal is it to minimize the environmental impact of the automobile over the entire product lifecycle to meet the needs of human health and our natural habitat.



BMW 4-cylinder aluminum engine block with VALVETRONIC; BMW 3-series compact

BMW fleet fuel consumption for new registered vehicles in Germany (DIN 1/3 mix, weighted according to number of vehicles)



high-tech innovations like the new VALVETRONIC technology developed by BMW. VALVETRONIC electronically controls intake valves and eliminates the need for conventional throttle valves. This effectively lowers fuel consumption by around 10 percent based on EU standards. In actual driving conditions, additional savings of around 15 percent are possible compared to the previous model with a performance increase of up to 20 percent.

The first BMW engine equipped with VALVETRONIC technology is the new 1.8-liter four-cylinder unit built at the BMW plant in Hams Hall. Featured in the latest BMW 316ti compact model, this engine already complies with the tough EU4 emission standards. The new BMW 7-series will also use advanced VALVETRONIC technology. By the end of 2002, VALVETRONIC will be standard in all BMW cars equipped with V-8 or 12-cylinder engines.

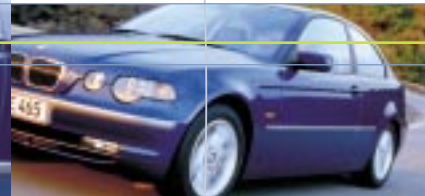
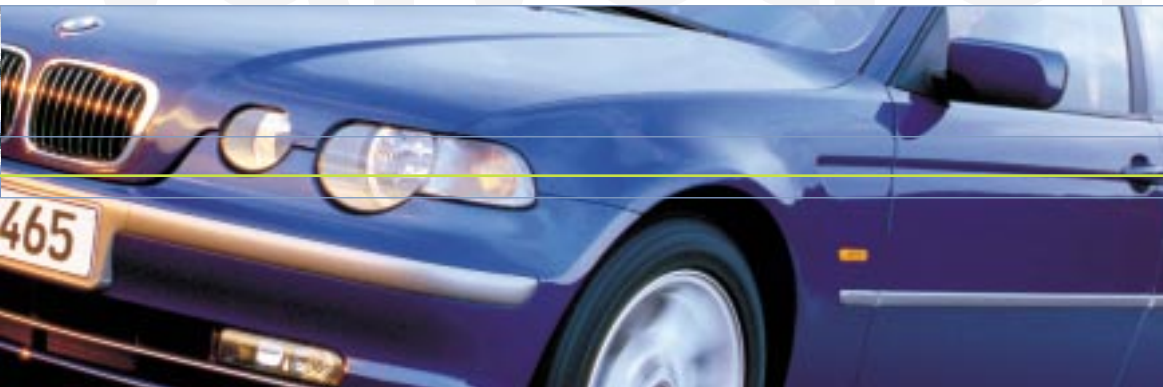
**Specifications BMW 316ti (N42B18)  
4-cylinder engine with VALVETRONIC**

Engine \_\_\_\_\_ gasoline powered, inline 4  
 Power \_\_\_\_\_ 85 kW/115 bhp @ 5,500 rpm  
 Torque \_\_\_\_\_ 175 Nm @ 3.750 rpm  
 Displacement \_\_\_\_\_ 1.796 ccm  
 CO<sub>2</sub> emissions \_\_\_\_\_ 167 g/Km  
 Emission rating \_\_\_\_\_ EU4

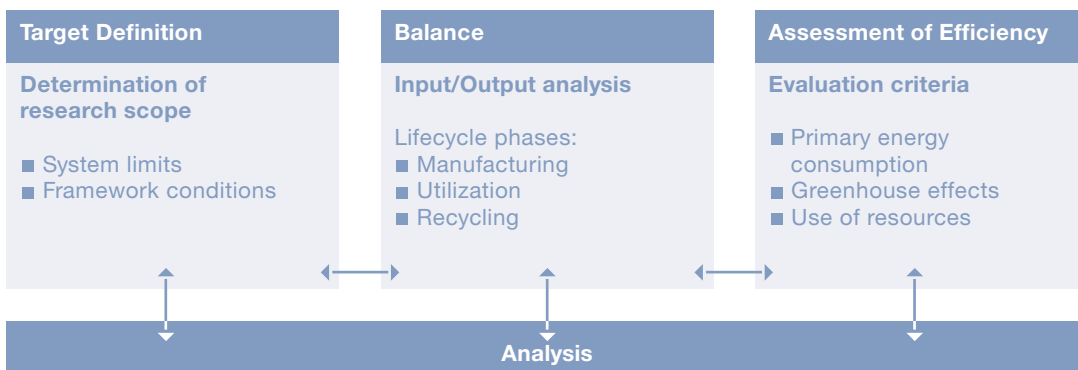
**Fuel economy  
316ti compact and previous model**



# Valvetronic



**Methodology of the ecological component balance (eco-balance)**



BMW 3-series:  
Recyclable plastics



### Design for recycling

The list of demands on a BMW automobile is extensive. It includes the typical BMW performance features as well as active and passive safety functions. At the same time, it must ensure maximum passenger comfort and comply with the highest standards of quality. Environmental compatibility is also a key factor. This becomes especially important when a BMW is recycled at the end of its long life. Design for recycling: This is the BMW approach to engineering environmental compatibility into the vehicle in the early phases of product development. The BMW Recycling and Disassembly Center (RDZ) in Lohhof, Germany consistently exchanges information with the BMW research and innovation center. The objective is to develop solutions for environmentally and economically sensible recycling. This approach has proven successful. Today's BMW vehicles can be economically, and almost completely, recycled.

### Primary goal: Economical and environmentally safe recycling

Engineering new vehicle components involves a careful assessment of the energy and ecological balance. The BMW Recycling and Disassembly Center conducts detailed disassembly analyses. These studies take a close look at the amount of time and the tools required for disassembling end-of-life vehicles. This information is then used as a basis for determining whether the vehicle construction and materials are suitable for recycling. Recommendations are made regarding recycling-optimized design and the eco-efficient, i.e. ecological and economical recovery of

end-of-life vehicles. For good recycleability key factors are the choice of materials, the appropriate marking of components and the joining techniques. This ensures that the components can be properly separated and recovered. Another important factor is the way the component parts are attached to the vehicle. The knowledge gained in this area flows directly into product development and production operations. Instead of focusing on the metals used in manufacturing a car, which make up 75 percent of its total mass and can be easily recycled, BMW specialists concentrate on the increasing proportion of plastics used in modern cars to reduce weight and increase fuel efficiency. The current BMW 3-series cars, for example, contain around 162 kilograms of plastic materials. This is 15 percent more than the previous model. Nearly 90 kilograms of these plastics can be economically recycled in compliance with BMW recycling standards.

### Recycling in the product development process

In the product development process, BMW engineers carefully consider the environmentally relevant characteristics of an automobile, called "PEP". One objective is to formulate the different requirements to synchronize the interdisciplinary work. In order to ensure efficient vehicle recycling, the criteria in all decision phases must be carefully evaluated. The established recycling objectives generally pertain to individual vehicle components. To optimize products for recycling, the BMW Group uses different methods in the product development phase. In addition to a list of specifications for the entire vehicle, a detailed spec sheet listing material identification codes and recycling



standards is created for the separate parts. A disassembly analysis is conducted and recycling instructions are finalized along with an environmental/economic assessment of recycling-relevant components. In all phases of the product development process, these methods ensure that recyclability in consensus with other technical requirements are taken into consideration.

### Increasing use of recyclates

In keeping with a sustainable product design strategy, a number of options are available in the choice of materials. These range from the use of recyclates to the implementation of renewable raw materials.

With the increasing use of plastics in automobiles, the recyclability of these materials becomes more important. The proportion of plastics in a BMW vehicle is currently around 12 percent. Depending on the model, 14 to 15 percent of these plastics are made from recyclates. The goal is to gradually increase

this proportion in conjunction with the market conditions and technical feasibility. BMW quality standards apply to plastic recyclates as much as they do to new materials. Consequently, the implementation of recyclates in the production of new parts must be coordinated with the design engineers who are also responsible for granting final approval. Typical areas in which recyclates can be used include rear shelf sections and floor panel covering, cable conduits, engine compartment shrouds, housings, and brackets.

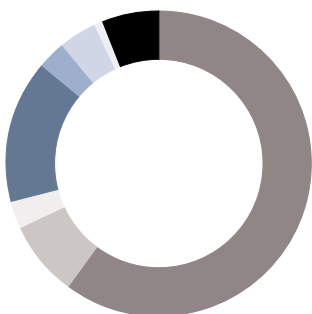
### Renewable raw materials

Natural fibers and other renewable raw materials are used in BMW cars for sound insulation, inner door panels, as a fleece carrier material in the luggage compartment, and as surface trim. The potential for further development is regarded by BMW as positive: These materials are lightweight, have a favorable environmental balance, and generally reduce costs.

BMW Group Recycling and Disassembly Center (RDZ) in Munich-Lohhof

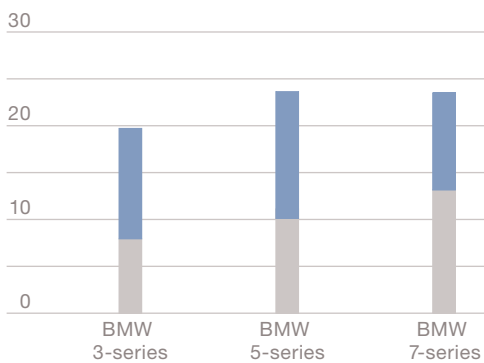


Industrial materials used in the production of the current BMW 3-series cars



Iron	60%
Light alloys (cast/forged)	8%
Non-ferrous metals	3%
Polymers	15%
Processed polymers	3%
Other materials and composites	4%
Electronics/electrical	1%
Operational materials and aids	6%

Implementation of renewable raw materials: Comparison of BMW models



■	19.8	23.8	23.6	Overall weight of renewable raw materials (kg) including rubber, leather, wool, cotton	
■	approx. 8	10.2	13.2		natural fibers (kg)

# Profile of BMW vehicles



## MINI: Renewing an old friendship

The MINI plays a key role in lowering the average BMW fleet consumption. This new version of the popular subcompact car exemplifies the BMW strategy of offering premium cars in all relevant market segments and producing successful niche models.

First introduced in 1959, the MINI was soon followed by the sporty MINI Cooper in 1961. Now, some 40 years later, BMW has relaunched the car as the MINI One and MINI Cooper. This new subcompact is manufactured at the BMW plant in Oxford, which currently has a production capacity of nearly 100,000 units per year.

# MINI Cooper

## Spec Sheet: MINI One

As of 9/2001

### Engine and performance data

Engine \_\_\_\_\_ gasoline powered inline 4  
Displacement \_\_\_\_\_ 1,598 ccm  
Power \_\_\_\_\_ 90 bhp/66 kW  
Torque \_\_\_\_\_ 140 Nm @ 3,000 rpm  
Top speed \_\_\_\_\_ 185 km/h

### Weight

Unladen (EU) \_\_\_\_\_ 1,115 kg  
Max. permissible \_\_\_\_\_ 1,470 kg

### Fuel consumption (99/100/EG)

City \_\_\_\_\_ 8.7 l/100 km  
Highway \_\_\_\_\_ 5.2 l/100 km  
Combined \_\_\_\_\_ 6.5 l/100 km  
CO<sub>2</sub> emissions \_\_\_\_\_ 158 g/km

### Emission ratings according to 99/102/EG

Limited exhaust gas emissions (CO, HC, NO<sub>x</sub>) according to emission rating EU4

### Noise emissions according to 99/101/EG

Accelerated pass-by \_\_\_\_\_ 74 dB (A)

## Engine

The MINI is unmistakably a MINI – even though the new version is nearly 50 centimeters longer than its predecessor and now offers room for four passengers. Today's MINI has a 1.6-liter, 16-valve, 4-cylinder engine generating 90 DIN bhp. Based on EU standards, average fuel consumption is about 6.5 liters per 100 kilometers. It already meets the EU4 emission standards that will go into effect in Germany in 2005.

## Meeting the highest recycling standards

Recycling was one of the primary objectives in designing the new MINI. In order to achieve the highest possible recycling ratio, steps were taken in the early phases of product development to ensure recycling-compatible construction of the component parts. This is a prerequisite for high value recycling in which entire assemblies can be recycled and the materials recovered for future use. Examples include the catalytic converter, clutch assembly, transmission, water pump, crankshaft, alternator, starter, central control unit, air conditioner compressor, radio, etc. BMW engineers were able to comply with the BMW recycling standard 113 99.0 as well as the guidelines of the BMW recycling manual for vehicle construction. The economical disassembly of a variety of MINI components is optimized by special assembly techniques and a careful choice of materials. Examples include the instrument panel trim, the lining the rear deck lid, and front seat backs.



## BMW C1 redefines mobility

With the C1 the BMW Group introduced a vehicle concept that redefines urban mobility. The C1 combines the typical comfort and safety features of an automobile with the driving characteristics and environmental advantages of a 2-wheel vehicle. Following its market launch in spring 2000, the C1 has attracted attention in many southern and western European countries.

# C1

### Spec Sheet: BMW C1

As of 9/2001

#### Engine and performance data

Engine \_\_\_\_\_ single cylinder  
four-stroke engine  
Displacement \_\_\_\_\_ 125 ccm  
Power \_\_\_\_\_ 15 bhp/11 kW  
Torque \_\_\_\_\_ 12 Nm @ 6,500 rpm  
Top speed \_\_\_\_\_ approx. 100 km/h

#### Weight

Unladen (EU) \_\_\_\_\_ 185 kg  
Max. permissible \_\_\_\_\_ 360 kg

#### Fuel consumption

At a constant 55 mph \_\_\_\_\_ 2.9 l/100 km  
CO<sub>2</sub> emissions \_\_\_\_\_ 64 g/km  
Noise level \_\_\_\_\_ 77 dB (A)

### Engine and emission control

The C1 is equipped with a single-cylinder, four-stroke engine (125 ccm) based on a design developed by Bombardier-Rotax. This engine features an innovative electronic engine management system with a combined microprocessor timing system for ignition, fuel injection, oxygen sensor, and idle speed regulation. Like all BMW two-wheel vehicles, the C1 concept was developed to include a regulated 3-way catalytic converter for reduced emissions. This results in a CO<sub>2</sub> output of less than 64 grams per kilometer. At a constant speed of 90 km/h, fuel economy averages over 2.9 liters per 100 km.

### Exhaust system

The exhaust system was adapted for the 3-way catalytic converter and is designed to comply with noise level restrictions (77 dB, A) specified for motorcycles in this class.

### Safety

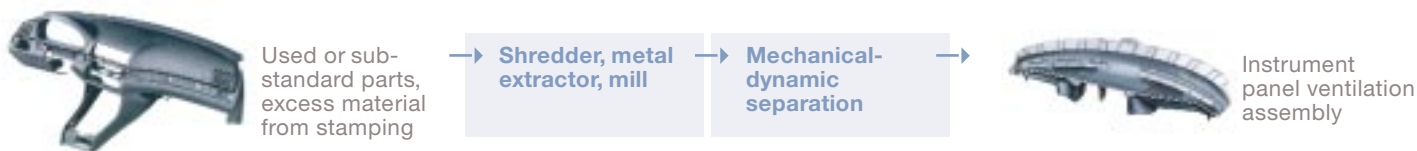
The C1 safety concept essentially includes five modules: The crash deformation shroud above the front wheel, the BMW Telelever as an additional energy absorbing assembly, the main frame that serves as a safety cell for the driver, a special seat with head restraints, and a 3-point/2-point seat belt. BMW C1 drivers are not legally required to wear a helmet in many European countries.



## Setting industry standards: BMW320d

The BMW 3-series sets the standards for recycling-optimized vehicles of the future. This car can be virtually 100% recycled in compliance with economic and environmental guidelines. The recycling concept is integrated into the design of many of the car's components and assemblies. For example, the instrument panel is manufactured based on a new recycling approach designed to enter excess materials into a high-quality recycling process.

