GREEN GOAL

FIFA FUSSBALL-WELTMEISTERSCHAFT DEUTSCHLAND 2006

Legacy Report

Green Goal™ – the environmental concept for the

2006 FIFA World Cup™

Contents

Sigmar Gabriel

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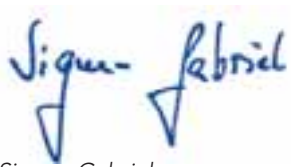
Dear readers,

Germany and the world experienced in the summer of 2006 a football festival that hardly anyone had expected. Besides the smooth organization, beautiful stadiums and good football, the pleasure and enthusiasm of football fans will be a lasting memory. The 2006 FIFA World Cup was also the first World Cup that had an environmental concept with ambitious objectives. Green Goal, the environmental programme, comprised measures for the economical use of water, the reduction of waste, an increase in energy efficiency, sustainable transport and climate neutrality.

13 of the 16 objectives were achieved! This success speaks for itself and is particularly praiseworthy, since Green Goal was founded on the voluntary involvement of the OC, participating cities, stadiums and World Cup partners. Unlike the Olympic Games, an environmental concept is not obligatory in the case of a World Cup tournament. Not yet, I would like to say to FIFA. I regard the development of binding environmental guidelines for future applications for the organization of the FIFA World Cup as essential. Experiences with Green Goal have shown that more would have been possible, particularly in the case of stadiums.

For the first time in the history of the tournament, additional greenhouse gas emissions brought about in Germany by the 2006 FIFA World Cup have been compensated. For this purpose, climate protection projects in India and South Africa were selected that meet "Gold Standard" criteria. Southeast India was badly affected by the tsunami in 2004. I regard it as a positive sign that other continents will also profit from the "green legacy" of the 2006 FIFA World Cup.



Sigmar Gabriel
Federal Environment Minister

Dear readers,

Sustainable effects of the World Cup were at the centre of planning by the German Football Association and its Organizing Committee for the 2006 FIFA World Cup™ from the very beginning. A few months after the final in Berlin we notice that Germany and German football profit from the sustainability of the World Cup as a result of newly-created jobs, the construction of spectacular stadiums and rekindled enthusiasm for honorary posts.

This report is concerned with sustainable benefits within the framework of the Green Goal™ environmental programme. The German Organizing Committee, with the close co-operation of the Federal Environment Ministry, succeeded in setting new environmental protection standards for the organization of large sporting events in the future. We would like to offer our sincere thanks to the Federal Environment Ministry (BMU), the Deutsche Bundesstiftung Umwelt (DBU), FIFA, numerous commercial partners, the United Nations Environment Programme (UNEP), FIFA host cities and our consultants Öko-Institut.

We are proud to present the results achieved by Green Goal. They demonstrate that Germany grasped the opportunity to present itself as a country that is friendly towards guests, keen on sport and environmentally aware. The adverse environmental effects that are inevitably associated with the organization of a World Cup were kept as low as possible. Marked declines in the consumption of water and energy were achieved in comparison to previous large sporting events.

The largest rainwater cistern at a European football stadium was built in Berlin. Photovoltaic plants of the order of 2,800 kW_p were constructed within the framework of Green Goal – enough to cover the total annual electricity demand of a stadium.

We are particularly pleased that 74 per cent of ticket holders travelled to stadiums with public transport, coaches or on foot. We set the signals for this with the introduction – for the first time at a World Cup – of the KombiTicket. And with the financing of projects in India and South Africa the 2006 World Cup in Germany also made a contribution towards global climate protection.

We hope that the organizers of large sporting events in the future will further optimize Green Goal, and that environmental protection will be a firmly established, integral part of the FIFA World Cup, wherever our tournament is organized.

I hope that this report arouses your interest.

Yours sincerely

Horst R. Schmidt
Senior Vice-President of the Organizing Committee, 2006 FIFA World Cup.

"The German Organizing Committee, with the close co-operation of the Federal Environment Ministry, succeeded in setting new environmental protection standards for the organization of large sporting events in the future."

Summary

In June and July 2006 the world experienced a breathtaking football festival, and for the first time in the history of the World Cup the environment was on the programme. With Green Goal™, an innovative and ambitious environmental programme was successfully carried out at the 2006 FIFA World Cup™ in Germany, which pursued new paths for large sporting events. The Green Goal vision was both simple and demanding: adverse effects on the environment, which would inevitably be associated with the organization of the World Cup in Germany, should be reduced to the greatest extent possible. The Executive Board of the Organizing Committee (OC), with its President Franz Beckenbauer, regarded Green Goal from the very beginning as an integral part of the planning and organization of the tournament and a contribution towards the "sustainable legacy" of the World Cup.

In the summer of 2001 the OC decided to commission a comprehensive environmental concept for the World Cup; and at the beginning of 2002 it instructed a team of researchers from Öko-Institut and WWF Germany to draw up comprehensive, ambitious guidelines and environmental objectives for the 2006 FIFA World Cup. The Federal Environment Ministry supported and followed the progress of work on the concept right from the start, and the Deutsche Bundesstiftung Umwelt (DBU) (German Federal Environment Foundation) provided financial support for the preparation and realization of the concept. By the spring of 2003 the researchers had developed ambitious, measurable environmental objectives for waste, energy, transport and water; and, with regard to global climate protection, the organization of the 2006 FIFA World Cup was to have a neutral effect on the climate, as far as emissions within Germany – the area of responsibility of the OC – were concerned.

Summary

In March 2003, the environmental objectives, to which the OC and its partners were jointly committed, were presented to the public. At the same time, implementation of Green Goal began. During the following months, the OC and Öko-Institut worked together with host cities and stadium operators on implementation of environmental measures in the stadiums. Green Goal working groups were set up in a number of host cities, which used the environmental programme to promote their own municipal projects (such as the installation of solar plants, waste avoidance measures and the promotion of public transport).

In September 2005, Green Goal received prominent support: the OC and the United Nations Environment Programme (UNEP) signed a Memorandum of Understanding, in which they arranged to work together on the realization and communication of Green Goal. The then Executive Director of UNEP – and former German Federal Environment Minister – Professor Klaus Töpfer became Green Goal Ambassador. From the end of 2005, the FIFA and its official partners (Coca Cola and Deutsche Telekom) as well as national suppliers (Deutsche Bahn, EnBW) and other business concerns (PlasticsEurope, Total) joined the Green Goal team. They actively supported Green Goal objectives with their own activities and participated financially in climate protection projects.

Realization of the ambitious environmental programme was a challenge for all participants. On the one hand, there existed no empirical experience from earlier World Cup tournaments. On the other hand, the scope for environmental protection measures was restricted by the fact that in World Cup stadiums planning and construction work had already begun, and the OC had therefore only a limited influence on stadium planning. The additional measures, which were nevertheless undertaken to support Green Goal objectives, must therefore be rated highly. These activities included, for example, measures to increase energy efficiency, the construction of rainwater cisterns and the installation of water-saving sanitary fittings and systems. Furthermore, environmental management competence in the stadiums was strengthened.