### Recycling plan used for manufacturing instrument panels



# 320d

#### Spec Sheet: BMW 320d

As of 9/2001

##### Engine and performance data

Engine \_\_\_\_\_ diesel powered inline 4  
 Displacement \_\_\_\_\_ 1,995 ccm  
 Power \_\_\_\_\_ 150 bhp/110 kW  
 Torque \_\_\_\_\_ 330 Nm @ 2,000 rpm  
 Top speed \_\_\_\_\_ 216 km/h

##### Weight

Unladen (EU) \_\_\_\_\_ 1,450 kg  
 Max. permissible \_\_\_\_\_ 1,875 kg

##### Fuel consumption (99/100/EG)

City \_\_\_\_\_ 7.7 l/100 km  
 Highway \_\_\_\_\_ 4.5 l/100 km  
 Combined \_\_\_\_\_ 5.7 l/100 km  
 CO<sub>2</sub> emissions \_\_\_\_\_ 152 g/km

##### Emission ratings according to 99/102/EG

Limited exhaust gas emissions (CO, HC, NO<sub>x</sub>) according to emission rating EU3

##### Noise emissions according to 99/101/EG

Accelerated pass-by \_\_\_\_\_ 73 dB (A)

#### Engine

Under the hood of a BMW 320d is an innovative 4-cylinder diesel engine with direct fuel injection. Fuel consumption for the 2-liter DI engine is from 10 to 15 percent lower than the previous model: The BMW 320d averages 5.7 liters per 100 kilometers of diesel fuel. With CO<sub>2</sub> emissions reduced to 152 g/km, the 320d complies with the EU3 emission standards.

#### Lightweight chassis

Lightweight construction is one of the key factors in improving fuel economy. By integrating aluminum and magnesium into the car's chassis, BMW engineers were able to reduce the car's weight by nearly 8 kilograms compared to the previous model.

#### Maintenance

Maintenance of the BMW 320d was optimized in keeping with environmental and cost criteria. The car's drivetrain is maintenance-free: Automatic/manual transmissions and differentials use a permanent lubrication system. The service intervals for engine oil and filter (around 20,000 kilometers), air and fuel filters (80,000 kilometers), and coolant (three years) were all significantly increased.



## Smooth-running inline six: BMW 530i

BMW has been engineering inline 6-cylinder engines since 1968. This design concept not only ensures a smooth-running engine, it also offers maximum driving comfort. The latest 3.0-liter inline six was introduced in the BMW 530i in 2000. BMW engineers were tasked with creating a smoother, quieter, more powerful engine without increasing fuel consumption or emissions. Result: The BMW 530i meets the EU3/D4 emissions standards with an average fuel economy of 9.5 liters per 100 kilometers.



# 530i

### Spec Sheet: BMW 530i

As of 9/2001

#### Engine and performance data

Engine \_\_\_\_\_ gasoline powered inline 6  
Displacement \_\_\_\_\_ 2,979 ccm  
Power \_\_\_\_\_ 231 bhp/170 kW  
Torque \_\_\_\_\_ 300 Nm @ 3,500 rpm  
Top speed \_\_\_\_\_ 250 km/h

#### Weight

Unladen (EU) \_\_\_\_\_ 1,605 Kg  
Max. permissible \_\_\_\_\_ 2,070 kg

#### Fuel consumption (99/100/EG)

City \_\_\_\_\_ 13,1 l/100 km  
Highway \_\_\_\_\_ 7,4 l/100 km  
Combined \_\_\_\_\_ 9,5 l/100 km  
CO<sub>2</sub> emissions \_\_\_\_\_ 229 g/km

#### Emission ratings according to 99/102/EG

Limited exhaust gas emissions (CO, HC, NO<sub>x</sub>) according to emission rating EU3/D4

#### Noise emissions according to 99/101/EG

Accelerated pass-by \_\_\_\_\_ 73 dB (A)

### Emission control

The concept of locating catalytic converters in close proximity to the engine was carried over from the previous model. This improves cleaning efficiency by ensuring that the catalysts reach their operating temperature faster. By changing the cell density and implementing different metals in the catalytic converters, BMW engineers have made it possible to convert a higher percentage of the hydrocarbons, carbon monoxide, and nitrogen oxides into non-toxic gases.

### Double VANOS

Lower fuel consumption is achieved with the Double VANOS variable camshaft control. This technology significantly improves the torque curve of the 6-cylinder engine. The electromechanical throttle valve control increases fuel efficiency and provides smoother idling. Digital Engine Electronics (DME), another BMW 530i innovation, ensures optimum performance with lower fuel consumption and emissions.

### Lightweight chassis

Like all of the latest BMW 5-series models, the 530i (E 39) is built on a lightweight chassis. Along with the integrated aluminum rear axle, this concept features an aluminum twin A-arm front axle assembly to help reduce overall vehicle weight while reducing fuel consumption and exhaust emissions.



## Introducing a new standard: BMW735i

One of the engineering objectives was to create an innovative balance between economy, comfort, driving dynamics, and safety. The new BMW 7-series that premieres at the IAA 2001 Motor Show in Frankfurt, Germany introduces a number of innovations designed to make driving safer, more relaxed, and environmentally compatible. One of the most interesting innovations is the iDrive concept that combines all functions and reduces hands-on controls to a minimum. Instead of conventional switches and knobs on the center console, there is a control panel for traffic telematics including a navigation system and the individually configurable ASSIST-Online, the world's first BMW Internet portal.

# 735i

### Spec Sheet: BMW 735i

As of 9/2001

#### Engine and performance data

Engine \_\_\_\_\_ gasoline powered V-8  
 Displacement \_\_\_\_\_ 3,600 ccm  
 Power \_\_\_\_\_ 272 bhp/200 kW  
 Torque \_\_\_\_\_ 360 Nm @ 3,700 rpm  
 Top speed \_\_\_\_\_ 250 km/h

#### Weight

Unladen (EU) \_\_\_\_\_ 1,935 kg  
 Max. permissible \_\_\_\_\_ 2,440 kg

#### Fuel consumption (99/100/EG)

City \_\_\_\_\_ 15,0 l/100 km  
 Highway \_\_\_\_\_ 8,2 l/100 km  
 Combined \_\_\_\_\_ 10,7 l/100 km  
 CO<sub>2</sub> emissions \_\_\_\_\_ 259 g/km

#### Emission ratings according to 99/102/EG

Limited exhaust gas emissions (CO, HC, NO<sub>x</sub>) according to emission rating EU4

#### Noise emissions according to 99/101/EG

Accelerated pass-by \_\_\_\_\_ 70 dB (A)

### Higher performance – lower fuel consumption

BMW 7-series technical innovations include the new-generation 8-cylinder engines. With a 6-speed transmission, the new V-8 engine in the BMW 735i delivers 14 percent more horsepower (272 bhp) than the previous model. BMW engineers actually lowered the car's fuel consumption by the same amount (14%). Based on EU standards, the BMW 735i averages 10.7 liters per 100 kilometers. Thanks to a number of infinitely variable parameters including valve timing (Double VANOS), valve lift (VALVETRONIC), and the world's first adjustable intake manifold length, engine performance can be perfectly adapted to the actual load conditions. The intelligent lightweight construction of the new 7-series dramatically improves fuel economy. With features including active suspension control and electronic damping, the entire BMW 7-series chassis is made of aluminum.

### Recycling-optimized design

The new BMW 7-series complies with the most stringent recycling standards. Many of the car's components and assemblies were designed for optimal recycling. This includes the center console, rear deck ventilation, and the engine shroud. Adding to the environmentally compatible engineering approach is the central ignition control for all pyrotechnic elements in the passive safety system. The proportion of recycled materials used in the car's plastic components was increased to 14 percent.

## Safe and economical: BMW X5 3.0d

With the introduction of the first Sport Activity Vehicle, BMW continued its successful niche product policy in the premium segment. From the very beginning, the BMW X5 has ranked at the top of the customer surveys conducted by the J. D. Powers market research institute. The BMW X5 also meets the highest safety standards. It was acclaimed as the safest car ever tested by the independent American Insurance Institute for Highway Safety.



# X5 3.0d

### Spec Sheet: BMW X5 3.0d (automatic transmission)

As of 9/2001

#### Engine and performance data

Engine \_\_\_\_\_ diesel powered inline 6  
Displacement \_\_\_\_\_ 2,926 ccm  
Power \_\_\_\_\_ 184 bhp/135 kW  
Torque \_\_\_\_\_ 410 Nm @ 2,000-3,000 rpm  
Top speed \_\_\_\_\_ 200 km/h

#### Weight

Unladen (EU) \_\_\_\_\_ 2,170 kg  
Max. permissible \_\_\_\_\_ 2,685 kg

#### Fuel consumption (99/100/EG)

City \_\_\_\_\_ 12,3 l/100 km  
Highway \_\_\_\_\_ 8,2 l/100 km  
Combined \_\_\_\_\_ 9,7 l/100 km  
CO<sub>2</sub> emissions \_\_\_\_\_ 259 g/k

Emission ratings according to 99/102/EG  
Limited exhaust gas emissions (CO, HC, NOx) according to emission rating EU3

Noise emissions according to 99/101/EG  
Accelerated pass-by \_\_\_\_\_ 74 dB (A)

### Focus on safety

A wide range of control systems adds to active passenger safety. Features on the BMW X5 with permanent all-wheel drive include Dynamic Stability Control (DSC) and the Automatic Differential Brake ADB-X that automatically applies the right amount of braking pressure to each wheel. Hill Descent Control (HDC) ensures sure-footed traction in all driving situations. The Dynamic Brake Control (DBC) supports the driver's reaction by automatically sensing emergency situations and applying full braking power.

### New diesel engine

The advanced engine technologies featured on the 6-cylinder inline diesel in the BMW X5 3.0d include Common Rail Injection, a turbocharger with variable geometry, and four valve engineering. BMW X5 3.0d fuel economy is favourable in its class. With average consumption rated at 9.7 liters per 100 kilometers of diesel fuel, the X5 3.0d automatic meets the stringent EU3 emissions standards.



Dr. Burkhard Göschel  
Vice President,  
Development and  
Procurement

The demand for sustainability has added a new direction in all areas of industrial management. At the same time public interest in this theme still focuses on personal mobility – primarily the automobile. Ecology and energy efficiency are so firmly established in the minds of customers that automobile designers can only increase the safety, comfort, and performance of their products if they pay close attention to conserving natural resources. This has become an increasingly important factor in the advancement of automotive engineering. In the future, the issue of sustainability will be determined by the technology leaders in the automobile industry.

For BMW Group engineers, sustainability has become the main focus of product development over the past few years. The Sustainable Value Report 2001/2002 documents how BMW engineering has reinforced the company's standing as a technology leader. Examples of innovative BMW engineering include VALVETRONIC, a new technology that eliminates the need for mechanical throttle valves. The new electronically controlled intake valves improve fuel economy by up to 10 percent.

ConnectedDrive is another example of how pioneering information technology is used to set new standards in the interaction between the driver, vehicle, and surroundings while reducing traffic congestion and environmental impact.

The spectacular success of the BMW Group in Formula 1 racing represents the cutting edge of high-tech engineering. Lower fuel consumption and lighter vehicles are important success factors in Formula 1. At BMW, this technology flows into the development of today's series production cars.

Success on the racetrack is not an end in itself. But it proves that high-tech and genuine innovations must be consistently placed in the context of sustainability to ensure the ultimate driving experience.

Munich, August 2001

Burkhard Göschel

## Research & Development: A step into the future



Innovative light technology integrated into parking light ring adds an instantly recognizable design accent.

**BMW Group research and development departments have a clear objective: Advanced product design with minimum environmental impact. At the same time, it is important to ensure adequate mobility without limiting the quality of human life. BMW invested over €2.1 billion in 2000 for research and development. In addition to new drive technologies, some of the company's main research objectives include lightweight body construction technology and the advanced engineering of driver assistance and information systems. This technology makes using traffic systems safer and more efficient for BMW drivers while avoiding traffic congestion.**

# Visions

Testing lab





## Benefits for the driver and the environment

Waiting in traffic is a waste of energy. In Germany alone, up to 14 billion liters of fuel are wasted each year as a result of traffic congestion. According to BMW figures, the annual financial loss in Germany amounts to nearly €100 billion. One way to reduce the resulting environmental impact is to use existing roads more efficiently. With this in mind, the BMW Group is working intensively on the development of new driver assistance systems.

### ConnectedDrive: A networked approach

The innovative BMW ConnectedDrive concept links all driver assistance and information systems. BMW researchers follow the theory that networking the different services improves safety and comfort while reducing environmental impact.

ConnectedDrive is based on the interaction between the driver, vehicle, and environment. Special sensors record information on weather and road conditions. At the same time, the driver is informed about potential danger situations and current traffic status. The concept encompasses a variety of active driving aspects to ensure smoother traffic flow and enhance safety.

An Internet portal in the ConnectedDrive vehicle provides direct access to all traffic relevant data and is networked with a satellite navigation system to optimize road travel.

## Dynamic online information services

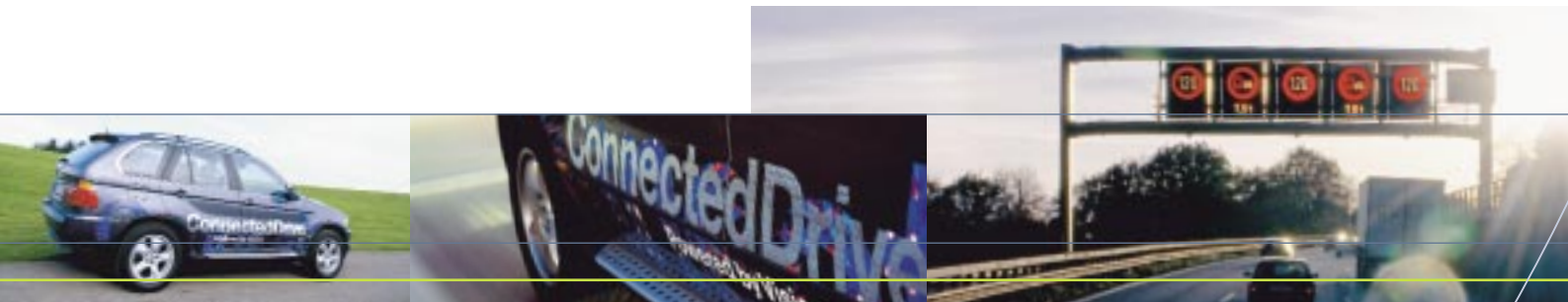
Dynamic telematics applications will become more important in the future. The comprehensive networking of traffic information can significantly improve traffic flow and reduce environmental impact. BMW researchers have taken this a step further with Extended Floating Car Data. This system compiles vehicle information including speed and current position and sends it anonymously to a data collection point where it is used to provide information to other drivers on the road.

BMW innovations in this field include online services. For example, the BMW parking assistant makes it easier to find a parking space by actively searching for vacancies in the immediate area. Known as BMW ASSIST, this system is a component of the ConnectedDrive package available in the new BMW 7-series cars. Using Internet technology, BMW drivers can take advantage of this and many other services. A user-configured Internet portal provides direct access to traffic information and notifies the driver of traffic tie-ups or detours. These technologies work together to make personal mobility more compatible with environmental objectives.

### Introducing SOFC

The number of electronic applications in modern automobiles will continue to increase in the future. In order to make the electrical system in

# Connected



ConnectedDrive



ConnectedDrive

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

Science Club

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

Williams Formula 1

[www.bmw.williamsf1.com](http://www.bmw.williamsf1.com)

BMW Motorsport

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



new BMW cars more environmentally compatible, BMW researchers teamed up with an industry affiliate to develop a gasoline powered fuel cell. The SOFC (Solid Oxide Fuel Cell) transforms gasoline into electricity much more efficiently than the conventional method using a combination of engine, generator, and battery. An SOFC uses about half as much fuel to generate electricity as a normal internal combustion engine with generator.

### BMW Research and Innovation Center

Located near the corporate headquarters in Munich, the BMW Research and Innovation Center (FIZ) offers an ideal environment for developing creative technical solutions. Built in the mid-eighties, the center employs nearly 6,000 people. This is where information and knowledge come together enabling new synergies that, despite modern communications, are often unachievable when designers are not located under the same roof. One of the key themes at the center focuses on sustainable mobility of the future along with its social and environmental impact.

While the designers at the BMW Research and Innovation Center concentrate on advanced automotive engineering concepts, the 100 employees at Technik GmbH in Munich-Moosach lay the groundwork for other innovative concepts. Independent of the current product range, this "Think Tank" provides creative ideas that flow into the development of new vehicle concepts and components. Examples include the revolutionary Mechatronic lightweight vehicle Z22 and the BMW C1 two-wheel vehicle, a totally new concept in environmentally compatible, urban mobility.

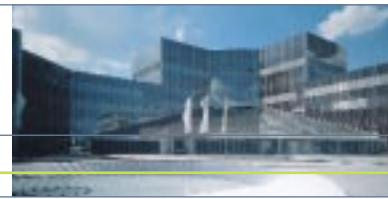
### Key technology: Lightweight construction

Since the company was first established in 1985, one of the primary focuses at Technik GmbH has been on intelligent lightweight construction. For BMW, this technology is the key to reducing fuel consumption and complying with the stringent EU4 emission standards that go into effect in Europe in 2005. The importance of the company's research in this field is emphasized by the fact that lowering vehicle weight by 100 kg can improve fuel efficiency by 0.5 liter per 100 kilometers.