Construction of a rainwater cistern in Stuttgart stadium.

Environmental management

The World Cup stadiums in Nuremberg and Munich were the first football stadiums in Europe to adopt, within the scope of Green Goal, the environmental management system EMAS. The stadiums in Hamburg and Gelsenkirchen introduced at an early stage the ÖKOPROFIT environmental management system; the stadiums in Dortmund and Kaiserslautern are currently following the same path. Stadiums without certification have also integrated environmental management into their everyday operations.

Water

The main Green Goal objective for water was the protection of resources of potable water (water fit for drinking but also used for other purposes) by reducing consumption in stadiums by 20%. The success achieved was mainly attributable to greater use of rainwater and the installation of dry urinals, water-saving toilets and water-flow regulators. Rainwater cisterns were constructed in stadiums in Berlin, Frankfurt, Nuremberg and Stuttgart, and included, in Berlin, the largest cistern (1,400 cubic metres) in a European football stadium. Four of the twelve World Cup stadiums installed dry urinals, and in many others water-saving sanitary fittings were installed. In Berlin, Frankfurt and Munich, additional rainwater infiltration systems were built to promote a near-natural water cycle. Further measures for the purposes of modern rainwater management were carried out, including the desealing of land, the water-permeable paving of open spaces and the greening of roofs.

The result of these measures was that stadium demand for potable water decreased by 18%. Taking into account additional savings from improved water management, which are difficult to quantify, the Green Goal objective was largely achieved. The additional consumption of potable water for the World Cup will be offset by savings in two years of Bundesliga operations.

Waste

At the centre of the Green Goal waste concept was waste avoidance. Measures were taken in and around stadiums for the greatest possible avoidance and reduction of waste. The initial impression during the World Cup confirmed that stadiums were very clean with little litter. The returnable beaker for the serving of drinks in stadiums celebrated its première at the World Cup. At no previous World Cup, or Olympic Games for that matter, had multi-use systems been employed. Furthermore, in line with the "Put it in a roll!" campaign, stadium kiosks served such items of food as sausages and schnitzels without additional packing. Innovative solutions for the avoidance of waste were also employed in the construction of the "International Broadcasting Centre" in Munich, which, with an area of 30,000 square metres, was mainly built of wood. This wood was not disposed of as waste after the World Cup, but will be used for the building of 60 houses.

As a result of successful initiatives for waste avoidance, the main Green Goal objective – the use, wherever possible, of packaging-free and multi-use systems and a reduction in waste in and around stadiums of 20% – was largely achieved. Quantifiable reductions amounted to more than 17%.

For the first time at a World Cup drinks were sold to spectators in stadiums only in returnable beakers – a great success for waste avoidance.

Separate collection of waste was planned to enable the highest recycling quality. Green Goal symbols were specially created for the waste fractions of glass, paper, plastic packaging materials and residual refuse. In addition, notice boards at stadium entrances and kiosks provided information on returnable beakers and separate collection of waste. It can be said that in "backstage" areas separate collection functioned satisfactorily. In spectator areas, waste avoidance measures were on the whole successful, and separate collection – with very few exceptions – could have been dispensed with.

Energy

A central Green Goal objective for energy was the determination and exploitation of savings and efficiency potentials at all twelve World Cup stadiums, through, for instance, optimized light management, more efficient energy production, heat recovery and other electricity- and heat-saving measures. Appreciable savings potentials were identified in the stadiums, but they could not all be exploited. Despite efforts in some stadiums – for instance, very good heat insulation in Stuttgart – the objective of a minimum 20% reduction in the energy consumption of World Cup stadiums was not achieved. Savings calculated within the scope of Green Goal amounted to 13%. It can be assumed, however, that further potentials will be exploited in the future as a result of improved energy management.

By contrast, a second Green Goal objective of providing efficient supplies of energy for the 2006 FIFA World Cup as far as possible from renewable sources was achieved. Photovoltaic plants made the main contribution. The largest solar plants in or at a football stadium in Germany were installed in Kaiserslautern, Dortmund and Nuremberg. In all, photovoltaic plants with more than 2,800 kW_p were installed. This corresponds to an area of over 20,000 square metres, which is sufficient, in theory, to cover the complete annual demand for electricity of one of the World Cup stadiums. The plants produce an annual total of around 2.5 million kWh of electricity, enough to cover within the next five years the total electricity requirements of the 2006 World Cup. The second important additional contribution to attainment of the objective was the provision of 13 million kWh of certificated green electricity from hydropower. This actually exceeded the total

Several thousand square metres of solar modules were installed on the roofs of World Cup stadiums, which now produce environment-friendly green electricity.

demand for energy of the stadiums, their additional hospitality and media facilities as well as the International Broadcasting Centre (a total of about 12.6 million kWh). The environmental effect of this action is equivalent to the direct supply of green electricity to all stadiums during the World Cup.

Transport

One of the key objectives of the Green Goal transport concept was an increase in the share of public transport: The share of journeys by public transport to World Cup stadiums should be increased to 50%.

This objective was surpassed. On the average of all World Cup games and cities, around 57% of visitors used public transport for travel to and from stadiums (including park & ride). A further 6 % made their way on foot, around 11 % travelled by coach. Travel by environmentally favourable means of transport therefore accounted for a total share of 74%. Only 23 % of visitors to stadiums travelled there by car. The reasons for the success of public transport were, above all, the good connections of stadiums to the public transport network, the quality of services (for example, their frequency), few parking spaces at stadiums and, especially, the "KombiTicket", which was introduced for the first time at a World Cup championship and entitled ticket holders to travel free of charge on match days on the entire public transport network of host cities.

A further central objective of the transport concept was a reduction in the effects of transport on the environment: The climatic effects of journeys to and from the 2006 FIFA World Cup should be reduced by 20 %. Journeys (within Germany, the area of responsibility of the OC) of visitors to World Cup stadiums and cities – including the supply and logistics of stadiums – gave rise to greenhouse gas emissions amounting to 73,000 tonnes of CO_2 equivalents. Emissions arising from journeys of foreign visitors to and from Germany were disregarded.
Without the transport measures initiated by Green Goal, greenhouse gas emissions brought about by the World Cup would have totalled around 91,000 tonnes, which means that Green Goal saved about 17,000 tonnes, or 19%, of transport-related greenhouse gas emissions. The objective of reducing green-

house gas emissions by one-fifth was therefore largely achieved. This is attributable, above all, to the large share of journeys by rail. Deutsche Bahn (DB) had developed and marketed special offers to attract as many visitors as possible to rail travel. These included the "World Champion Ticket", the "World Champion Pass" and "World Champion Surf&Rail".