The search for lightweight industrial materials is running full speed ahead. BMW is hoping to gain from the carbon fiber reinforced polymer (CFRP) technology used in Formula 1 racing. The development of CFRP has been successful for the BMW Williams F1 team. Also the engine of the team's FW23 racecar is based on advanced lightweight construction technology that will be implemented in BMW series production models in the future. The engine's cylinder head is manufactured from aluminum. Other engine parts were developed at the BMW Innovation and Technology Center (LITZ) in Landshut where a special foundry is used in the development of other innovations for series production technologies.

### Lightweight automotive technologies

A new joint cooperation with the science community has been established to advance lightweight automotive construction. Initiated by the BMW Group, a special curriculum for lightweight construction technology has been established beginning with the winter semester 2000/01 at the Landshut Technical Institute. This new course of study is being financed in the first 5 years by the BMW Group with a donation of over €500,000.



BMW Research and Innovation Center (FIZ)

# Reducing weight to benefit the environment



## New material with excellent environmental qualities

Losing weight is not only good for human health, it also benefits the environment. When it comes to reducing the weight of a BMW automobile, the “diet” must not reduce vehicle safety, comfort, or driving enjoyment.

This approach led to a technological masterpiece in lightweight automobile construction designed by the BMW experts at Technik GmbH in August 2000. One of the characteristics that make the BMW Z22 unique from an environmental standpoint is its fuel economy. Although in terms of comfort, performance, and interior space the new car is comparable to a BMW 530i touring, this technological wonder uses only 6 liters of fuel per 100 km. The 35% weight reduction represents a quantum leap in lightweight construction technology.

Weighing just 1,100 kg (10kg/kW), the Z22 is the world's first Mechatronic automobile. Mechatronic, which refers to a mechanical system with electronic control, represents an automotive revolution. New Steer-by-Wire and Brake-by-Wire technologies in the Z22 replace the mechanical steering and hydraulic brake systems.

A team of engineering specialists developed the 70 innovations and new composite materials featured on the new technological tour de force. The degree of project success borders on the phenomenal: The lightweight Z22 virtually launched a technological chain reaction at BMW.

Based on Z22 project results, the company decided to work more extensively with carbon

fiber reinforced polymers (CFRP). Since then, the BMW Group has been developing this material for use in series production cars.

## The material of tomorrow

CFRP is destined to become a familiar term for BMW owners. In the future, they may very well find themselves sitting in a passenger cabin made from carbon fiber reinforced polymer. This is one more way in which BMW demonstrates its technological leadership in lightweight vehicle construction. CFRP currently shows the greatest weight saving potential in car body construction. It is 50 percent lighter than steel and up to 30 percent lighter than aluminum. BMW is developing CFRP technology as part of its Design for the Environment program. Along with lower weight, the material is corrosion resistant and performs extremely well in vehicle crash testing.

## International project team

An international project team made up of members from all BMW divisions is currently working on the development of CFRP for lightweight, series production auto bodies. This process is managed by the experts at the BMW Research and Innovation Center in Munich.

One thing is already clear: BMW will only start using CFRP in series production when it becomes cost neutral compared to aluminum. Along with environmental criteria, economy is an important aspect in the development of new lightweight materials.



Far left: Technology prototype Z22  
Left: Z22, central control panel  
Right: Z22, multi-function steering wheel

## 55% reduction in auto body weight



Side frame in deep-forged steel: **47.1 kg**

Z22 side space frame in CFRP material: **21.3 kg**

## Benchmarking recyclability

The prospects of using carbon fiber reinforced polymers still has one major drawback: CFRP structural parts from end-of-life vehicles are not suitable for a mechanical recycling due to the high disassembly costs. Consequently, they will be thermally recovered in the future as a component of the automotive shredder residue. In some cases this could lead to a conflict with the objectives of the lifetime environmental effects and compliance with material recycling quotas in the EU end-of-life vehicle directive. BMW material flow managers are optimistic in their approach to handling the waste materials from production operations. By the time series production with CFRP is launched, they expect to have a closed material recycling loop in place.

As part of its environmental commitment, the BMW Group strives to minimize the environmental impact of its products. In a direct comparison of environmental factors, including vehicle recycling and lightweight construction, a minor impact on the environment must be regarded as acceptable as long as the primary objective is environmental compatibility. In order to examine these relationships, BMW specialists are conducting an environmental lifecycle

analysis on CFRP materials and components. Thus far, this research has shown positive results.

In a comparison with a BMW 5-series touring side frame made of steel, the lighter CFRP frame performed extremely well in terms of environmental compatibility, i.e. energy consumption, potential greenhouse effects, and resource depletion. This goes to show that CFRP is a valuable material when it comes to environmental aspects. It has outstanding potential for environmental compatibility throughout the total lifecycle.

BMW has conducted further tests on CFRP materials in series production. These tests are designed to benchmark CFRP processes along with the economic aspects of its use in manufacturing.

## From basic concepts to innovative standards

Preparing for series production is one of the main tasks of the BMW Innovation and Technology Center where the CFRP pilot system is located. The innovation center focuses on developing basic concepts into innovative standards. Opened in December 1999, the technical institute is located at the BMW plant



Z22 lightweight cockpit and side frames made from carbon fiber reinforced polymer (CFRP)



in Landshut and consists of two main departments focusing on plastics and light alloys, the primary materials used by the BMW Group in advanced lightweight construction. Since the establishment of the technical institute, one of the major themes at the BMW Landshut plant is on testing lightweight materials and composites.

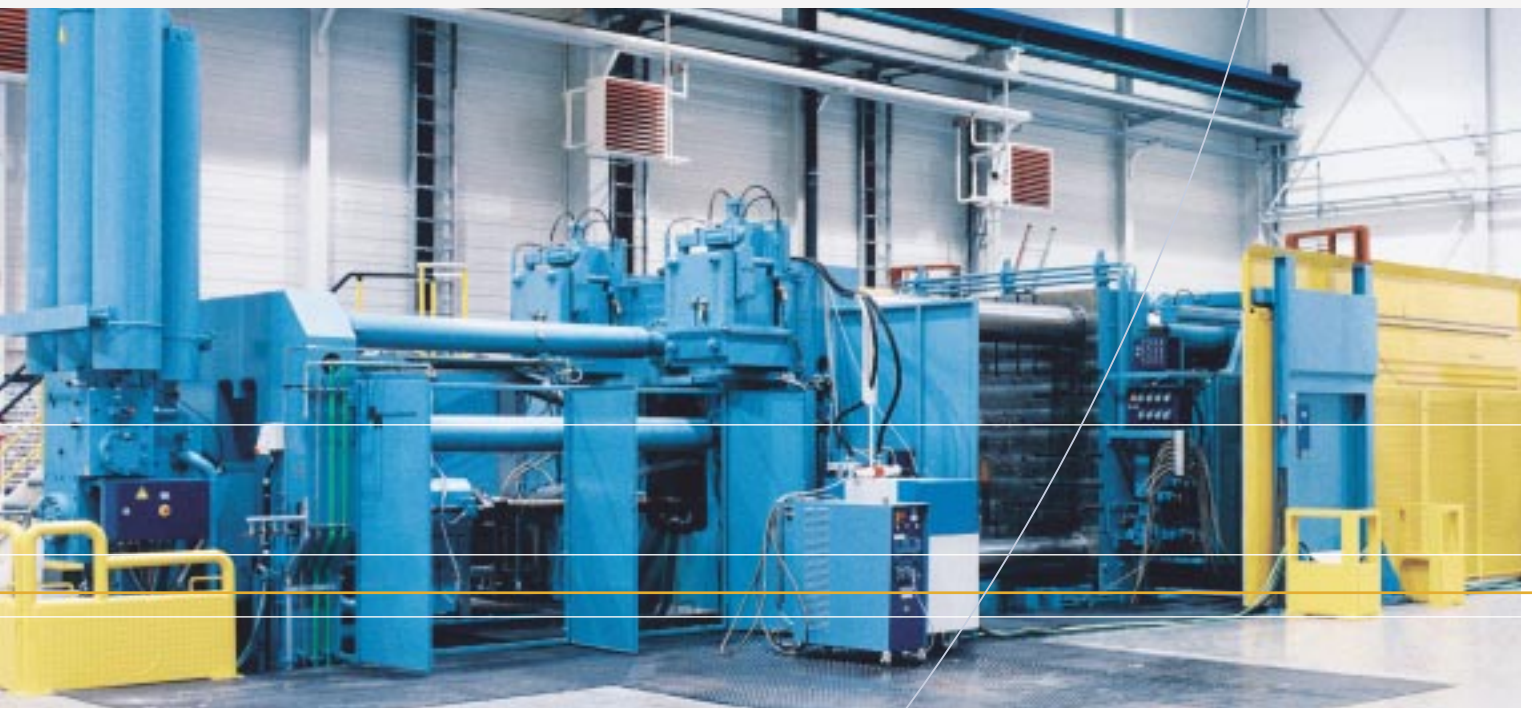
### **Making components lighter**

The innovative strength behind lightweight construction technology goes beyond CFRP and is demonstrated by a number of advanced developments for new BMW models. Light alloys including magnesium or aluminum also offer significant weight reduction potential.

A lightweight cockpit and an optimized rear seat back assembly are included in the LITZ development program. BMW will continue to explore new approaches to weight reduction and examine each assembly unit to determine whether lightweight construction can be intelligently implemented. Lightweight construction is not only relevant in the car body; the combination with other factors also plays an important role.

BMW engineers are keenly interested in the progress made in the development of fuel-efficient engines. Practical environmental benefits can be gained through optimized engine performance – especially in small cars. VALVETRONIC and hydrogen power are perfect examples.

**The Landshut Innovation and Technology Center is one of the focal points of the lightweight construction strategy followed by BMW in designing new-generation automobiles.**



BMW Group Landshut plant: LITZ light alloy die casting machine



# Clean production



Powder coating

Environmental protection, in any country – whether it is highly industrialized or a developing nation – is not a luxury. Consequently, an enterprise must be capable of providing innovative answers to the critical questions of the future. This demands technically advanced products that satisfy a variety of customer needs and are socially acceptable at the same time. It also means product development and manufacturing based on economic and ecological efficiency. Most importantly, it involves people who support the company's success with a sense of responsibility.

Sustainable management is the keyword and it is substantially more than a modern catchphrase. It is a synonym for the ability of the management to achieve economic success while paying close attention to its social responsibility and the needs of the environment.

Following this approach, BMW Group executives endorsed international environmental protection guidelines in 1998. This course of action is based on the Agenda 21 principles proposed at the world summit in Rio de Janeiro. A primary focus of Agenda 21 is to encourage global enterprises to follow the same standards in their foreign plants as they do in their homeland. This strategy is strictly adhered to by the BMW Group worldwide.



Dr. Norbert Reithofer  
Executive Vice President  
Production

A global BMW environmental standard represents a level of technology and knowledge transfer that extends far beyond the enterprise itself.

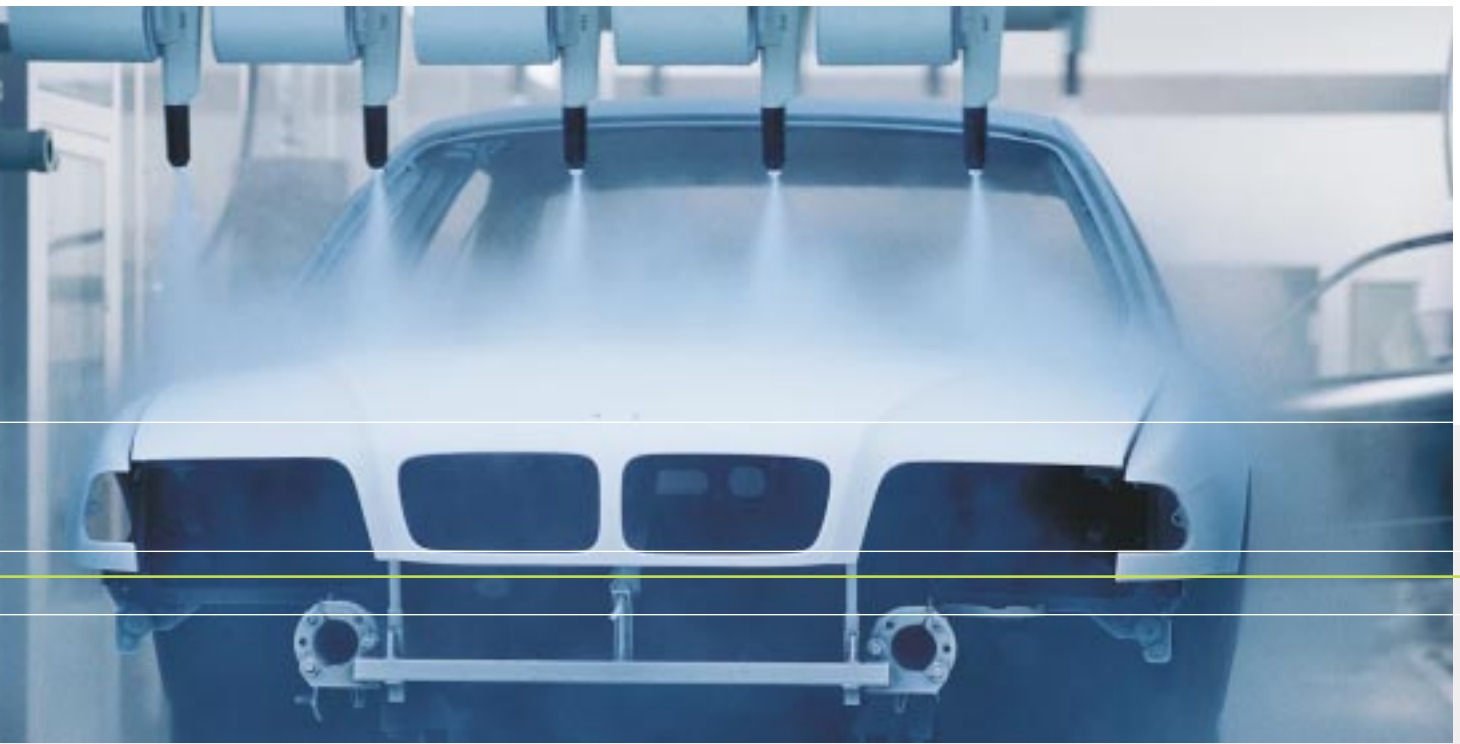
Every company that regards itself as global player needs to have an environmental policy that functions both on global and regional levels. With this in mind, each BMW environmental management system is specifically adapted to the local ecological and social conditions of the respective location. In contrast to a centralized, uniform way of doing things, this approach enables a substantially more effective management of the respective environmental and social aspects.

In the new BMW Group Sustainable Value Report, we outline many of the innovative features of our products and our international operations. We invite you to take a close look at the worldwide BMW Group sustainability policies and to provide us with your comments and opinions.

Munich, August 2001

Norbert Reithofer

# Environmental



High quality is one of the most outstanding characteristics of BMW products. This is clearly reflected in the company's premium car strategy. All fifteen of the BMW Group plants worldwide consistently meet the highest standards of quality. A company committed to sustainable economic growth should also integrate the highest environmental standards into its production quality. In addition to environment-friendly product engineering, the BMW Group focuses on environmental management in its manufacturing operations company wide. The goal is to minimize the environmental impact and the exploitation of resources while responding to the increasing demand for BMW products.

# Compatibility

**“Our goal is to meet the highest standards.”**

Prof. Joachim Milberg, BMW Group Chairman of the Board

**“Similar to our approach to quality, our orientation to the environment will always be a top priority at BMW.”**

Dr. Norbert Reithofer, BMW Group Executive Vice President for Production



Painting operations: Quality control

**Company-wide environmental management system**

The BMW Group is the world's first car manufacturer to have both quality management and environmental management systems in place at all of its production plants. Key environmental factors in automobile production include energy and water consumption, wastewater disposal, exhaust gas and noise emissions, waste and hazardous materials, carbon dioxide, and the use of solvents. In order to ensure continued progress in these areas, the BMW Group invested €15.8 million in 2000 in environmental protection. Another €31.5 million is currently being spent on environmental programs.

For example, based on the number of units produced, BMW was able to reduce the use of solvents by nearly 30 percent since 1996. Along with water-soluble paints, the company's new powder coating technology will help reduce solvents even further. The BMW factory in Dingolfing, Germany was the world's first automobile manufacturing plant to introduce powder coating technology. Today, the solvent-free final coat is applied without harmful emissions. The new pollution-free paint processes used in BMW plants are supported by investments in the triple-digit million range.