Climate

Global climate protection was of great significance for the Green Goal concept. The main objective of the OC and its partners was that the 2006 FIFA World Cup should have a neutral effect on the climate, as far as incremental greenhouse gas emissions in Germany were concerned. The World Cup should in effect be "climate-neutral". This most ambitious Green Goal objective was achieved through the compensation of incremental emissions in Germany by way of three climate protection projects in India and South Africa.

The project entitled, "Family Clean Energy Packages" provided for the climate-friendly supply of energy to around 900 families in the region of Tamil Nadu in southeast India, which had been badly hit by the horrific tsunami in December 2004. Here, biogas-generating units are being supplied to several hundred families to provide them with gas for cooking. The families also receive support for the repair of their huts and houses, and needy families are given cows, whose dung is required for the biogas units. With the use of these biogas-generating units, fossil energy sources are replaced and at the same time climatically harmful emissions of methane are avoided. With this project around 30,000 tonnes of carbon dioxide will be saved during the course of the next ten years.

In one of the two climate projects in South Africa, at a sewage plant close to a township near Johannesburg, climatically harmful sewage gas is collected and used for the generation of electricity. In the second project, regenerative raw materials are used instead of coal for the supply of energy to a citrus fruit farm not far from the Krüger National Park. With these projects around 70,000 tonnes of climate gases caused by the 2006 FIFA World Cup in Germany will be compensated during the next three to four years.

All three climate protection projects meet the specifications of the so-called clean development mechanism (CDM), and they also meet the highest environmental and social standards for such projects, namely the so-called "Gold Standard", which was developed by the WWF together with other environmental organizations. In all, a total of around 100,000 tonnes of carbon dioxide will be compensated. The 1.2 million euros required to finance the three projects were provided by the German Football Association (DFB) as well as FIFA and its partners.

In order to secure the climate neutrality of the 2006 FIFA World Cup in Germany, 92,000 tonnes of CO_2 equivalents had to be offset. For the first time in the history of the World Cup, the organizers succeeded in more than offsetting incremental greenhouse gas emissions caused by the tournament in Germany.
Besides quantities of saved greenhouse gases, the high standards ("Gold Standard") of the projects are the most important factor in voluntary climate compensation, and they represent both a model and a challenge for future large sporting events.

The DFB financed the construction of biogas-generating units in the Indian province of Tamil Nadu, in order to compensate a proportion of the greenhouse gases caused by the World Cup in Germany. Biogas units provide gas for cooking - there is no longer a need to gather wood.

Communications

The public relations activities of the OC set the tone for Green Goal communications, and the main communications channels were the Green Goal Website, press conferences and publications. Communications were supported internationally by UNEP and Green Goal Ambassador Professor Klaus Töpfer. Official FIFA partners as well as national suppliers of the OC and the host cities contributed with their campaigns and media activities to Green Goal public relations activities.

Communications also offered the opportunity to sensitize and gain the support of broad sections of the public for environmental protection and environment-friendly behaviour. This was carried out successfully, for instance, with the "Club 2006" campaign, directed at the 27,000 football clubs affiliated to the German Football Association, into which Green Goal was integrated. Around 400 clubs competed for prizes with environmental activities and the organization of an "Environment Day". This was a good example of how Green Goal achieved broad effects. The general public was reached, however, to only a limited extent. Here, the lack of FIFA involvement made itself felt, as well as low-key integration into overall World Cup communications and the absence of personalization (for instance the employment of well-know sporting personalities). This remains a challenge as well as an opportunity for future World Cup tournaments.

The Organizing Committee promoted Green Goal before the World Cup with striking messages on posters.

Balance

Looking back, the OC demonstrated, with the most varied support, that environmental objectives could be an integral part of the successful planning and organization of a large sporting event. In all, 13 of 16 Green Goal objectives were to a large extent achieved. That is a heartening result for the first environmental programme for a FIFA World Cup, bearing in mind that setting of objectives was based on the voluntary co-operation of all participants. This will help to encourage the integration of environmental concepts on the part of organizers of future World Cup tournaments and other large sporting events.

Those who organize large sporting events in future, or who will be generally involved in football, should profit from the experiences made. With a number of showpiece projects and many other measures that will have their effect in the long term – also in the Bundesliga operations of stadiums – Green Goal has made a contribution to the "sustainable legacy" of the FIFA World Cup.

Experiences with Green Goal have not only indicated existing opportunities, they have also shown where and why an environmental concept for World Cup tournaments has its limitations. It is unfortunate that under the prevailing circumstances the objectives of an increase in energy efficiency, greater use of rainwater and the environmentally beneficial tending of football pitches were not achieved. With Green Goal, however, important organizational tasks and opportunities were identified for all those who will be involved in future in the organization of World Cup tournaments.

The creation of Green Goal

Green Goal™ stands for green objectives and achievements of the 2006 FIFA World Cup™ in Germany. For the first time in the history of the World Cup, an innovative, demanding and extensive environmental programme was successfully carried out and new paths pursued for large sporting events.

The organization of the World Cup was a great opportunity for Germany to present itself to the world as very friendly towards visitors, keen on sports and also environmentally aware. The World Cup Organizing Committee (OC), with its President Franz Beckenbauer, and the German Football Association (DFB) recognized this opportunity and challenge. With Green Goal, the DFB and OC have underscored their sense of responsibility for the environment.

The Green Goal vision was both simple and ambitious: to reduce as far as possible the adverse effects on the environment that would inevitably be associated with the organization of the World Cup in Germany. The environmental programme also offered the opportunity to sensitize broad sections of the public for environmental and nature conservation beyond the World Cup, and to demonstrate that environmental protection can also be economically worthwhile.

Franz Beckenbauer and the former Federal Environment Minister at the presentation of Green Goal objectives in March 2006.

The Executive Board of the OC had regarded Green Goal™ from the beginning not only as an integral part of the planning and organization of the tournament, but also as a contribution towards the "sustainable legacy" of the World Cup, which enjoys a special status among large sporting events. Since the stadiums are intensively used not only during the World Cup, considerable effects on the environment are to be expected as a result of their everyday use; for example, in Bundesliga games. Green Goal did not therefore have the objective of creating a "green island " for one month, but rather of making a long-term and lasting contribution to the improvement of environmental protection in football stadiums. Behind Green Goal was also the idea of providing a model for other large sporting events, such as the UEFA EURO 2008 or the 2010 FIFA World Cup™ in South Africa, and winning over their organizers to comparable concepts.

2.1 Chronicle

At the beginning was the idea: With a chapter entitled "Environmental Concept for the Stadiums" in its very first application dossier for the 2006 FIFA World Cup™ in Germany, the DFB made clear that, in planning and organizing the tournament, environmental protection in the areas of water, waste, energy and transport would play an important role. In contrast to the International Olympic Committee (IOC), FIFA does not include environmental protection as an integral part of applications to organize a World Cup. The DFB therefore broke fresh ground.