Significant progress has also been made in other important environmental aspects over the past five years. As a result, the CO<sub>2</sub> emissions per vehicle produced decreased by 15 percent, process water requirements dropped by over one-third, wastewater disposal by 16 percent, and energy consumption per unit by 20 percent.

Although the amount of excess production materials increased slightly compared to 1996 figures, the proportion of recovered materials has been higher with a reduction of the percentage of disposed waste.

**New environmental controls**

In order to improve environmental protection in production operations, BMW Motoren GmbH in Steyr, Austria developed a new environmental control system in cooperation with the University of Linz. Once this system is successfully implemented in Steyr, the BMW Group plans to introduce it at all BMW production facilities. One of the key goals of the environmental control system is it to use the scientific knowledge gained to systematically monitor and improve the efficiency of environmental protection and sustainability programs.

**Example: Great Britain**

In the future, all BMW manufacturing operations will benefit from the experience gained in Steyr. The international exchange of information between Steyr and the new BMW engine plant in Hams Hall, England has resulted in the development of an environmental management system at the new plant. In January 2001, series production of the new 4-cylinder VALVETRONIC engine was launched at the Hams Hall plant near Birmingham. Environmental certification of the new plant followed in July. In conjunction with the new environmental management system, special teams focusing on waste disposal,

## BMW engine plant in Hams Hall

Production \_\_\_\_\_ BMW 4-cylinder engine with VALVETRONIC  
Current capacity \_\_\_\_\_ 60,000 units per year (2001 target)  
Full production capacity \_\_\_\_\_ 400,000 units per year  
Series production launch \_\_\_\_\_ January 2001  
Environmental certification \_\_\_\_\_ July 2001  
Investment volume \_\_\_\_\_ €610 million  
Employees \_\_\_\_\_ 650 (by Dec. 2001)

## MINI production plant in Oxford

Production \_\_\_\_\_ MINI, MINI One, MINI Cooper  
Capacity \_\_\_\_\_ 100,000 units (from 2002)  
Series production launch \_\_\_\_\_ April 2001  
Environmental certification \_\_\_\_\_ 1995  
Investment volume \_\_\_\_\_ €366 million  
Employees \_\_\_\_\_ 2,500 (by Dec. 2001)

energy, and chemical control were formed. Working in cooperation with local employees, these teams are tasked with reducing environmental impact in their respective areas. This also has a positive effect on the cost structure: The new waste material separation system designed to sort 20 different materials has already paid for itself. In 2001 alone the plant expects to generate nearly £100,000 from recovered waste materials.

Just three months after the Hams Hall plant opened, the first new MINI rolled off the assembly line at the BMW plant in Oxford on April 26, 2001. This former Rover factory was changed over for MINI production in less than 10 months. The BMW Group invested over €360 million in body and assembly operations.

The paint shop at the Oxford plant was rebuilt in 1998 and now ranks as the most modern of its kind in Europe. The modernization project aimed at reducing the environmental impact of the painting process to a minimum. Today, virtually all of the materials used in the plant's paint operations are water-soluble. This applies to the paint itself as well as to the wax used for sealing body parts. The paint is applied using an advanced electrostatic process.

In order to reduce harmful emissions, all paint vapors are accumulated and purified. Painting jigs are cleaned in a special unit to ensure total control over environmental pollutants. Wastewater treatment at the Oxford paint shop meets the latest environmental standards. The water is purified in a special treatment plant to ensure full compliance with water pollution restrictions. Recycling is also practiced in

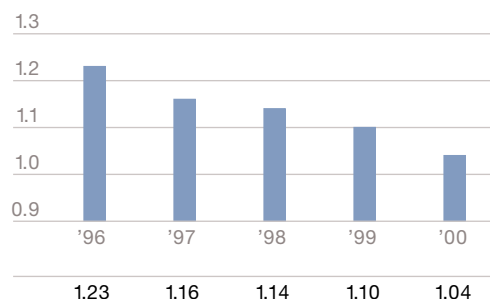
painting operations at the Oxford plant. This applies to wastewater as well as to waste materials and solvents.

The MINI production operations in Oxford meet the same environmental and quality standards in force at all BMW Group plants. Environmental certification was completed at the Oxford plant in 1995. All environmental management and control systems are in line with ISO 14001 standards. This helps create the conditions for sustainable production while paying close attention to environmental factors and the needs of local residents.

### Suppliers: Environmental compatibility of products required

BMW Group suppliers are also fully integrated into the company's policy of environmentally compatible production. One important aspect of BMW procurement conditions is the environmental compatibility of all BMW products. Suppliers are informed about the objectives of the BMW environmental policy of minimizing the negative impact on people and the environment. The environmental requirements are clearly defined in the product development process and outlined in specification sheets. Evaluation criteria include the efficient use of resources, suitability for recycling, materials and component substances, and emissions. This makes it possible for the BMW Group to select suppliers according to their level of compliance with environmental criteria.

CO<sub>2</sub> emissions per unit produced in tons



Automobile Assembly, Dingolfing, Germany

Component Assembly, Landshut, Germany

Automobile Production and Engine Assembly, Munich

BMW Group Figures\*

		1996	1997	1998	1999	2000
<b>Vehicle Production</b>						
BMW automobiles	Units	639,433	672,238	706,426	755,547	834,519
Manufactured engines	Units	640,940	672,962	713,329	792,026	876,656
Personnel in production	No.	44,600	44,465	47,137	48,543	50,300
Frequency of industrial accidents**	No.	24	16	15	14	17
Complaints from local residents***	No.	10	28	47	86	74
Land development****	%	--	20	--	24.6	--
Property area	m <sup>2</sup>	--	11,923,975	--	12,491,329	--
<b>Emissions</b>						
Carbon dioxide (CO <sub>2</sub> )*****	t	786,879	780,271	803,386	833,232	870,862
CO <sub>2</sub> per unit produced	t/unit	1.23	1.16	1.14	1.10	1.04
Nitrogen oxide (NO <sub>x</sub> )	t	808	854	987	875	476
SO <sub>2</sub>	t	11	7	4	5	6
Carbon monoxide (CO)	t	218	211	279	275	244
Volatile organic compounds (VOC)	t	2,872	2,354	2,636	2,870	2,679
VOC per unit produced	kg/unit	4.49	3.50	3.73	3.80	3.21
Particles, dust	t	39	34	33	35	37
<b>Water</b>						
Wastewater total	m <sup>3</sup>	2,231,194	1,985,842	2,340,409	2,131,837	2,206,733
Water consumption/water input	m <sup>3</sup>	3,736,900	3,468,948	3,423,820	3,403,209	3,344,939
Process water input	m <sup>3</sup>	2,917,520	2,717,549	2,737,398	2,650,677	2,481,127
Process wastewater	m <sup>3</sup>	809,988	853,241	870,815	868,044	882,286
Process wastewater per unit produced	m <sup>3</sup>	1.27	1.27	1.23	1.15	1.06
Total heavy metals and heavy metal compounds	kg	344	301	400	383	318

\* BMW Group figures apply to the following car and engine manufacturing facilities: Automobile Assembly, Dingolfing; Component Assembly, Landshut; Automobile Production and Engine Assembly, Munich; Automobile Production, Regensburg; Automobile Production, Rosslyn, South Africa; Automobile Production, Spartanburg, USA; Engine Assembly, Steyr, Austria.

\*\* Number of registered industrial accidents per 1 million man-hours.

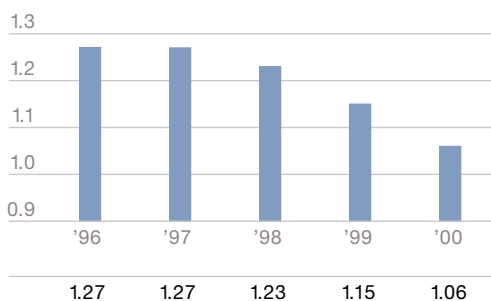
\*\*\* Increase since 1998 resulting from outdated CDP dryer in Munich paint shop. Completion of new building and pretreatment facility scheduled for 2002.

\*\*\*\* Survey conducted every two years.

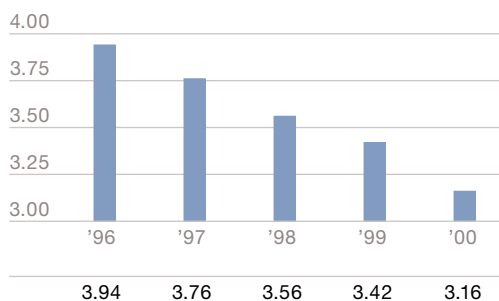
\*\*\*\*\* Includes CO<sub>2</sub> emissions of external electricity production.



**Process water per unit produced  
in cubic meters**



**Energy consumed per unit produced  
in MWh**



Automobile Production,  
Regensburg, Germany

Automobile Production,  
Rosslyn, South Africa

Automobile Production,  
Spartanburg, USA

Engine Assembly,  
Steyr, Austria

1996 1997 1998 1999 2000

<b>Waste</b>		1996	1997	1998	1999	2000
Total waste	t	218,374	219,298	259,000	278,232	291,082
Total waste per unit produced	kg/Unit	342	326	367	368	349
Materials to recycling	t	190,287	200,629	236,532	257,817	268,998
Waste for removal	t	28,087	18,668	22,468	20,415	22,084
Scrap	t	225,012	232,002	268,334	284,567	297,838

<b>Energy Consumption</b>		1996	1997	1998	1999	2000
Total energy consumption	MWh	2,517,758	2,527,577	2,517,528	2,518,423	2,636,565
Energy consumption per unit produced	MWh/Unit	3.94	3.76	3.56	3.42	3.16
Electricity (from outside sources)	MWh	958,651	951,711	1,043,051	1,086,358	1,163,233
Electricity (produced internally)	MWh	105,962	114,870	120,908	117,168	94,757
Heating oil	MWh	91,730	33,743	8,948	45,119	23,729
Coal	MWh	0	0	0	0	0
Remote heating	MWh	225,645	186,985	189,773	192,559	117,896
Mineral oil	MWh	0	0	0	0	0
Natural gas	MWh	1,135,770	1,240,268	1,154,848	1,140,219	1,236,950

<b>Expenditures</b>		1996	1997	1998	1999	2000
Environmental protection investments (excludes major investments)	EUR	6,373,765	8,816,762	5,005,548	8,413,308	15,800,297
Current environmental expenditures	EUR	21,730,539	25,229,857	26,657,584	29,799,187	31,500,000

**Paint and solvent emissions from partial processes based on figures from Spartanburg assembly plant in 2000:**

Paint process	Input: lacquer / paint	Output emissions: escaping volatile organic compounds (VOC)
Pretreatment, CDP*, UBS**	t 524.80	5.44
Filler	t 370.90	15.80
Primer	t 398.40	15.14
Clear coat	t 398.40	21.54
Polishing compounds/sealing	t 0.98	4.98

188.3 tons total thinner used in all process phases

\* Cathode Dip Bath  
\*\* Underbody Sealing

# Serv

Sales & Service: Serving  
the interests of the customer  
and the environment



# ice

Comprehensive services meeting the highest standards of quality, safety, reliability, and environmental protection: For the BMW Group, these are the key factors leading to customer satisfaction. Customers are among the most important stakeholders in the BMW Group because they make a valuable contribution to the company's economic prosperity. In the BMW Group global sales network consisting of 27 marketing companies, over 3,000 authorized BMW dealerships and 1,300 MINI sales & service centers, customer satisfaction plays an essential role. BMW customers clearly appreciate the quality of BMW service. In a customer satisfaction survey conducted by J.D. Power and Associates in 2000, the BMW Group ranked number 3 among 37 car manufacturers.



**“A car manufacturer’s responsibility does not end when the vehicle is delivered to the customer. The relationship between mobility and environmental responsibility is more important today than ever before. In the interests of environmental compatibility, this includes the material recovery cycle that begins when a new product is developed and continues until final disposal at the end of its lifecycle. As a pioneer in the field, the BMW Group began conducting recycling studies in the mid-eighties. Today, BMW is an automobile industry leader in recycling-optimized design.”**

Dr. Michael Ganal, Vice President of Marketing and Sales, BMW AG



In order to increase customer satisfaction, management performance, and market penetration, the BMW Group created the BMW Quality Trophy, a program designed to improve BMW dealership quality. To date, 190 BMW dealers have received this award based on individual performance assessments. In 2001, six BMW dealers were commended as “BMW Success Partners.”

**Quality – Safety – Environmental Protection**

Along with work safety, employee health, and commercial success, environmental protection has become a primary responsibility for BMW dealers worldwide. This is based on the realization that active environmental protection not only improves the corporate image, it is an indispensable aspect of quality management. It also significantly reduces costs in sales and service operations. BMW customers reap the benefits through extended service intervals and low maintenance automobiles. In 1982, BMW became the first manufacturer to introduce an electronic service interval indicator that automatically determines the level of service required based on actual vehicle mileage and driving conditions. This innovation has extended the average interval between oil changes for

gasoline engines to over 25,000 kilometers. For diesel engines, this figure was more than doubled to 22,500 kilometers.

Lifetime oil in transmissions and differentials and the extended life of spark plugs and air filters to over 100,000 kilometers have also drastically reduced the amount of potentially hazardous waste materials. This is one more way the BMW Group and BMW dealers have decreased disposal and recycling costs.

**Material recycling and recovery**

BMW successfully developed a system for waste disposal in BMW service centers. By offering BMW dealers targeted incentives for separating recyclable materials, this system has resulted in significant reductions in the costs of industrial waste disposal. Combining disposal methods and recycling a higher volume of waste materials not only lowers costs, it supports uniform environmental requirements. Working together with 800 BMW dealerships, the BMW Group developed the BMW community disposal system in 2000 for eliminating used commercial packing materials. Within this system, all packing materials can be returned for recycling – an important contribution to environmental protection. In 2000 alone, 72 percent of

**“Our focus is on the human aspect: Employees and customers.”**

Guiding principle from the Quality and Environment Management Manual published by the BMW manufacturer’s showroom in Frankfurt

**Sustainability in BMW dealerships**

**Humans**

Work safety protects employee health

**Ecology**

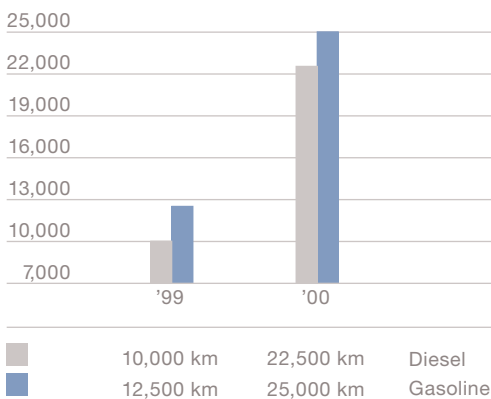
Environmental management reduces environmental impact

**Economy**

Quality management secures customer satisfaction and economic prosperity



### Extended motor oil service intervals for BMW automobiles in kilometers



### Amount of waste returned at no charge from the BMW dealership network in Germany

		1999	2000
Used oil (engine/transmission)	million liters	4.94	5.07
Scrap tires	qty.	433,566	442,610
Front/rear glass sections	qty.	100,500	99,702
Bumpers (plastic)	qty.	59,095	58,903
Fuel tanks (plastic)	qty.	590	482
Air cleaners	qty. (million)	1.27	1.46
Batteries	qty.	112,904	133,696
Plastics, mixed	kg	824,939	985,570
Electrical/electronic scrap	kg	36,474	47,607
Airbags, deflated	kg	27	52
Radiator coolant	liters	471,629	526,415
Brake fluid	liters	275,706	291,886

the 2,000 tons of packing materials brought into circulation were returned for recycling. This new system and the actual return rate were evaluated and certified by industry experts.

### End-of-life vehicle hotline: Environmental service for customers

BMW customer service extends to the environmentally compatible disposal of end-of-life vehicles. In 1999, BMW became the first automobile manufacturer to set up a telephone hotline to advise customers and provide information on local vehicle recycling companies. In Germany, a network was created with nearly 100 BMW- approved recycling firms and 200 vehicle drop-off points. These operations are audited by the BMW Group, inspected annually by independent experts, and licensed in

compliance with end-of-life vehicle regulations. All BMW dealerships are certified as authorized drop-off points so that customers can rely on total service from a single source for the life of their cars. Within the framework of the "Together for Recycling" program co-sponsored by MG Rover, Fiat, and Renault, the BMW Group guarantees environment-friendly end-of-life vehicle recycling in all major EU countries. European recycling firms are also supported by the International Disassembly Information System (IDIS), which was established under the auspices of the BMW Group. IDIS provides comprehensive data for recycling cars made by 21 different manufacturers worldwide and helps ensure that end-of-life vehicles are efficiently and economically recycled. The current IDIS 2.02 database is available in 8 languages to over 5,000 recycling firms in Europe.