Not long after the setting-up of the OC on 29 September 2000 and the opening of its office in Frankfurt on 15 March 2001 work began on the environmental programme. It was inspired by the great success of the environmental concept for the 2000 Summer Olympics in Sydney, Australia. In selecting the twelve stadiums for the World Cup from the final sixteen applicants, the OC took account of environmental criteria, in so much as the FIFA document that laid down technical recommendations and requirements for World Cup stadiums (the basis for nomination of stadiums by FIFA), was extended by a chapter on the environment. Here, the stadiums described their environmental activities and plans for the period leading up to the World Cup.

In the summer of 2001, the OC decided to commission a comprehensive environmental concept for the World Cup; and at the beginning of 2002 it instructed a team of researchers from Öko-Institut and WWF Germany to draw up comprehensive, ambitious guidelines and environmental objectives. Öko-Institut is one of the leading independent research and consultancy organizations in the field of sustainable development in Europe. The Federal Environment Ministry supported and followed the progress of work on the concept right from the start, and the Deutsche Bundesstiftung Umwelt (DBU) (German Federal Environment Foundation) provided financial support for the preparation of the concept. A package of environmental guidelines, which formed the backbone of the later environmental programme, was ratified by the OC Executive Board at the time of the 2002 FIFA World Cup in Japan and Korea. By the spring of 2003, the researchers had developed specific, measurable environmental objectives for waste, water, energy and transport, as well as for global climate protection. For the first time, therefore, ambitious and measurable objectives were set for such a large-scale sporting event, to which the OC and its partners jointly committed themselves. These objectives were intended to fill the gap left by the lack of binding specifications on the part of FIFA, and to encourage voluntary support of the environmental programme by all parties involved in planning the World Cup.

On 31 March 2003, Franz Beckenbauer and the then Federal Environment Minister Jürgen Trittin presented the environmental objectives to the public at a press conference. At the same time, implementation of Green Goal began, backed by the Federal Environment Ministry and supported financially by the Deutsche Bundesstiftung Umwelt (DBU).

During the following months the OC worked together with World Cup cities and stadium operators on implementation of environmental measures in the stadiums. At many venues, planning and construction work was already underway, which restricted the scope for supplementary environmental measures. Nevertheless, numerous measures were initiated at a number of venues. Green Goal working groups were set up in a number of host cities, which made use of the environmental programme to promote their own municipal projects.

In April 2005 Green Goal went online. Its Website http://greengoal.fifaworldcup.yahoo.net regularly reported on activities and progress right up to the end of the World Cup. In September 2005, the OC and the United Nations Environment Programme (UNEP) signed a Memorandum of Understanding, in which they arranged to work together on the realization and communication of Green Goal. Professor Klaus Töpfer, at that time Executive Director of UNEP, became Green Goal Ambassador. At the same time, the first climate protection project in India was presented, which was financed by the DFB. Later two further projects in South Africa followed. With these three projects climate gases brought about by the World Cup in Germany were compensated.

In November 2005, Green Goal was presented at a conference of the International Olympic Committee (IOC) and UNEP, following which Green Goal attracted ever-increasing international attention.

From the end of 2005, an increasing number of official FIFA partners (Coca Cola, Deutsche Telekom), national suppliers of the OC (Deutsche Bahn, EnBW) and other business concerns (PlasticsEurope, Total Germany) joined the Green Goal team, and FIFA declared its readiness to provide generous financial support for climate protection projects. As a result, it could be announced in Match 2006 that the 2006 FIFA World Cup would be climate neutral as far as emissions in Germany were concerned. Never before had 100,000 tonnes of carbon dioxide brought about by a large sporting event been neutralized by high-grade "Gold Standard" climate protection projects – a milestone in voluntary climate compensation.

On 9 June 2006, the "Summer Night's Dream" began. The world experienced an overwhelmingly positive FIFA World Cup and, for the first time in the history of the tournament, the environment won with Green Goal.

This Legacy Report documents and presents a balance of the results of Green Goal four months after the end of the World Cup. Öko-Institut also looks at the outlook for the future and makes appropriate recommendations. The Report provides answers to the following questions: Which objectives were met? Which objectives were not met, and why? What are the lessons to be learnt by organizers of large sporting events in the future? And finally: What contribution did Green Goal make to the sustainable legacy of the 2006 FIFA World Cup?

United for Green Goal: Professor Klaus Töpfer, former Executive Director of the United Nations Environment Programme UNEP and OC Senior Vice-President Horst R. Schmidt sign a co-operation agreement in September 2005 in the presence of the then Federal Environment Minister Jürgen Trittin

2.2 Organization

For the first time in the history of the tournament, the Organizing Committee (OC) of the 2006 FIFA World Cup in Germany had to plan and implement an innovative and ambitious environmental programme.

This was no easy task. One of the biggest challenges was that, on the one hand, the OC planned and implemented Green Goal without a binding FIFA framework, and on the other hand, the OC had only limited influence on the construction or modernization of stadiums, which were planned, built and operated by clubs, municipalities or private service providers. FIFA and the OC had only rented the stadiums for the period of the World Cup. This was particularly the case with environment-relevant measures and facilities, since the FIFA, in contrast to technical and security-related measures, had not laid down relevant instructions. More limited still was the influence on infrastructure, whose extension and capacity had a decisive influence on the environmental effects of transport flows during the World Cup.

These factors distinguished the 2006 FIFA World Cup from the Olympic Games, the only comparable large sporting event. An environmental concept has been an essential and obligatory part of application procedures for potential organizers of the Olympic Games since 1994. The organizers are also responsible for the construction and extension of sporting venues as well as for their operation during the Olympic Games. This makes the implementation of ecological measures that much easier.

Against this backdrop, the OC decided, as sponsor of the Green Goal initiative, to rely on the voluntary co-operation and willingness to participate of potential partners. Success would not have been possible without the involvement of stadium developers and operators, and without representatives of the host cities, official partners and national suppliers as well as the media. At the same time, reliance on voluntary participation and co-operation involved particular demands on organizational structures and processes.

Green Goal project management within the OC was a staff function reporting directly to Senior Vice-President Horst R. Schmidt, which co-ordinated Green Goal activities with the five departments responsible for hospitality and catering, marketing (together with FIFA marketing), media and communications, stadiums as well as transport and traffic. The involvement of stadium operators and host cities was initiated by the department responsible for stadiums, supported later by the local offices of the OC in all host cities. Co-operation with stadiums focussed on implementation of Green Goal measures in the areas of environmental management and, in particular, energy and water. On the basis of stadium planning in the environmental area, as detailed in the extended FIFA documentation, the realizability of more far-reaching measures was discussed and their later implementation monitored.

Co-operation with World Cup cities had the objective of encouraging environmental activities on the municipal side. Such initiatives were launched in most cases by the World Cup offices in the cities, or by municipal environment offices or sports departments. Green Goal working groups and initiatives - with the co-operation of environmental organizations - were established in Dortmund, Gelsenkirchen, Hamburg, Kaiserslautern, Leipzig and Munich. The host cities were also an important partner in the planning and realization of the waste concept. Co-ordination also covered agreement with official FIFA partners (Anheuser Busch, Coca Cola and McDonalds) and OC partners in the catering area.