# Working together for progress



Employees at BMW dealership in Munich



### Customer interface: BMW dealerships in Munich and Frankfurt demonstrate how environmental protection and customer satisfaction go hand in hand

Collection bins are located throughout the service garage. Six plastic containers in different colors are integrated into a rack system. The racks are mounted on wheels so that they can be easily rolled to the outdoor waste collection point. The bins are clearly identified according to color: Green for plastic foils, blue for paper, red for air filters, yellow for rubber and plastic parts, silver for metal, and black for other waste materials.

### Environmental protection: Easy and effective

In order to be effective and gain acceptance by employees, environmental protection and recycling systems have to be easy to use. This is clearly demonstrated by the BMW dealerships in Frankfurt, Germany. The waste collection racks were specially developed for use in the service garages at the 7 locations in Frankfurt. Separating waste has become standard

procedure for all employees, from managers to cafeteria personnel. The waste separation program outlines 47 different categories, and all employees know exactly what to do with waste produced in their work areas. There's no question that this approach pays off: Since the program was introduced two years ago, waste disposal costs have been reduced by 50 percent.

### Sustainability: A corporate principle

Environmental protection has been a primary concern of the BMW Group for many years. In keeping with this corporate principle, the environmental protection officers working at dealerships in Frankfurt receive full support. Special workshops are conducted on a regular basis to ensure that all employees are familiar with the company's environmental policies. Environmental protection is also part of the standard curriculum for BMW trainees. This theme is addressed on the BMW Intranet as well as in the employee magazine and on posters. BMW environmental protection officers are always available to answer questions and respond to employee suggestions.

Separating waste for recycling at the BMW dealership in Munich



**“BMW concentrates on serving the needs of people, the environment, technology, economy, and progress: Future generations have a right to a healthy environment.”**

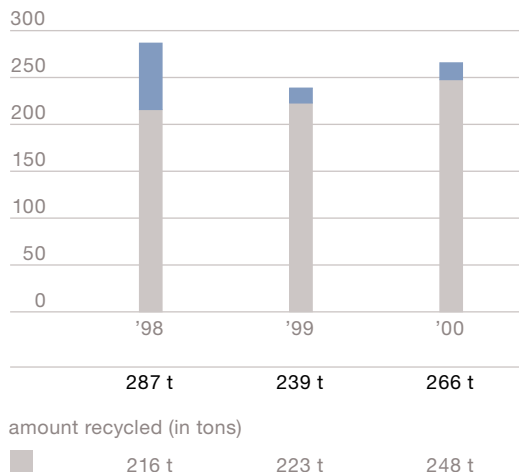
“Quality and Environment” guidelines published by the BMW dealership in Frankfurt

## Facts & Figures, BMW dealership in Frankfurt, Germany

Data from 2000

Employees	578
including trainees	121
Number of showrooms	7
Sales	€292 million
Units sold, new cars	6,043
Units sold, used cars	5,930
ISO 14001 Environmental Certification	1999

## Amount of waste produced/recycled by BMW dealership in Frankfurt (in tons)



In many cases, the small measures determine the success of a sustainable management approach. Sustainability is a primary focus at the second-largest BMW dealership organization.

### Quality and environment go hand in hand

Management guidelines published by the Frankfurt dealerships ensure that quality and environmental management go hand in hand. The comprehensive quality management system introduced in Frankfurt was followed in 1999 by an environmental management program in compliance with ISO 14001 international standards. In April 2000, environmental certification was awarded to the dealerships located in Darmstadt and Offenbach. Certification is planned for the other dealerships in the Frankfurt area.

### Environmental protection at Munich dealerships

The BMW dealerships in Frankfurt were the first to achieve environmental certification – but certainly not the last. Just 400 kilometers south,

the BMW dealerships in Munich introduced an environmental management system in compliance with ISO 14001 standards in November 2000. With over 1,200 employees, the Munich dealership is the largest in the BMW Group.

Plans call for all BMW dealerships to be certified by October 2001. The Munich organization has also developed a detailed program outlining environmental objectives for 2001. These measures will be gradually implemented and employees will be familiarized with the environmental program requirements.

### Motivation based on information

Special environmental training is conducted on a regular basis to inform and motivate BMW personnel. Additional information is provided on the BMW Intranet and local bulletin boards. Keeping the general public informed of BMW-sponsored environmental protection programs is a top priority for the Munich dealerships. The goal is to maintain a good relationship with the local neighborhood. Automobiles and the environment are important themes for BMW customers. This was demonstrated by the

**“We consistently inform the public on our company’s environmental impact and environmental protection programs.”**

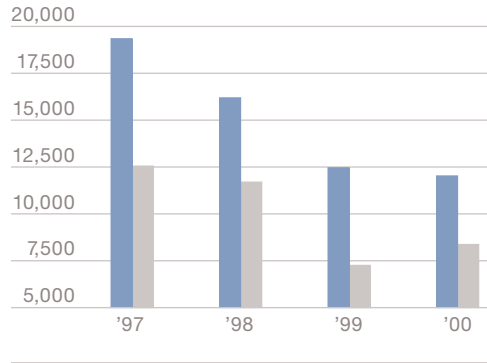
Environmental policy, BMW dealership Munich

## Facts & Figures, BMW dealership in Munich, Germany

Data from 2000

Employees _____	1,193
including trainees _____	252
Number of showrooms _____	9
Sales _____	€541 million
Units sold, new cars _____	9,445
Units sold, used cars _____	8,960
ISO 14001 Environmental Certification _____	2000

## Water consumption and amount of wastewater\* in cubic meters, BMW dealership in Munich (main showroom on Frankfurter Ring)



■ 19,340 m³ 16,182 m³ 12,467 m³ 12,030 m³ water consumption  
 ■ 12,557 m³ 11,701 m³ 7,275 m³ 8,365 m³ amount of wastewater

\* in service garage and car wash

positive response to the BMW Group Environmental Exhibition presented in February 2000 at the BMW showroom on Dachauer Strasse in Munich. To enhance the dialogue with the public and municipal government, the BMW dealership is represented on the district council.

### Conserving water and energy

The efforts to save water at the Munich dealership have been extremely effective. Operating the two wash bays located in the parking garage on the lower level of the main showroom in Munich requires a huge quantity of water: Over 200 liters are needed to wash a single car. With an average of 120 vehicles passing through the car wash each day, this adds up to a lot of water. In 2000, the new wastewater treatment plant at the showroom on Frankfurter Ring effectively reduced the volume of wastewater by 30 percent compared to 1997 figures. Overall water consumption decreased by nearly 40 percent.

Another focus in Munich is on reducing energy consumption. Current plans call for a 20 percent reduction in energy use by the end of

2001. New fast-reaction garage doors will help lower energy consumption by conserving heat in the service area. The positive effects of this action are not to be underestimated: In a dealership servicing 250 to 300 cars per day, the garage doors open and close several times a minute – and Munich winters can be extremely cold! This is only one example of the on-going efforts being made in Munich. BMW has one primary environmental objective: Continuous improvement.



Car wash, Munich dealership

## Energy consumption, BMW dealership in Munich (main showroom on Frankfurter Ring)

		1997	1998	1999	2000
Electricity	KWh	4,898,020	4,669,020	4,783,526	4,658,745
Long-distance heat	MWh	5,321.9	4,940.7	4,568.8	2,983.4
Natural gas	m³	139,323	153,277	135,427	149,587



Ernst Baumann  
Executive Vice President  
Human Resources

What makes a company successful? The people who work there make all the difference. Through their skills and performance, our employees contribute directly to the success of the BMW Group. This philosophy forms the core of our company's value-oriented personnel policy, something that has a long tradition at BMW. Working as a member of the BMW Group means meeting the high standards of a premium automobile manufacturer and sharing a spirit of enthusiasm for the brand name and the products. It also means high quality work, a willingness to learn, and versatility on the job. Most importantly, it means contributing to the continued success of the BMW Group in keeping with the company's approach to sustainability. Following the principle "Compensation for Performance," the BMW Group offers excellent employment conditions and social benefits. This is what makes BMW one of the world's best places to work.

In order to attract the best-qualified personnel and encourage a sense of commitment, a company has to offer the right personnel policies. It also has to be appealing. The work histories

and life plans of today's workforce are more diverse than ever before. Employers of the future are evaluated according to four criteria: A stimulating atmosphere (great company), challenging work (great job), above average remuneration (great pay), and high compatibility between work and private life (great balance).

At the BMW Group, responsibility for the workforce and social involvement are not just passing fads. Both of these attributes have been an integral part of our corporate ethos for many years. We plan to continue to set the standards in these areas and serve as a model for other companies. In other words, we are doing everything we can to ensure that our responsibility to our workforce and to the society as a whole continue to meet "premium" standards – today and tomorrow.

Munich, August 2001

Ernst Baumann



## Value oriented: BMW Group personnel policy



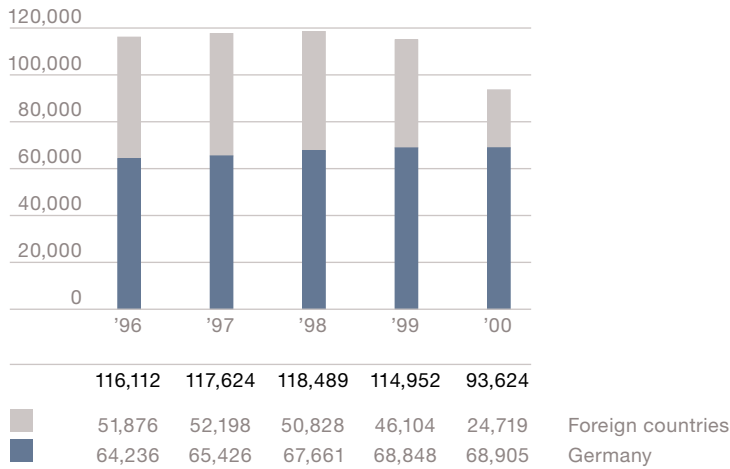
# People



**The success of a company depends on its employees. A value-oriented personnel policy was clearly defined by BMW in 1983. The company's sustainable growth is based on its employee-oriented personnel policies. This is absolutely essential to the prosperity of the BMW Group. The success of this approach is demonstrated by the fact that in the past 39 years, there have been no layoffs resulting from operational conditions.**

As of December 31, 2000, BMW Group employees at the company's 15 production sites and sales points worldwide numbered nearly 94,000. Due to corporate restructuring involving the sale of Rover, Land Rover, and MG, and the takeover of the jet engine division by Rolls-Royce PLC, the number of BMW Group employees decreased by 18.6 percent in 2000. Following the termination of its involvement with Rover/Land Rover, BMW placed top priority on retaining jobs at the plants in England. The Phoenix consortium and the Ford Motor Company took over nearly 19,000 of the employees. This process of separating the different companies took place in close cooperation with employee representatives and did not require any plant closures. In Germany, over 2,200 new jobs were created in 2000 with 300 new positions added in South Africa and nearly 1,000 in the USA. BMW Group personnel costs in 2000 totaled around €5.98 billion.

**Number of BMW Group employees**



**Improving qualifications**

Improving employee qualifications and securing their jobs are top priorities for the BMW Group. A comprehensive new project aims at qualitative and quantitative personnel planning to identify future personnel needs. This enables the



BMW Z3 production, Spartanburg, USA

company to enhance the long-term qualifications of current employees and help external training institutes prepare for the educational needs of new employees. In 2000, the BMW AG Training Center conducted over 6,700 classes and seminars attended by nearly 45,000 employees. Compared to 1995, this reflects a 30-percent increase in the number of participants attending over twice as many training sessions. The electronic human resources project (e-HR) is another component enabling innovative organizational structures and continued corporate development. Within the framework of the migration of existing personnel systems to a Web-based platform by 2004, internal processes will see major improvements with reduced administrative activities and more effective internal customer service. This step benefits BMW employees as much as it does the company.

### **Focus on personnel secures economic growth**

BMW Group sustainable personnel policies are aimed at the needs of the employees and the economic growth of the enterprise. The employees are the ones who can best identify problems in their work areas and point out potential improvements. This is why BMW

actively involves all employees in the on-going development of the company. This process is enhanced by regularly conducted employee surveys and the targeted integration of employees into operational improvement processes. In 2000, an average of three suggestions per employee were submitted at the BMW plant in Steyr, Austria. The subsequent improvements resulted in cost savings of over €7 million – an average of €3,000 per employee. Company-wide, BMW AG saved over €46.8 million in 2000, an increase of 115 percent over 1995.

### **Positive response for future security**

Full-coverage electronic surveys of BMW employees were conducted in 2000 at all BMW plants in Germany. On the average, over 96 percent of the workers surveyed indicated that they regard BMW as a “great place to work.” This overwhelmingly positive response is an outstanding asset that clearly demonstrates personal identification with the company and the overall appeal of BMW as an employer. The high level of employee satisfaction is also evident in the very low annual turnover rate of only 1.4 percent at BMW AG. The positive image of BMW as a highly rated employer has also been confirmed in studies conducted by



### **BMW Group value-oriented personnel policy guidelines:**

- 1** Employee relations are based on mutual respect. We consistently strive for a positive negotiating atmosphere.
- 2** Taking national and cultural differences into account is of primary importance.
- 3** Employee earnings are based on performance and results.
- 4** Teamwork is more than the sum of individual employee performance.
- 5** We offer secure, well-paid jobs to motivated and responsible employees.

external sources. In Germany this is reflected by the high ratio of qualified applicants to open positions at BMW (approx. 30 to 1).

### Training for tomorrow

The company's responsibility for training and education is a primary focus of the BMW Group personnel policy. In 2000, the company invested around €100 million in employee training programs. During this period, nearly 3,300 trainees were employed by BMW AG in over 40 occupations. This places the proportion of trainees at about 5 percent – the highest in the German automobile industry.

The BMW Group invested over €15 million in a new training center opened during September 2000, at the largest BMW plant in Dingolfing, Germany. This facility is in operation year round for local employees and around 12,000 other BMW seminar participants. The Euro Apprentice exchange program is offered by the BMW Group to qualified candidates. Working in cooperation with the BMW plants in

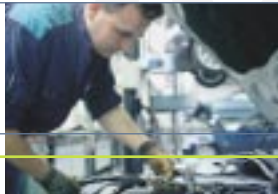
the UK, the trainees spend 9 months in England and, upon completion of the program, are eligible for the German IHK (Chamber of Industry and Commerce) certificate as well as the equivalent British qualification.

1,500 employees, around half of the workforce at the BMW plant in Rosslyn, South Africa are currently participating in courses to attain higher job qualification certificates. This program requires 720 hours of training to reach the highest of the four stages. In the past year, BMW South Africa offered free intensive training to 300 members of the local community. This training provided participants the opportunity to learn the basic skills required to qualify for a job in the industry. BMW production increases made it possible for 250 of the trainees to be hired immediately after completing the program.

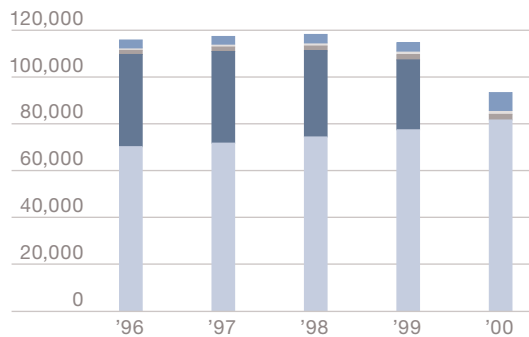
### Young talent in the "Fast Lane"

In order to help young people get started in new careers, the BMW Group has set up a number of sponsorship programs. These

# New Talent



Number of BMW Group employees according to segment



	'96	'97	'98	'99	'00
BMW automobiles	70,510	72,020	74,664	77,723	81,913
Rover automobiles	39,407	39,172	36,821	29,884	--
BMW motorcycles	1,754	1,905	2,039	2,191	2,397
Financial services	1,051	1,234	1,339	1,561	1,671
Other*	3,390	3,293	3,626	3,593	7,643

Other\*  
Financial services  
BMW motorcycles  
Rover automobiles  
BMW automobiles

\* 2000 figures, incl. Oxford plant, Hams Hall, and other affiliated companies in the UK

programs are designed to provide a pool of upcoming talent on a long-term basis. One example is the new talent support program (NFP) open to qualified high school graduates. This gives them an opportunity to combine professional training at BMW with a college education.