Workshops run by the OC had the aim of informing representatives of host cities and stadiums about Green Goal and agreeing measures.

Green Goal measures in the transport area were integrated into the general transport and traffic concept by the appropriate OC department. Here, the extensive involvement of the federal government, the Länder, host cities, transport companies and OC partners (Deutsche Bahn, Hyundai) was necessary. Official partners and national suppliers – that is, FIFA and OC sponsors - were involved and provided with information by the OC marketing department, though mainly by FIFA Marketing & TV. The OC environmental programme was presented to them at an early stage to encourage co-operation, and individual proposals for participation put forward on request. This way, Deutsche Telekom and Coca Cola, from the circle of official partners, and Deutsche Bahn und EnBW, the national suppliers of the OC, were won over to co-operation with Green Goal. At the same time, PlasticsEurope – the Association of Plastics Manufacturers – and the oil company Total also supported the environmental concept.

The PR, Media and Communications Department of the OC was responsible for integrating the Green Goal initiative into World Cup communications as a whole, and it was supported by UNEP and its former Executive Director Professor Klaus Töpfer as Green Goal Ambassador. In addition, the department presented the environmental concept of Green Goal in two campaigns to the clubs of the German Football Association as well as to schools both in Germany and abroad.

Guidelines and objectives of Green Goal

A major event such as the 2006 FIFA World Cup™ is a challenge not only for the teams competing, but also for the environment. 3.4 million people visited the stadiums during the World Cup, covering many thousands of kilometres by train or car. The 64 games in twelve host cities could not have been played without the expenditure of energy. Broadcasting to a billion viewers and listeners required a secure and reliable supply of energy. Thrown-away rubbish and large quantities of waste are part and parcel of Bundesliga games, but waste is much more of a challenge in the case of the World Cup. A World Cup tournament makes, not least, great demands on the quality of the playing field. Sufficient sprinkling with corresponding quantities of water is the prerequisite for a green pitch.

Besides these direct effects, there are indirect, less obvious effects, from catering for spectators in the stadiums, for instance. Moreover, souvenirs and merchandise are part of the atmosphere at such a large sporting event as the World Cup. At the same time, World Cup tourism, and, in particular, the journeys and overnight stays of foreign visitors, have an effect on the environment.

There are more than enough points of contact with the environment. An environmental concept has to find solutions and reconcile football and the environment, according to the principle that "sport and the environment go hand in hand". The reduction of adverse effects on the environment was therefore the prime objective of the Green Goal™ environmental programme. The World Cup offered, at the same time, the opportunity to bring the issues of environmental and climate protection to the attention of a worldwide audience. Communications and sensitization were therefore an important task for Green Goal.

Green Goal began with the 2006 FIFA World Cup™, but it did not end with the final whistle. Measures in the stadiums were realized with the World Cup in mind, but they will benefit the environment long after the tournament ended and contribute to everyday Bundesliga operations, which will conserve resources and save costs. A further important aspect of Green Goal is, therefore, the sustainable effect of the environmental programme. In this respect, and so far as stadiums are concerned, football in Germany already possesses an important advantage. Other than in the case of many Olympic Games, the long-term use of the stadiums is secured through Bundesliga operations. The only exception is Leipzig, which does not have a Bundesliga club. Many stadiums were merely rebuilt or modernized. Only the Munich stadium was newly built at a new site.

3.1 Individual fields of action

Four main areas were examined within the scope of Green Goal: water, waste, energy and transport. From a global point of view, climate protection is currently the greatest challenge for environment policy. Climate protection, as a cross-sectorial task, therefore had priority over the four environmental areas. Individual environmental areas had varied addressees and responsibilities. "Water" and "Energy" directly concerned World Cup stadiums, and the implementation of appropriate measures was therefore the responsibility of stadium operators, who would profit from savings measures not only during the four-week World Cup. Savings measures are of long-term benefit to stadiums. "Waste", "transport" and, in particular, "climate protection" measures were the prime responsibility of the OC. Climate protection, as a cross-sectorial task, also covered energy and transport issues, but responsibility for the precise implementation of measures in these areas was largely independent of stadiums or cities, becoming one of the main tasks of the OC in Green Goal.

On the basis of stadium inspections and discussions between experts and stadium operators, guidelines were initially adopted for the four environmental areas and climate protection, and a comprehensive status-quo analysis of World Cup stadiums prepared. In order to be able to estimate the possible effects of measures from both an ecological and an economic point of view, exemplary initial implementation measures were defined quantitatively, as a result of which precise and measurable environmental objectives emerged. These objectives were supported by a concept for implementation and verification.

This approach enabled a systematic and extensive reduction in the harmful effects of the World Cup on the environment. Following identification of relevant environmental areas, a detailed status-quo analysis was made, which provided information on the scale of contributions of individual processes and procedures to environmental effects. The determination of quantitative environmental targets resulted in greater obligation on the part of all participating parties, an important point bearing in mind that the implementation of measures and objectives within

the framework of Green Goal was voluntary. With the analyses, for the first time a database and standard of comparison were prepared for other large sporting events.

Environmental protection requires capital expenditure. From an economic point of view, Green Goal measures were characterized by the fact that necessary capital expenditure would be recouped sooner or later in reduced operating costs, ultimately producing net relief. Costs of potable water and energy in Germany have increased continually over many years. Capital expenditure is recouped through reduced operating costs all the quicker the more expensive water and energy become. Energy costs give rise to the largest expenditure in stadium operations, followed by the costs of potable and waste water, charges on sealed land and the costs of waste disposal.

3.1.1 More responsible use of water

Water is an important resource, which is worth protecting. More responsible use of water is therefore an important contribution to sustainable development, also in everyday sports operations. The topic of water was highly rated during the World Cup in Germany. At the centre of attention were the use and handling of water in stadium operations, whereby the actual saving of potable water was by no means the only aspect. Modern water management, as defined by Green Goal, also comprises the extensive use of rainwater, infiltration of rain as well as other measures to support as natural a water cycle as possible.

Savings potentials can already be exploited during construction of a stadium, for instance through the installation of modern, water-saving technology in sanitary facilities. In the case of renovation and modernization of stadiums, water-saving fittings and dry urinals can be additionally installed. Potable water can also be saved in specific operations, particularly by means of organizational measures.

Underground infiltration plants - like here in Frankfurt stadium - store rainwater and let it slowly seep into the natural water cycle.

Guiding principle for water
Careful treatment of potable water is the focus of attention. This includes reducing the consumption of potable water, the use of rain-, well- and surface water instead of potable water, allowing rain to infiltrate naturally, and reducing contamination of waste- and groundwater.

The main objective was the **protection** of **resources:** In order to protect resources of potable water, water consumption of stadiums will be reduced by 20%.