The "Fast Lane" program launched in 2000 is open to qualified students who have completed their fourth semester of college. Fast Lane participants are assigned to special mentors. This helps recruit dedicated students who completed an internship at BMW into permanent positions with the company.

Cooperation with local universities is of central importance to the BMW Group. The BMW plant in Spartanburg USA donated \$1 million to the University of South Carolina to sponsor students in the Masters of International Business program. Other partnerships with regional universities include scholarships, employee memberships, and teaching contracts for BMW employee training programs.

BMW Group, Careers

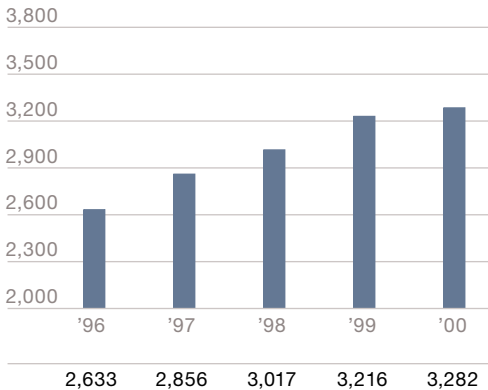
[www.bmwgroup.com](http://www.bmwgroup.com) ▶ Careers

Alex Current Factbook

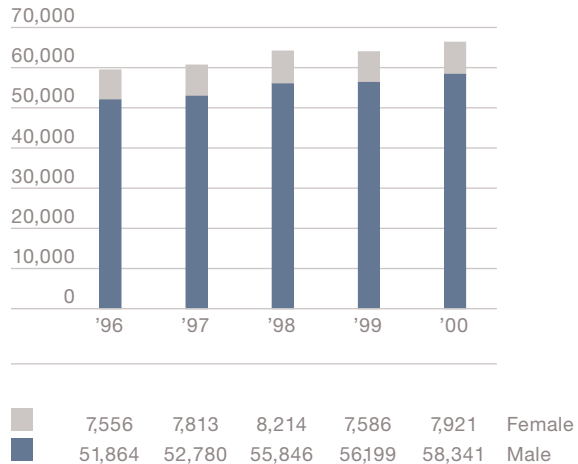
[www.bmwgroup.com](http://www.bmwgroup.com) ▶ News & Information  
▶ Current Factbook



**BMW AG trainees**



**BMW AG personnel structure**





According to a BMW employee paradigm, “the success of the company is determined by the employees.” How is this basic principle implemented?

**Schoch:** The deciding factor is whether these principles are practiced on an everyday basis. We focus on ensuring that the work environment is appropriate and that BMW employees are motivated to do their job. This enables them to make a significant contribution to the company’s success.

What are the factors that determine a positive work environment in the BMW Group?

**Schoch:** The employees expect to be adequately remunerated for their work. In addition to the monthly salary, vacation pay, and annual Christmas bonus, BMW AG offers a profit sharing program that was established in the early seventies. Employees have consistently shared in company profits, even in 1999, the year of the new orientation. BMW employees also benefit from a variety of other attractive

How does the works council influence environmental protection at BMW?

**Schoch:** Environmental protection in the BMW Group focuses on three aspects: People, production, and products. We strive to make BMW employees aware of this theme – even when it comes to the small details. This applies, for example, to separating waste materials. The works council also has an influence on environment-friendly product design. In many areas, BMW emission levels are far below the legal requirements. The new powder coating technology is a good example. In order to effectively implement its sustainability strategy, BMW management relies on the cooperation of employee representatives.

How would you characterize the relationship between the works council and BMW management?

**Schoch:** We judiciously follow all developments from the employee’s viewpoint and place special importance on sharing a constructive dialogue

Did the new orientation in 1999 prove that globalization strategies in the automobile industry endanger jobs?

**Schoch:** I don’t think this applies to BMW. The company added nearly 4,000 new jobs worldwide in 1999. Most of these jobs were at BMW plants in Germany. So it’s obvious that globalization can secure jobs in Germany when it comes to international manufacturing operations. One example is the V-8 engines manufactured at the BMW plant in Munich and used in the BMW X5 produced at the Spartanburg plant in the USA.

What are the major challenges for the future?

**Schoch:** We must continue to bring our work at BMW in line with the best interests of human beings and the requirements of environmental protection. Our main mission, of course, is to manufacture automobiles in order to secure the economic success of the company and create new jobs. But I think it goes beyond that. We need to pay close attention to social issues



## “Sharing a constructive dialogue”

An interview with Manfred Schoch, Chairman of the EURO Committee and National Works Council, Deputy-Chairman of the BMW Group Supervisory Board

programs. These include flextime work schedules, a 4-day workweek, and discounts on public transportation to and from work. In the area of employee health, we have the “Move” health center located at the Munich plant. The works council is actively involved in these initiatives.

with management. In areas where there are deficits, we attempt to make improvements. For instance, we consistently support the promotion of women into top positions. We can achieve a lot when everyone – employees, works council, executive and supervisory boards – work together. This was extremely important in getting through the difficulties the company experienced in 1999. Today, the BMW Group is stronger than ever. We set new records in 2000 with the highest profits in company history!

and high environmental standards throughout all BMW divisions. I am convinced that the future of the BMW Group will be even better if environmental, social, and economic requirements are considered in unison.

## Knowledge management: A competitive edge

Knowledge is one of the most important resources of the future. Instead of following the trend of packing knowledge into electronic databases, the BMW Group pursues a long-term strategy focusing on the promotion of a knowledge culture. This approach is based on the principle that a knowledge culture creates the basic conditions to support BMW employees in their efforts to make better use of internal and external information.

Based on information obtained from empirical studies, BMW recognized at an early stage that knowledge management often requires highly functional information technology (IT). At the same time, it must not run parallel to, or contradict the business processes. A key factor in long-term success, however, is the work on the knowledge culture in a world, in which "sharing knowledge" is often contrary to the "knowledge is power" concept.

Consequently, a majority of the measures are aimed at strengthening the awareness in dealing with knowledge and to provide sustainability, for example, by implementing this frame of mind in the corporate principles. This includes qualifying personnel within the framework of

target-group specific training, as well as the creation of suitable incentives and performance appraisal systems.

Another focus of attention is on the preparation and organization of communication platforms to ensure that experiential knowledge can flow beyond the limitations of departments and company plants. This includes, for example, facilitating an exchange of experience via Intranet platforms face-to-face encounters, and communication spaces in the production plants. Knowledge within the corporation can only gain effectiveness through the maximum networking of knowledge carriers and knowledge transfer.

## Sharing success

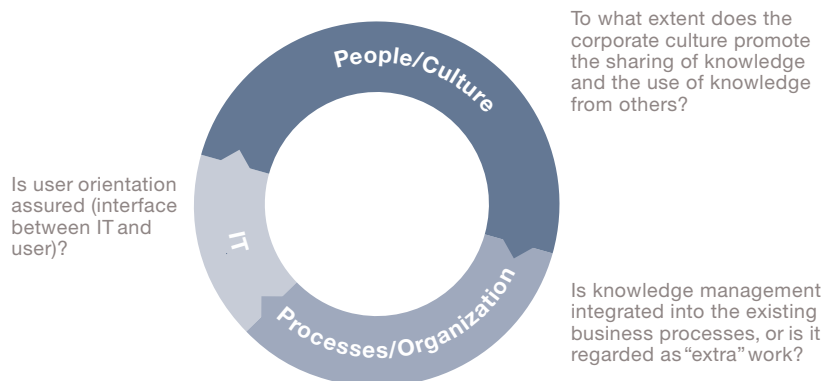
Profit sharing and financial participation plans are components of the employee-oriented BMW Group personnel policies.

In 1973 BMW AG successfully introduced a profit sharing plan essentially based on the payment of dividends. In 2001, BMW AG distributed around €235 million in profit sharing based on the 2000 financial year. This is over 2.5 times more than the amount paid out five years ago. In 2000, the total bonus payments including profit sharing, vacation pay, and

BMW plants in Spartanburg and Dingolfing



## Basic questions of knowledge management



Source: BMW

### Halfway around the world and back, daily

The BMW plant in the Bavarian town of Dingolfing, Germany employs around 20,000 workers. Following the takeover of the factory site from Hans Glas GmbH in 1973, BMW developed the property by adding a large assembly facility. By building in a relatively remote area, far away from major cities, BMW helps counteract urban sprawl. An intelligently organized bus system with nearly 300 vehicles transports 14,400 BMW employees to and

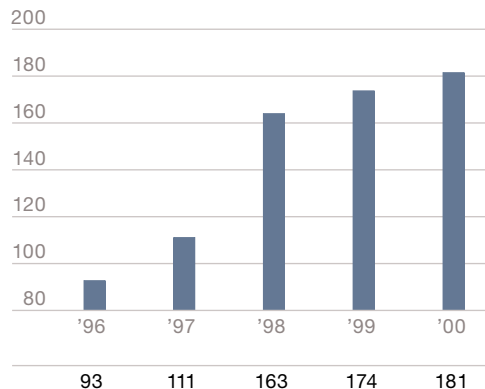
from work each day. Many of these people live up to 100 kilometers away. This shuttle service involves 18 different transportation companies working in cooperation with BMW. The buses cover a total distance of up to 40,000 kilometers – halfway around the world and back – daily. The associated costs of around €10 million are subsidized by BMW. This project not only enables BMW workers to continue living in their hometowns, it also reduces the amount of road traffic and contributes to a cleaner environment.



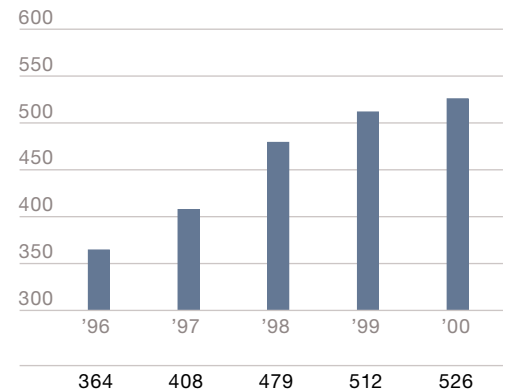
Shuttle service, BMW Dingolfing



**BMW AG profit sharing dividends in million euros (year paid)**



**Bonus payments paid by BMW AG in million euros\* (year paid)**



\* Includes Christmas bonuses, profit sharing, vacation pay

Christmas bonus paid to the average employee were equivalent to three gross monthly salaries for a full-time employee with six years seniority at BMW. The financial benefits and BMW Group training program were rated as "exemplary" in the Dow Jones Sustainability Index 2000. BMW employees in Germany received over €526 million in the form of bonus payments in 2000.

BMW AG pension and investment plans include the BMW asset development program introduced in 1974. Since 1989, employees have had the option to purchase preferred BMW shares. This program was used in 2000 by over 46 percent of eligible participants in Germany. In November 2000, the national works council and BMW Group executive board signed an agreement enabling BMW AG workers to participate in a private pension fund. This personal retirement capital is based on a system of deferred payments. During an employee's years of active service with the company, a percentage of the gross monthly income is set aside in an investment fund until the person reaches retirement age. Although there is no ceiling on the potential net yield, the minimum interest rate is currently 3.25 percent. Other retirement plans include the BMW pension fund and a life insurance policy.

## Work-Life-Balance: Well-adjusted workers

The Work-Life-Balance model aims at combining careers with other tasks and interests to the greatest extent possible. This gives employees a chance to follow through with their personal life plans. The company benefits by attracting highly-qualified, committed employees who are looking for more than a good salary.

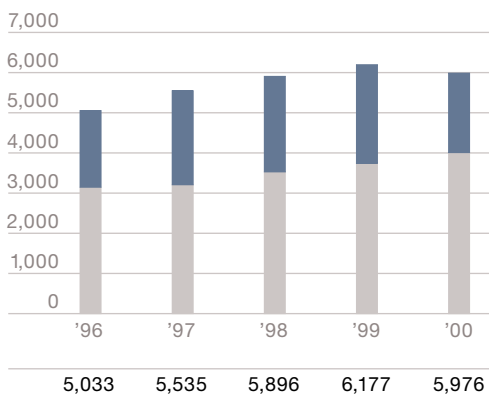
Flextime models are an important factor in job satisfaction. Over one-third of all BMW workers are on flextime schedules. Altogether, the company offers over 300 different work schedules. For example, nearly 15,000 employees at 5 BMW plants work a 4-day week. At 3.3 percent, the BMW Group has one of the highest proportions of part-time employees in the German automobile industry.

Flextime work schedules are also an important aspect of the Work/Life Balance model. Over 1,000 BMW AG employees participate for example in alternating teleworking plan. The growing number of employees on sabbatical leave is a clear indicator of the overall acceptance of progressive work programs at BMW. Last year, over 600 BMW employees took sabbaticals. Nearly 2,000 employees have participated in this program since it was first launched in 1994.



BMW workers at Rosslyn, South Africa and Spartanburg, USA

BMW Group personnel costs in million euros\*

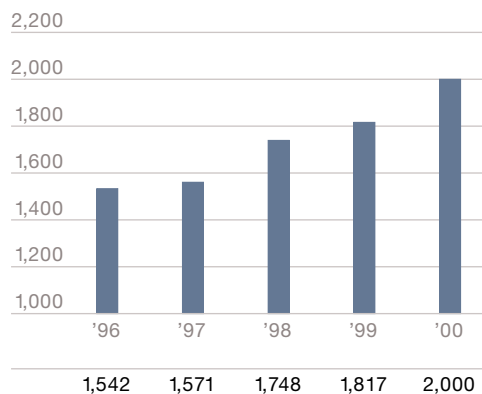


Includes BMW AG personnel costs in million euros\*

■ 3,144 3,198 3,516 3,722 4,001

\* includes base pay and benefits

Cost of benefits paid by BMW AG in million euros\*



\* includes paid sick days, cash bonuses, social benefits, retirement pay, social services, social welfare, training expenses

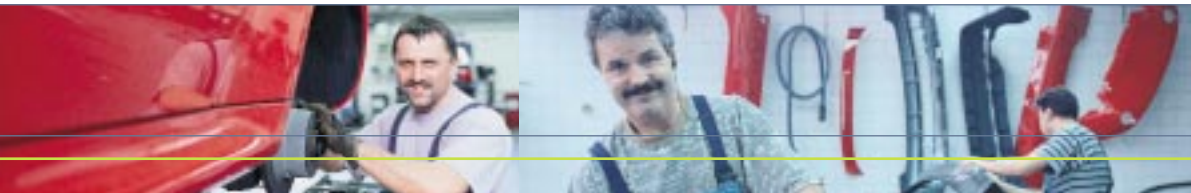
Teleworking and part-time employment options play an important role in supporting career development among the women who make up 12 percent of the BMW workforce. In recognition of its innovative development of future-oriented employment planning, the BMW Group received the Bavarian "Advancement of Women Award 2000."

The personal initiatives of BMW employees have also proven successful. In 2001, the second daycare center for infants and young children was set up in Munich by a parent's initiative of BMW employees. BMW provides the space and supplies the food for this project free of charge.

A special part-time work program for senior employees introduced on May 1, 1998 offers more flexible options for early retirement from BMW AG. Over 2,300 BMW AG employees have already taken advantage of this program. Sports, recreation, wellness, childcare programs, and other services including a relocation program offer a variety of individualized options.

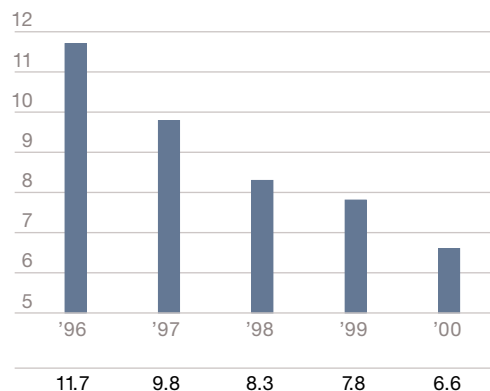
### Integrating handicapped citizens

Within the framework of a long-term personnel policy, the BMW Group takes special respon-

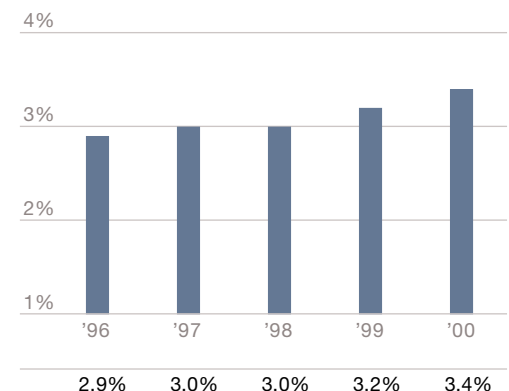


BMW workers at the Munich plant

Frequency of industrial accidents at BMW AG\*



Percentage of handicapped workers at BMW AG



\* Number of registered industrial accidents per 1 million man-hours



sibility for integrating people with disabilities into the work process. The company also outsources work to government-approved employers of disabled citizens.