Further objectives were:
Use of rainwater: 20% of remaining water requirements of stadiums will be covered by rain-, well- and surface water.

Sealing: To counteract the effect of land sealing and to encourage near-natural rainwater management, water-permeable materials will be used for newly created areas, open spaces and paths.

Reduction of waste and groundwater contamination: To avoid waste- and groundwater contamination, environment-friendly agents will be used as far as possible for stadium cleaning and the tending of pitches. Furthermore, the quantity of wastewater will be reduced to the greatest extent possible.

Guiding principle for waste:
Waste should be avoided to the greatest extent possible. Unavoidable waste should be recycled in an environmentally favourable manner, and non-recyclable waste should be properly disposed of.

The use of rainwater offers very great savings potential. Rainwater infiltration mainly concerns the immediate surroundings of stadiums, and is therefore relevant, above all, for the redesign of external areas and for the construction of new stadiums.

Though modern water management is an important environmental objective, appropriate measures are implemented "in the background" and are seldom noticed by spectators or players. Of prime importance for stadium operations is that the pitch is in an optimum condition, whether it is watered with potable or rainwater. In the case of dry urinals or economical toilet flushing only the expert knows how much water can be saved. These examples show that sport and the protection of resources can go hand in hand, even when the link is not obvious. It's a typical win-win situation: From the environmental point of view resources are saved, and the stadium operator can reduce his operating costs.
Careful use of potable water was an important contribution to sustainable action during the World Cup. Several objectives for water were therefore evolved for World Cup stadiums.

3.1.2 Waste avoidance and environmentally beneficial recycling

Those who live in the vicinity of a stadium, or in a city with a top football club know what open spaces and streets look like after a big match. Thrown-away packaging, leftover food and discarded advertising material are a cause of dissatisfaction and criticism. Litter is one of the most obvious problems associated with large sporting events. It is no surprise, therefore, that no other area is more closely associated with environmental protection than waste. Germany is well known for its know-how and high standards in the treatment of waste flows; a pioneering role that Green Goal™ wanted to do justice to.

There is another reason, however, why waste is very important: Waste is the perceptible interface between the ecological objectives of Green Goal and the football fan. Since visitors to stadiums and open-air events in host cities account for the largest share of waste, they are, as it were, part of the waste concept.

The focus of Green Goal attention during the World Cup was waste that arose in and around stadiums on match days. Here, catering was of major importance. A distinction was made between two areas: the backstage area, where food and drink was delivered, prepared and sold, and spectator areas, where food and drink were consumed. A similar distinction applied to the sale of merchandise. The foundations for successful waste avoidance are created backstage, in an area for which the organizers are responsible, and where they can implement appropriate measures. Environmentally favourable waste recycling largely depends on separate waste collection. Expert recycling and disposal of waste is ultimately undertaken, independent of World Cup organizers and stadiums, by the waste sorting and disposal facilities of the respective municipalities.

Information and sensitization are also important elements of every waste concept. Separate collection and the avoidance of waste promote environmentally conscious behaviour on the part of spectators and other visitors. The provision of information and instructions to backstage employees made a major contribution to realization of the waste concept during the World Cup.

Waste also accumulates in areas that are less obvious to spectators, in areas that actually have little directly to do with the game of football. They include the erec-

tion of temporary facilities for the World Cup, such as centres for the media and volunteers. Subsequent use of these facilities and their equipment was the prime consideration for the purposes of waste avoidance.

Waste arose during the World Cup not only in the stadiums. The Green Goal waste concept therefore addressed not only the stadiums and their immediate environs, but also bus and tram stops, car parks, routes to stadiums and the locations of open-air, public-viewing events officially organized by the host cities. The idea was to accompany football fans with a standardized system of measures from their arrival at the main station until their return after World Cup games. In contrast to water and energy, the signals for a well-functioning waste concept were set not by the technical infrastructure of stadiums, but through the provision of specific instructions for individual areas and those employed there. Responsibility for implementing the waste concept in and around stadiums therefore lay primarily with the OC and Green Goal participants.

3.1.3 Environment-compatible production and the efficient use of energy

Normal Bundesliga operation of stadiums requires not only electricity - for instance, for floodlighting – but also heat for hot water and heating systems. For the World Cup, additional demand for electricity arose, above all, through the extensive media presence.

The efficient use of energy, efficient energy supply and the use of renewable energy sources are essential elements of environmental protection policy. For this purpose, exploitation of energy-saving potentials and promotion of the use of renewable energy were the top priority during the World Cup. The provision of electricity and heat should be associated with the least possible effects on the environment. This is possible, above all, by means of renewable sources such as wind and the sun.

Multi-use systems were very important for the supply of food and drink in stadiums. Pretzels and rolls, for instance, were delivered in returnable containers.

The departure point in the area of waste was the objective for:
Waste avoidance: Measures will be taken for the greatest possible avoidance of waste not only in stadiums, but also in the area around stadiums.

Based on this, the key objective was:
Waste reduction: Packaging-free and multi-use systems will be used as far as possible in all areas to reduce quantities of waste. The quantity of waste in and around stadiums will be reduced by 20 %.

A further objective was:
Waste recycling: Separate collection systems will be set up for biowaste, light packaging materials, paper, glass and residual refuse at each venue, in order that these types of waste can be completely separated and made available for high-grade recycling.

Guiding principle for energy:
Energy-saving potentials will be exploited during the World Cup through modern technical and organizational measures, wherever these are possible and economically feasible. The energy required for the efficient organization of the World Cup will be produced so far as possible by environment-compatible means.

The departure point in the energy area was:
Exploitation of efficiency: Savings and efficiency potentials will be determined and exploited at all venues.

Two main objectives were evolved for the energy area:
Reduction of energy consumption: Energy consumption in World Cup stadiums will be reduced by at least 20% through the efficient use of energy.

Use of renewable energy sources: The efficient supply of energy for the 2006 FIFA World Cup will be provided as far as possible from renewable energy sources.

The OC resolved to strive for these environmental and climate objectives in the organization of the 2006 FIFA World Cup™.

Modern football stadiums are not only sporting venues, they also include conference centres, restaurants, administrative wings, shops and even museums. Closable stadium roofs and mobile playing fields are part and parcel of the event characteristics of present-day stadiums, reflecting, too, the greatly increased demand for comfort. A higher specific demand for energy is an inevitable feature of these complex sporting venues. Expensive multi-functional stadiums require, moreover, the highest capacity-utilization possible. In contrast to fortnightly Bundesliga operations in former times, a large number of additional small and large events nowadays take place in stadiums; and this results in a further increase in annual demand for energy.

That the energy consumption of modern football stadiums is not greater still, has to do with technological progress. Floodlighting systems, for example, previously accounted for the greater part of electricity consumption. Today, they are equipped with floodlights that use less electricity, but whose illuminative quality nevertheless satisfies the high standards set by television broadcasting. Through the use of central building control systems, technical facilities such as air-conditioning plants, heating and lighting systems are demand-controlled and orientated towards actual use-profiles. Central building control systems are an important tool for the environmentally sound energy management of highly complex plants.