BMW AG employs over 2,000 handicapped persons who represent 3.4 percent of the company's workforce. Work orders to handicapped suppliers reached a total volume of nearly €21 million in 2000. In this way, BMW AG makes a significant contribution to helping the handicapped secure meaningful employment.

### Further improvement to health and work safety

Today's jobs in industrial enterprises must be secured both economically and in terms of employee health. Over the past 10 years, BMW has consistently reduced the frequency of industrial accidents. The number of reported job-related accidents involving hourly workers at BMW AG totaled 396 in 1999. This figure decreased by 18 percent in 2000 to 326. The primary focus of BMW Group health protection is on prevention. Along with a comprehensive sports and recreation program, the BMW plant in Munich provides a fitness center for

employees. In 1999 this was supplemented by the "MOVE" center offering physical therapy for employees suffering from muscular or skeletal ailments. Medical facilities available at various BMW sites include health centers with doctor's offices, mental health services, and substance abuse programs. This targeted approach to employee health at BMW AG contributed to a decrease in the hours lost due to sickness from 5.1 percent in 1995 to 4.4 percent in 2000.

### Campaign for tolerance

BMW employees come from over 100 different nations. Around 12.4 percent of BMW AG workers are from countries outside of Germany. Consequently, the guidelines of the long-term BMW Group personnel policy focus on transcending national and cultural borders. For over 30 years, this principle has been a mainstay of BMW campaigns to prevent discrimination both inside and outside of the company. The main emphasis of this work is on cross-cultural learning designed to bring different nationalities and ethnic groups together.

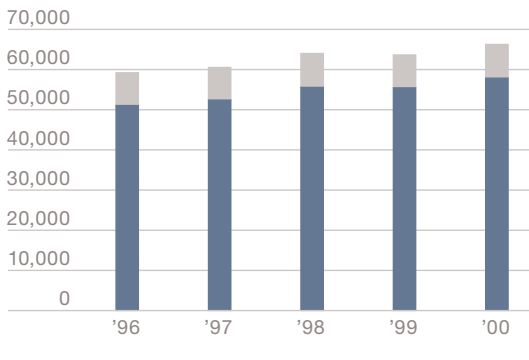
**"If we, as a company, are made to 'feel at home' everywhere in the world, then it must be important for us to ensure that everyone who comes to work for BMW is treated equally and respected as an individual."**

Professor Joachim Milberg, BMW Group Chairman of the Board



BMW workers at the Kaliningrad plant

### Proportion of foreign nationals at BMW AG\*



■	8,185	8,130	8,409	8,229	8,205	Foreign nationals
	(13.8%)	(13.4%)	(13.1%)	(12.9%)	(12.4%)	Percentage
■	51,235	52,463	55,651	55,556	58,057	German nationals

\* Includes all non-German citizens

# BMW Group sustainability goals: Environmental, economic, social

The BMW Group is the world's only multiple-brand automobile manufacturer pursuing a premium brand strategy. Increasing profitability in all business divisions and promoting sustainable growth are essential aspects of the company's intelligent approach to the "premium" concept. Following this strategy, the BMW Group defines corporate targets in the areas of environmental, economic, and social sustainability.

## On-going objectives from the 1999/2000 reporting period

### Environmental Goals

Goal	Action	Status
<b>Emissions</b>		
Meet the BMW commitment for reducing CO <sub>2</sub> emissions in compliance with the ACEA fleet average of 140g by 2008 resulting in a 25 percent decrease compared to 1995	Deploy VALVETRONIC technology in 8- and 12-cylinder gasoline engines by the end of 2002; increase use of lightweight components, supplement the range of compact models (1-series, MINI)	<input type="checkbox"/>
<b>Recycling</b>		
Environmentally compatible recycling of BMW vehicles and components	<p>Expansion of a customer-friendly, full-scale return and recycling system for BMW end-of-life vehicles in Germany, Austria, Italy, France, Sweden, the Netherlands and Japan</p> <p>Development of new economical technologies for processing and recycling end-of-life vehicles at the BMW Recycling and Disassembly Center; includes glass removal equipment and a fluid extraction station for draining fuel/oil</p> <p>Expansion of an economical material recovery system used primarily for recycling plastics; complete recycling of old/new plastic bumper components</p>	<input checked="" type="checkbox"/>



Goal	Action	Status
Environmentally compatible new car design	Increase technical/economic recycling quotas	■
	Development of software tools for the virtual disassembly and evaluation of BMW models	
	Comparative environmental component evaluation of alternatives for internal combustion engines (gasoline, diesel, natural gas, hydrogen) and innovative concepts for structural parts	
Joint cooperation with suppliers	New rules pertaining to the environmental compatibility of products specified in the procurement conditions and made compulsory for parts suppliers	■
	Update parts specification sheets for engineering service providers	
<b>Reduce emissions</b>		
Elimination of solvent emissions	Introduction of powder coat technology at the Dingolfing plant	■
	Installation of a zero-solvent powder coat system for applying bonding agents	
<b>Save energy</b>		
More efficient energy use	Installation of a combined heat/power unit at Dingolfing plant	■
<b>Environmental management</b>		
Introduction of an environmental management system	Certification/auditing of all BMW production plants	■
<b>Water conservation</b>		
Environmental protection	Centralized data system for monitoring environment related systems	■
<b>Waste materials</b>		
Create more transparency	ABIS waste information system to compile data on costs and waste control	■

■ completed □ in progress

## New goals for the 2001/2002 report

### Environment

Goal	Action	Year
<b>Emissions</b>		
Determine potential for long-term CO <sub>2</sub> reduction	Participation in the Transport Energy Strategy (TES) project designed to develop a strategy for the full-scale market introduction of hydrogen as a promising, long-term fuel source	current
	Involvement in the development of uniform technical standards in Europe for introducing hydrogen as an alternative fuel in the context of the European Integrated Hydrogen Project (EIHP)	current
<b>Recycling</b>		
Environmentally compatible recycling of BMW vehicles and components	Implementation of EU end-of-life vehicle guidelines: – full-scale return and recycling system in all EU member states – substitution of components containing heavy metal (lead, cadmium, mercury, hexavalent chrome) – return system for used parts from BMW service points	April 2002
	Implementation of a worldwide BMW recycling strategy: BMW will integrate the successful European strategy in all major BMW sales markets	current
	Development of new recycling concepts for innovative components and industrial materials, e.g. for alternative drive systems	current
	Development of a simulation tool for long-term design and maintenance of an environmentally safe end-of-life vehicle disposal system.	2002
	Development of new recycling techniques to increase process quality for BMW end-of-life vehicle salvage firms: – innovative shock absorber oil extraction system – first recycling facility for disposal of pyrotechnical components (airbags, belt tensioners)	2002
	Environmentally compatible new car design	Facilitate the development and implementation of an assessment method for evaluating the recyclability of vehicles within the framework of a model testing certification and creation of appropriate ISO standards
Environmentally compatible new car design	Comparative environmental evaluation of concepts for body-in-white and electrical system supplies	current
	Gradual increase in the proportion of recyclates used in plastic components for future models	current

Goal	Action	Year
Joint cooperation with suppliers	Common environmental homepage on corporate intranet joint supplier workshops list of recycling-relevant components in procurement conditions	2002
<b>Customer satisfaction</b>		
Increase customer satisfaction through added safety and convenience	More efficient electrical systems to support added safety and convenience features; development of the SOFC fuel cell technology for series production	2006
	Connected Drive: Advancement of driver assistance systems to handle routine tasks behind the wheel	
<b>Environmental management</b>		
Advancement and integration of management systems	Introduction of an environmental management system in all central BMW Group production departments	current
	Integration of environmental quality and health & safety management systems.	current
	Implementation of a group-wide information management system	2002
	Introduction of environmental and social factors into BMW Group procurement instruments	current
	Extension of environmental management systems to the assembly plants	current
	Completion of a sustainable management system implementation-pilot project in the design department	current
<b>Paint shops</b>		
Low emission paint operations	Introduction of powder clear-coat technology at additional production plants	current
	New pretreatment area and introduction of water-soluble paint at Munich and Dingolfing plants	current



## Economic Goals

Goal	Action	Year
<b>Principal BMW Group goal:</b>		
Profitable growth through		
- Above-average profitability	Expansion of premium makes BMW, MINI, Rolls Royce	current
- Premium strategy	Product promotion campaigns:	
- Above-average growth	MINI	2001
	Rolls Royce	2003
	New 1 series	2004
	New 6-series	open
	Expansion of BMW X line	open
	Added production capacity: new plant in Leipzig	2004
Reinforcement of the worldwide presence	Expansion of the global networks with new dealerships and locations (production/CKD/sales/procurement)	current
<b>Sustainable corporate management</b>		
Long-term increase in value in sustainability (DJSGI, FTSE4Good Europe)	Implementation of sustainability strategy	current
Expand the top positioning of the BMW plants (J.D.Powers)	Implementation of quality strategy	current
Consolidate top position as build-to-order manufacturer	Shorten the internal cycle from 30 to 10 days	2003
	Implementation of procurement strategy	2003
Secure top position in the supplier satisfaction index (SSI)	Implementation of procurement guidelines	current
Involvement in global and national sustainability initiatives and Rio +10 process	UNEP: Mobility Forum UN: Global Compact ECONSENSE: Sustainable Development Forum	current
High quality reporting	Expand stakeholder dialogue: Employees, customers, suppliers, social groups, government policymakers, industrial trade associations	current

## Social Goals

Goal	Action	Year
<b>High level of employee satisfaction</b>		
	Conduct regular full-scale employee surveys in the BMW Group followed up with improvement process	current
<b>e-HR (electronic Human Resources)</b>		
Increase process efficiency in personnel departments by reducing administrative expenses		2004
Increase employee satisfaction with personnel management through automated workflows	Migration of the existing personnel system; development and integration of new applications in a Web-based system within BMW AG	
Increase employee satisfaction through "Employee Self-Service" offers		

Goal	Action	Year
<b>Personnel planning oriented to medium and long-term goals</b>		
Recognition of important long-term qualitative/quantitative personnel needs in cooperation with the specialized departments	Continued development of qualitative/quantitative personnel planning, concept, and implementation	2001/2002
	In-house qualification of employees and/or influence on external training institutes, personnel recruitment, and employee commitments	current
<b>Improvement of BMW AG in-house recruiting activities</b>		
Max. 15 workdays between personnel requisition and submission of applications	Optimize existing processes	2002
At least one to three qualified candidates per vacant job for personnel shortage qualifications		
Selection process complete within 15 to 22 workdays with total transparency at all plant sites		
<b>Implementation of program management (multi-project control) for BMW Group personnel departments in order to achieve the following:</b>		
Group-wide transparency in strategic projects, optimal resource and interface control, establishment of clear decision-making processes, and creation of uniform project standards	Development of group-wide program management	2002
<b>Create a balanced work situation and good quality of life in a performance-oriented culture while taking into consideration future corporate challenges and the changing interests of employees</b>		
The following elements should be combined into an attractive package: Work hours, pay, orientation to phase of life, job content, personal development opportunities, health, personal lifestyle, work environment .	Development of a new, integrative future model	2001/2002
<b>Support in the further development of a knowledge culture</b>		
	Pilot implementation of employee homepages (voluntary homepages focusing on individual skills)	2001
	Development of existing tools and creation of new instruments to promote in-house knowledge transfer. Examples: – lessons learned – passing on knowledge when changing jobs – guidelines for Practice Communities or groups designed to share experiences	2001
<b>Intensified implementation of key elements in the long-term personnel policy (LPP) worldwide</b>		
	Further development of the personnel systems based on the LPP world-wide	2001

# BMW retrospective: Legacy for the future

Every step of the way, the BMW Group focus for the future has been on environmental protection, employee orientation, social commitment, market globalization, and sustainability. The following presents an overview of the BMW Group economic, social, and ecological milestones: Yesterday, today, tomorrow.

## 1913

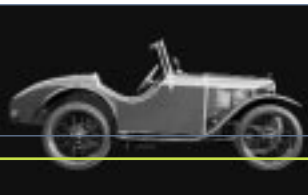
Founding of the Rapp Motorenwerke and the Otto Werke. These companies were renamed to become the Bayerische Motoren Werke AG in 1922.

## 1930

The BMW 3/15 Wartburg is the first BMW with a metal alloy body.

## 1964

A fuel saving low-friction alternator is introduced in the BMW 1800.



1930  
BMW 3/15  
Wartburg

## 1972

The Olympic Games are held in Munich. BMW introduces the first electric-powered car.

## 1973

BMW is the world's first car manufacturer to appoint an environmental protection officer. This person is responsible for establishing the basis for preventive environmental protection.

Introduction of a profit sharing plan for BMW employees.

Production begins at the new BMW plant in Dingolfing.

## 1978

The BMW 528i is equipped with a catalytic converter for the US market.



## 1983

BMW formulates the goals for a value-oriented personnel policy.

## 1985

BMW is the first German car manufacturer to offer catalytic converters in all models.

## 1986

A new BMW plant opens in Regensburg.

BMW is the first German automobile manufacturer to introduce a 4-day working week to meet growing demand. Plant operation is no longer dependent on employee work hours resulting in hundreds of new jobs.

1964  
BMW 1800



1979  
The first  
hydrogen-  
powered  
BMW

## 1990

BMW is the first car manufacturer to set up a pilot project for vehicle disassembly at the company's plant in Landshut.

## 1991

Beginning of cooperation with a company that provides environmentally safe recycling of end-of-life vehicles based on BMW standards.

Introduction of group work in assembly operations.

## 1992

Introduction of the BMW Mobilcard: All BMW employees in Munich are entitled to unrestricted use of the city's public transportation system free of charge.

World's first manufacturer to institute its own recycling-optimized vehicle construction standard (BMW N 113 99,0).

## 1967

BMW takes over car manufacturer Hans Glas GmbH in Dingolfing and Landshut, Germany.

The first BMW motorcycle rolls off the assembly line in Berlin.

## 1968

BMW begins operations at its new plant in Rosslyn, South Africa.

## 1971

The BMW 3.0Si with electronic fuel injection is introduced to the market. Modern technology lowers fuel consumption and emissions.

BMW works with other enterprises to establish a hazardous waste disposal system in Bavaria.

Continued development of flextime work schedules.

## 1979

BMW plant opens in Steyr, Austria.

The first hydrogen-powered BMW automobile is introduced.

## 1980

The BMW plant in Steyr is equipped with a combined heat and power system.

## 1982

Introduction of an Electronic Service Interval Indicator dramatically extends maintenance intervals on BMW cars.

## 1987

BMW introduces an electric-powered vehicle with an extended-capacity battery. The company starts recycling used catalytic converters.

## 1988

The introduction of digital diesel engine electronics in the BMW 524i results in a dramatic reduction of exhaust gas emissions.

## 1989

The first European paint shop to use water-soluble paint technology goes into operation at the BMW plant in Regensburg.

BMW AG employees are offered preference shares.

The ZEUS hazardous material information system is introduced.

## 1993

BMW management principles are extended to include environmental guidelines that are mandatory for all employees.

The first manuals are published for vehicle recycling operations ensuring ecological/economic disassembly and recovery of BMW models.

## 1994

Acquisition of British car manufacturer Rover Group Ltd. with Rover, MG, Land Rover and MINI brand.

BMW AG creates more part-time jobs.

Production begins at the new BMW plant in Spartanburg/USA.

Together for recycling: BMW cooperation with Renault and Fiat to build up a European network for recycling end-of-life vehicles.

### 1995

The BMW 316g compact is the first series-production car powered by natural gas.

Introduction of a teleworking alternative (working partially at home and in the office) at BMW.

A new BMW handbook documents and secures the company's environmental management system.

### 1996

Construction of new clear-coat paint line integrating low-emission water-borne paint technology into series production operations at the BMW plant in Munich.

### 1998

Introduction of flexible retirement program for BMW AG employees.

DRIVE, the new entry-level recruitment program for new college graduates replaces the former trainee program.

The BMW Group Executive Board adopts the company's new internationally oriented environmental guidelines. The corporation commits itself to sustainable environment protection.

Establishment of the Transport Energy Strategy (TES) project sponsored by BMW. TES is aimed at developing and implementing a market-wide alternative fuel strategy.