3.1.4 Environmentally favourable and efficient transport

The journeys of spectators, journalists and guests of honour to and from stadiums and between host cities during the World Cup inevitably involved adverse effects on the environment. The supply of stadiums also gave rise to delivery and logistics services and therefore additional effects on the environment.

Reduction of the adverse effects of transport on the environment is an important objective of sustainable development in Germany. This concerns the avoidance of unnecessary transport, shifting road and air traffic to environmentally favourable means of transport such as buses and trains, and the ecologically efficient design of existing transport systems (for instance, through the use of alternative, efficient engine and fuel systems. These objectives could be applied to the planning and, above all, the organization of the World Cup.

The guiding principle for sustainable action for the 2006 FIFA World Cup took up these points and demanded a shift to public means of transport as well as the ecological design of existing transport systems.

Analyses carried out at the start of planning for the 2006 World Cup in the respective cities showed that merely 40% of spectators travelled to the twelve World Cup stadiums with public transport. Buses and trains offer ecological advantages, in contrast to cars: they produce less exhaust gas and greenhouse gases, the number of traffic accidents is much lower and they produce fewer problems from parking in residential areas close to stadiums. The objective was to increase the proportion of spectators that travel to stadiums with public transport, and to avoid additional nuisance from exhaust gas and noise for local residents.

Early analyses also showed, however, that greenhouse gases from transport during the World Cup would be highly significant. They result, above all, from journeys between host cities. An appreciable reduction in total greenhouse gas emissions during the World Cup could only be achieved through a reduction in transport emissions. The achievement of such a reduction became a declared Green Goal objective. This meant that, besides the avoidance of unnecessary transport, journeys between host cities should take place by train or by coach, rather than by car or plane. To realize this objective, appropriate offers had to be developed and promoted for all groups of visitors (that is, for spectators – including those from abroad - and journalists, for official World Cup partners and suppliers, as well as for sports officials).

3.1.5 The first climate-neutral World Cup

Protection of the climate is one of the most important environment policy tasks worldwide, and it is perceived by broad sections of the public to be one of the greatest ecological problems. It was therefore the objective of Green Goal to avoid, as far as possible, adverse effects on the global climate from the World Cup. The guiding principle of Green Goal was the climate-neutral organization of the 2006 FIFA World Cup, so far as emissions in Germany were concerned.

The majority of World Cup visitors travelled in an environment-friendly way by train - they used their own cars less often.

Guiding principle for transport:
Transport during the 2006 FIFA World Cup should be environmentally favourable and efficient. Activities should be focused on the avoidance of unnecessary transport and a marked shift to public means of transport, as well as on the efficient and ecological design of existing transport systems.

Due to their significance for environment-compatible transport, two main objectives were laid down:
An increase in the share of public transport: The share of journeys to World Cup stadiums with public transport will be increased to 50%.

A reduction in the climatic effects of transport: The climatic effects of journeys to and from stadiums during the 2006 FIFA World Cup in Germany will be reduced by 20%.

To support the main objectives and to improve protection for residential areas, two further objectives were formulated:
Reduction in environmental impacts in the vicinity of stadiums: Direct environmental impacts (for example, noise and exhaust gas) in the vicinity of stadiums will be kept to a minimum.

Environmentally sound offers of transport for specific target groups:
Offers of environmentally sound transport will be specifically aimed at the main groups of visitors to the 2006 FIFA World Cup – foreign visitors, domestic visitors, journalists, "FIFA Family" and players.

Green Goal – guidelines and objectives

Climate neutrality: The formation of climatically harmful greenhouse gas emissions during the 2006 FIFA World Cup will as far as possible be avoided or reduced. Unavoidable incremental greenhouse gas emissions in Germany will be compensated by capital investment in climate protection projects elsewhere.

It was clear from the very beginning that organization of the World Cup would inevitably result in the emission of additional greenhouse gases, particularly due to transport. In order to achieve the objective of climate neutrality, three main steps were planned. First of all, energy consumption should be reduced as far as possible through savings- and efficiency-technology. Secondly, remaining demand for energy should be met, where possible, with renewable energy sources. Thirdly, unavoidable incremental greenhouse gas emissions in Germany resulting from the World Cup should be compensated through capital expenditure on climate protection elsewhere.

The 2006 FIFA World Cup in Germany therefore had, for the first time in the history of the tournament, climate neutrality as its prime environmental objective.

Further environmental areas

Besides the four key areas of water, waste, energy and transport, as well as the prioritized matter of climate neutrality, Green Goal addressed additional environmental areas, which were important for an environment-friendly World Cup. These included – to the extent allowed by the advanced stage of planning and construction work at the time Green Goal was launched – the environment-compatible construction and modernization of stadiums as well as the erection of media centres and other temporary facilities on the basis of ecological criteria. World Cup tourism was included in so much as the overnight stays of visitors, with their consumption of electricity and heat, were accounted for in the climate balance. The ecological effects of journeys between World Cup venues were also addressed in the area of transport.

Photovoltaic plants in World Cup stadiums – here in Dortmund – contributed to environment-friendly electricity production.

Green Goal defined initial demands for the sustainable production of merchandise and for environmentally favourable packaging. Since implementation was not possible, due to varied responsibilities – Green Goal with the OC on the one side, and merchandising with the FIFA on the other, as well as existing contractual commitments – this work can serve as a basis for application at future World Cup tournaments. So far as catering is concerned, possibilities of making use of regional produce and organic products were examined. For instance, the "Active Regions" project, which marketed regional produce at Bundesliga games in Dortmund stadium, was looked at. However, similar action in World Cup stadiums during the tournament was not possible.

3.1.6 Bases for quantitative objectives

There is a broad range of stadiums in Germany, from the classic football stadium, which is primarily organized around fortnightly Bundesliga games, to the multifunctional arena, which is no longer solely concerned with football. The twelve World Cup stadiums can therefore not be brought down to a common denominator as far as spectator capacity, technical infrastructure and type of use are concerned.

For Green Goal this meant that the definition of universally applicable environmental standards or parameters, for instance for energy or water consumption per game or per stadium, would serve no purpose. The energy consumption of a stadium, which opens its doors only at weekends, cannot be compared with the energy consumption of an arena with around-the-clock catering, a large administrative wing and supplementary commercial usage. Furthermore, quantities of waste or consumption figures for water, for example, were systematically recorded neither at the 2002 FIFA World Cup in South Korea / Japan nor at the 2004

UEFA EURO in Portugal. As a result, neither comparative figures nor other general environmental parameters were available to Green Goal for reference purposes. One alternative was to compare each specific environmental measure implemented at a particular stadium with the consumption of resources that would have occurred without this measure. For instance, how much electricity was saved through the use of energy-saving lights? Or, by how much would energy consumption be reduced with a heat recovery system?