### 1999

All BMW Group manufacturing facilities are certified according to ISO EN 14001 standards or validated in compliance with the Eco-Management and Audit Scheme.

### 2000

Strategic reorientation of the company as a premium manufacturer with the sale of Rover Group Ltd. and separation of the brands Rover, Land Rover, and MG.

The International Dismantling Information System (IDIS) becomes available in eight languages to over 5,000 recycling firms throughout Europe.

### 2001

Focusing on the theme "mobility based on sun and water," the CleanEnergy World Tour promotes the BMW sustainable mobility model worldwide.

The BMW Group clean energy concept is awarded the Energy 2001 innovation prize sponsored by the German Institute for International Research and a leading industry trade journal.

The new BMW engine plant in Hams Hall, England begins production on the new 4-cylinder VALVETRONIC engine.



1995  
BMW 316g  
powered by  
natural gas



2000  
Hydrogen-  
powered BMW  
750hL



2000  
BMW C1

A new BMW 7-series car is capable of operating on liquefied natural gas or hydrogen.

### 1997

All BMW Group manufacturing facilities in Germany, Austria and the UK are certified according to ISO EN 14001 standards or validated in compliance with the European Eco-Management and Audit Scheme (EMAS).

BMW formulates its vision of management and internal cooperation creating the employee and leadership model "We at BMW."

Powder coating technology is introduced in series production operations at the BMW plant in Dingolfing.

The BMW Group is the first car manufacturer to initiate an end-of-life vehicle hotline.

BMW is recognized in the new Dow Jones Sustainability Group Index as the worldwide automobile industry leader for corporate sustainability.

For its role in supporting culture, the BMW Group receives the Angel Award from the International Society for the Performing Arts.

A new system to improve management-employee relations is introduced.

The BMW Innovation and Technology Center opens in Landshut.

BMW confirms its role as a world industry leader in the corporate sustainability ranking in the DJSGI Rating and the Oekom Corporate Responsibility Ranking.

In conjunction with Expo 2000, 15 hydrogen-powered BMW 750hL sedans cars traveled over 62,000 miles without a single problem.

Joining 50 other international companies, the BMW Group supports the Global Compact proposed by UN Secretary General Kofi Annan for globally sustainable development.

A new training center is opened at the largest BMW plant in Dingolfing.

Market launch of the BMW C1 redefines urban mobility.

Production of the new MINI is launched at the BMW plant in Oxford.

A strategic partnership with an international supplier for the development of a gasoline-powered fuel cell for the electrical system of BMW vehicles is announced.

BMW is listed on the new Financial Times Ethic Index FTSE4Good-Europe.

# Glossary of Terms

## A

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

**Agenda 21** At the United Nations conference on the environment and sustainable development held in Rio de Janeiro in 1992, a global approach to poverty, population policies, urban development, human rights, trade, agriculture, environmental protection, research and technology was adopted under the auspices of Agenda 21. The primary objective was to ensure sustainable development, i.e., to eliminate exploitation of the natural resources and limit environmental pollutants to the greatest extent possible.

**APU** Auxiliary Power Unit, supplies vehicle electrical power. BMW is working to replace the conventional battery with gasoline or hydrogen powered fuel cell technology.

**Audit** Assessment of an environmental management system.

**Auto Shredder Residue (ASR)** Materials remaining after metals are extracted from the shredding process; primarily consists of plastics, rubber, glass, fibrous materials, paint, and residual metals.

## C

**Carbon dioxide (CO<sub>2</sub>)** A by-product resulting from burning fossil fuels, e.g. coal, oil, and natural gas. CO<sub>2</sub> is a primary contributor to the greenhouse effect (global warming).

**CFRP** Carbon fiber reinforced polymer with excellent potential for use in lightweight automobile construction.

**Combined Heat and Power station** A highly efficient system used to generate both heat and electrical power.

**CleanEnergy strategy** BMW Group approach to using liquid hydrogen from renewable energy sources as a fuel for cars of the future. The internal combustion process emits primarily vaporized water.

**Compressed Natural Gas (CNG)** In order to carry more fuel in the vehicle, natural gas is pressurized to 200 bar. Natural gas (CH<sub>4</sub>) primarily consists of methane, which is lighter than air and is highly evaporative.

**ConnectedDrive** Links all in-vehicle assistance features and information systems. Based on the interaction between driver, vehicle, and environment, this BMW concept is designed to optimize safety, comfort, and environmental compatibility (see Telematics).

## D

**DIN 1/3 mix** A fuel consumption standard valid in Germany from 1978 to 1995. The DIN 1/3 mix combines the average amount of fuel consumed at constant speeds of 90 km/h, 120 km/h, and the European driving cycle. Replaced in January 1996 by a new EU fuel consumption standard. (see below EU Norm cycle)

**DIN EN ISO 14001** A worldwide series of standards for environmental management systems used in different types of companies. 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.

**DJSGI** Dow Jones Sustainability Group Index developed by Dow Jones and the Swiss SAM Sustainability Group. A rating system for companies with strategies based on the sustainability concept. In 1999 and 2000, the BMW Group was ranked by the DJSGI as the automobile industry leader.

## E

**Eco-Audit (EMAS)** A component of the Eco-Management system, EMAS (Eco-Management and Audit Scheme) includes an ecological report that evaluates adherence to specified environmental objectives and regulations.

**Econsense** Forum for sustainable development initiated by the German Industry Association (BDI). The BMW Group is a charter member of this organization, which was established in summer 2000.

**Electrolysis** Process using electrical current to separate water into hydrogen and oxygen. Hydrogen is an environmentally friendly energy source when the electricity required to make it is produced with renewable energy.

**Environmental information system** Computer-supported system for the collection and administration of environmental statistics with the goal of enhancing data transparency and benchmarking.

**Environmental Protection Agency (EPA)** American federal government agency responsible for establishing and monitoring environmental standards.

**EU norm cycle** Based on Euro-norm 93/116/EG, this standard was introduced in 1996 to specify fuel consumption. The EU norm cycle New European Driving Cycle (NEDC) replaced the DIN 1/3 mix standard (see above). In addition to the former city-driving norm, which included the fuel consumed for cold starts, this standard includes the new highway driving cycle.

## F

**FIZ** BMW Research and Innovation Center in Munich. Serves, among other things, as a link between BMW research and series production operations.

**Fleet consumption** Weighted average fuel consumption for a series of new vehicles produced by a single manufacturer or by the overall automobile industry.

**FTSE4Good-Europe Index** New ethics index (Financial Times Stock Exchange). BMW is one of only two European car manufacturers listed in this index.

**Fuel cell** Efficient means of generating electricity. The functional principle is similar to a conventional battery but, instead of being charged, a fuel cell is continuously loaded with gas. The electricity is generated by an electrochemical reaction between anodes and cathodes separated by electrolytes ("cold burn").

## H

**Hydrogen service station** The first fully automatic, robotic hydrogen fuel station was opened with BMW support near the Munich airport.

## I

**Integrated product policy (IPP)** Concept aimed at improving BMW products throughout the entire life of the product and reducing environmental/human impact. One key advantage of IPP is the networked approach to the product lifecycle.

**International Dismantling Information System (IDIS)** Electronic disassembly database for end-of-life vehicles. The dismantling information system manual was developed under the auspices of the BMW Group and is currently used by nearly 5,000 vehicle salvage companies in Europe.

## K

**Knowledge management** BMW knowledge management creates a positive knowledge culture along with the technical conditions for promoting knowledge within the BMW Group.



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## L

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**Latent heat accumulator** Stores excess engine heat for several days and makes it available as needed. BMW is the first car manufacturer to offer this system in series-production vehicles. Enables an engine to reach its operating temperature faster after a cold start. The latent heat accumulator increases environmental compatibility since fuel consumption and exhaust gas emissions are highest in the first few minutes after a cold start.

**Lifetime lubricants** Fluids (transmission and differential lubricants) are filled into sealed systems during manufacturing and do not need to be changed for the life of the product. This conserves resources and reduces operating costs.

**Lightweight construction** A key technology for reducing fuel consumption. Lowering vehicle weight by 100 kg can save up to 0.5 liter of fuel per 100 km.

**Liquefied Natural Gas (LNG)** In order to carry more fuel in the vehicle, natural gas is cooled to a liquid state at  $-160^{\circ}\text{C}$  ( $-256^{\circ}\text{F}$ ). Not to be confused with LPG (Liquid Petroleum Gas), which is typically used in camping stoves, etc.

**LITZ Landshut Innovation and Technology Center** Engineering center located at the BMW plant in Landshut, Germany. Activities focus on lightweight construction, plastics, and alloys.

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## M

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**Mechatronic** Mechanical system with electronic control. Includes Brake-by-Wire system that replaces the conventional hydraulic braking system.

**Methane ( $\text{CH}_4$ )** Gaseous hydrocarbon; main component of natural gas. Forms when fossil fuels are not completely burned, or as a result of fermentation processes (biogas). Not toxic to humans, but a contributor to the greenhouse effect.

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## N

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**Noise** Vehicle noise emissions measured in dB(A).

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## O

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**Onboard Diagnosis Systems** Systems used in the vehicle to monitor exhaust emissions.

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## P

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**Polyurethane (PUR)** Synthetic material based on isocyanates and polyols. Used in car manufacturing as polystyrene foam (trim), soft foam (seats, head restraints, damping material), and in combination with renewable raw materials (flax and sisal fibers) in door linings.

**ppm (part per million)** Measurement used to express extremely low-level concentrations of a substance in air, water, soil, etc.

**Powder coat** A form of clear coat lacquer applied as the final layer on a new vehicle. BMW was the first manufacturer to use clear coat in series production operations worldwide. Powder coat is emission-free and 99 percent recyclable.

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## R

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**Recycling and Disassembly Center (RDZ)** In 1991, BMW became the first car manufacturer to establish its own disassembly operations (BMW Landshut plant). This pilot project was further developed and a new recycling and disassembly center was opened in 1994 at the BMW plant in Unterschleissheim near Munich. The RDZ was certified in 1998 as an end-of-life vehicle recycling center in compliance with EU guidelines.

**Resources** The goals of sustainable management include the objective of preserving renewable raw materials. In this context, the term "resources" refers to fossilized organic materials (e.g. oil and natural gas) as well as inorganic natural resources (e.g. economically degradable metals and metal ores, rare earth elements).

**Renewable resources** Organic materials of vegetable or animal origin used as raw materials for industry or as energy sources. In contrast to fossilized raw materials (e.g. petroleum), these resources are systematically regenerated. Applications in the automobile industry include seat upholstery, textiles, rear shelves, insulation materials in doors, etc.

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## S

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**Solid Oxide Fuel Cell (SOFC)** Gasoline-powered fuel cell planned for use by BMW as a fuel-saving energy source for vehicle electrical systems (see APU and fuel cell).

**Stakeholders** Groups who have a vested interest in an enterprise. For the BMW Group, these include customers, employees, shareholders and special interest groups as well as the municipalities where BMW plants are located.

**Sustainability** Primarily refers to sustainable development (see Agenda 21).

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## T

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

**Transport Energy Strategy (TES)** Project sponsored by BMW and other automobile manufacturers in conjunction with the energy industry under the auspices of the Federal Republic of Germany. TES is aimed at selecting and implementing alternative fuels.

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## U

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**Ultra Low Emission Vehicles (ULEV)** Refers to vehicles that comply with stringent California emission standards. Corresponds roughly to Euro IV regulations.

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## V

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**VALVETRONIC** BMW innovation in motor management technology that effectively enables fuel consumption savings of around 10 percent. VALVETRONIC controls valve lift and the amount of gas entering the cylinder. Replaces the function of the throttle valves.

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## Z

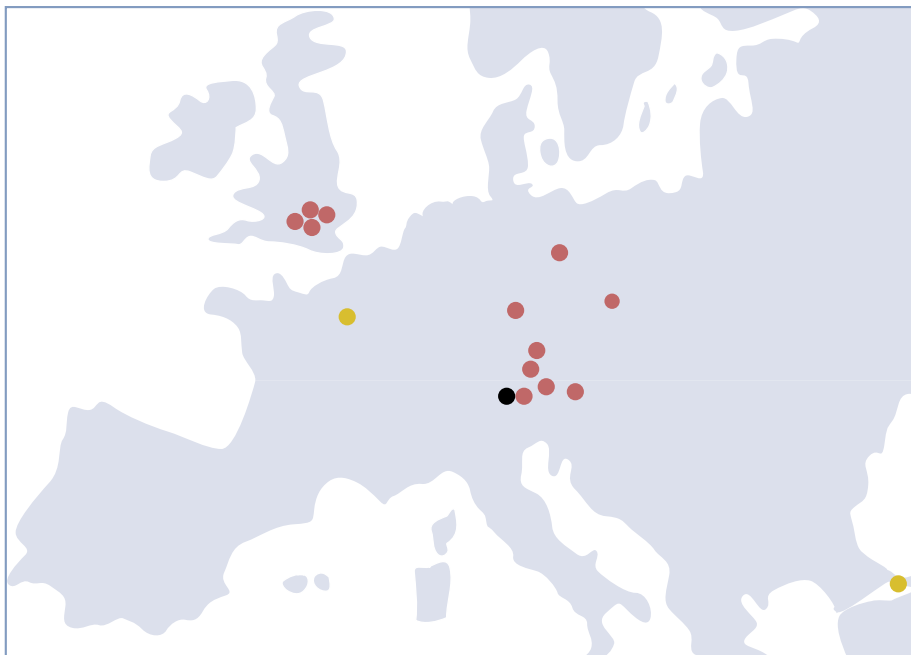
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**ZEUS** BMW hazardous material information system that provides important information for dealing with emergency situations. ZEUS is supported by manufacturers and suppliers of potentially hazardous materials who provide complete details on all materials used in production operations.

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# BMW Group Sites



Plant	Environmental certification system	Certifying authority	Date	Certification review
Berlin, Germany	EMAS/ISO 14001	Gerling Cert	5/1997	5/2000
Munich, Germany	EMAS/ISO 14001	TÜV	3/1997	3/2000
Dingolfing, Germany	EMAS/ISO 14001	TÜV	1999	2002
Steyr, Austria	EMAS/ISO 14001	TÜV	1/1998	1/2001
Roslyn, South Africa	ISO 14001/BS 8800	TÜV SA	11/1999	11/2002
Regensburg, Germany	EMAS/ISO 14001	TÜV	9/1997	9/2000
Spartanburg, USA	ISO 14001	TÜV NA	8/1997	8/2000
Oxford, UK	ISO 14001	VCA	9/1997	9/2000
Hams Hall, UK	ISO 14001	TÜV	7/2001	8/2004
Landshut, Germany	EMAS/ISO 14001	TÜV	6/1997	6/2000



**Production Plants**

- Berlin, Germany
- Birmingham, UK\*
- Dingolfing, Germany
- Eisenach, Germany
- Hams Hall, UK
- Landshut, Germany
- Munich, Germany
- Oxford, UK
- Regensburg, Germany
- Rossllyn, South Africa
- Spartanburg, USA
- Steyr, Austria
- Swindon, UK
- Tritec Motors Ltda., Curitiba, Brazil\*\*
- Wackersdorf, Germany

**Assembly Plants**

- Toluca, Mexico
- Amata City, Thailand
- Cairo, Egypt
- Jakarta, Indonesia
- Kuala Lumpur, Malaysia
- Manila, Philippines
- Kaliningrad, Russia
- Hanoi, Vietnam

\* sold in 7/2001

\*\* In cooperation with DaimlerChrysler

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**Publisher**

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## Dialogue with BMW recycling experts

### Invitation

You are invited to take part in a guided tour and discussion with BMW recycling experts. Topics include the comprehensive BMW program of environmentally safe, end-of-life vehicle recycling and recycling-optimized product design. Duration: approx. 4 hours. Dates are listed below.

#### Reply

I am interested in participating in a guided tour of the BMW Recycling and Disassembly Center (RDZ) in Unterschleißheim near Munich. I will be accompanied by \_\_\_\_\_ person(s).

Dates (please indicate your choice):

- November 8, 2001
- December 6, 2001
- February 6, 2001

We will confirm your dates and send you complete details in advance.

**Detailed information and publications are available on the following subjects:**

- Environmentally compatible automobile production
- Mobility and the environment
- Vehicle recycling

**Other publications:**

- BMW Group Guidelines
- BMW Environmental Reports
- Taking Responsibility

**Additional themes include:**

- Transportation concepts and traffic management
- Alternative drive concepts
- Clean air
- Energy strategies
- Environmental management systems
- CleanEnergy
- I am interested in receiving your next Sustainable Value Report