The waste, water and energy balances for the World Cup covered the entire period during which the stadiums were in the hands of World Cup organizers, commencing two weeks before the first game until shortly after the final game in the respective stadium. It has to be borne in mind that a Bundesliga game is not comparable with a World Cup game. A simple stadium metamorphoses for a few weeks into a small "World Cup city", with additional temporary facilities, such as a media centre, sponsor tents, areas where volunteers are in action and also technical facilities for television broadcasting. At the same time, the balances generally related to those areas for which the OC was responsible; that is, to the stadium and its immediate environs within the external security ring.

Actual quantities of waste, or water consumption, provided the basis for examination of Green Goal objectives. Quantities or consumption that would have arisen without the particular measure for environmental and resource protection provided the required reference values. The difference represented the achieved savings. It was not a question of every single stadium achieving the environmental objectives set by Green Goal, but rather that pre-determined savings be jointly achieved through the activities of the twelve stadiums as a whole.

Whereas for waste, objectives related to quantities collected during the World Cup, annual consumption in 2005 provided the reference values for energy and water. The reason for this was that the technical infrastructure of stadiums was used for energy supply during the World Cup. Since Green Goal should contribute to a long-term reduction in demand for energy, energy objectives and measures were primarily directed not at the short period of the World Cup, but rather at the normal Bundesliga operations of stadiums. Only in this way could it be ensured that savings measures in the area of heating energy were taken into consideration. The demand for heat during the World Cup was of little significance.

The same applies to water. Water consumption of a stadium is subject to considerable fluctuation during the course of a year. The playing field has naturally to be watered more often in the summer, and savings through the use of rainwater are then greatest. The World Cup took place in the middle of the summer. Had the Green Goal objective with regard to savings of potable water related solely to the very hot World Cup period, the use of rainwater would have been disproportionately weighted. Consideration of a twelve-month period was more useful, also in comparison with Bundesliga operations. Only by means of an annual average could an objective picture of savings be achieved. The balance of measures in the water area was therefore also related to annual consumption in 2005.

Water savings relating to consumption figures for the period of the World Cup were calculated on the basis of savings during annual Bundesliga operations. For the calculation of waste flows, or of energy and water consumption figures, recourse could be made to World Cup or Bundesliga data. A complete record of World Cup transport flows, on the other hand, was not available. Only in isolated cases was transport data (for example, from counting or spectator surveys)

recorded. Since transport data for the Bundesliga was not applicable to the World Cup, total World Cup transport figures were determined by means of a "scenario approach". On the basis of available data (for example, data on average length of journeys and on the use of varied means of transport), calculation of total transport provided was differentiated according to visitor group and means of transport. Since this approach took account of Green Goal measures implemented during the World Cup, the effects that would have occurred in the absence of such measures (for example, the lack of a "KombiTicket offering free travel on public transport) were calculated in a second scenario. The difference between the two scenarios reflected the effect of Green Goal measures.

In preparation for the World Cup, the twelve participating stadiums were renovated, modernized, extended or even newly constructed, some at an early stage, others later. The key question for Green Goal was: Which of the numerous constructional measures, installations and activities would be taken into account for the achievement of environmental objectives? To start with, measures were credited that were specifically influenced by Green Goal advice, as were activities for which Green Goal provided the framework or created the relevant environment. However, "older" measures for environmental and resource protection, which had been realized in 2001 with a view to the forthcoming World Cup, also flowed into calculations. Green Goal sees itself not only as a concept comprising original Green Goal measures, but also as a platform for the presentation of showpiece projects and environmental protection in stadiums rebuilt or newly constructed in previous years.

Standards common to all stadiums, however, were not taken into account. The same applied to measures that had been realized much earlier and had not been carried out within the framework of modernization for the World Cup.

3.2 Campaigns and communications

The 2006 FIFA World Cup was a huge event. More than three million spectators were expected in the stadiums, many times that number watched the games on television screens. This provided a great opportunity to sensitize the public at large, and football fans in particular, for the environment and climate protection. For this, two paths were chosen. On the one hand, reporting on Green Goal drew attention to the problem. On the other hand, projects and campaigns were initiated, which spread the Green Goal idea beyond the small group of World Cup participants to broad sections of the public.

Green Goal was an integral part of communications on the World Cup. An important communications channel was the Internet. The Green Goal Website http://greengoal.fifaworldcup.yahoo.net became the central medium for informing the public about current developments, objectives, background matters and Green Goal personalities. At the same time, the organization of press conferences was an essential factor with regard to television, radio and the press. Cooperation with the United Nations Environment Programme (UNEP), and the role of former UNEP Executive Director Professor Klaus Töpfer as Green Goal Ambassador, were important steps that attracted a lot of attention, particularly abroad.

Dr. Theo Zwanziger hands over the BahnCard 100 for the German team to Team Manager Oliver Bierhoff.

A project was initiated together with the Federal Environment Ministry on the topic of nature conservation and environment protection in German football clubs. Green Goal working groups were proposed in host cities in the period leading up to the World Cup, which should develop municipal environmental projects. Official Green Goal partners and suppliers that supported the realization of Green Goal objectives were involved in Green Goal communications, and they also made use of the programme in their own public relations and marketing activities.

A huge sporting event offers the opportunity to define sustainable environment protection as an element of modern planning. The integration of Green Goal into the planning and organization of the 2006 FIFA World Cup was an important step, not least for acquainting the football fraternity with ecological issues. Associated with this was the idea of providing the environment with a secure long-term foundation in national and international football. Using Green Goal as a model, the objective was to position the environment as an integral part of future World Cup and EURO Cup tournaments.

4 The realization of Green Goal

Realization of the environmental concept was a challenge for all participants. On the one hand, there was no experience from a World Cup tournament to fall back on. On the other hand, projects were initiated with ambitious, measurable environmental objectives and voluntary climate compensation mechanisms, which had never before been carried out during a large sporting event. The effects of individual environmental measures were also difficult to estimate before the World Cup. Furthermore, the scope for environmental protection was limited to a certain extent, since at the start of Green Goal a great deal of renovation and modernization of World Cup stadiums was already so advanced that far-reaching ecological improvements were difficult if not impossible.

In the following sections, Green Goal measures in the areas of water, waste, energy, transport and the climate are presented in detail and their contribution to the achievement of objectives analyzed. A reduction in adverse effects on the environment can also be achieved through the introduction of systematic environmental management in stadiums. Since this measure cannot be allocated to an individual field of action, however, the presentation begins with a description of successes achieved in environmental management.

Environmental management

Successful environmental protection is based not only on innovative technology, but also on intelligent management. Environmental management is therefore of particular importance for Green Goal. Under the "umbrella" of purposeful management the topics of water, waste and energy can be addressed, and this contributes substantially to environmentally beneficial operation of stadiums.
A number of World Cup stadiums implemented a formal management system. The stadiums in Nuremberg and Munich were the first in Europe to implement the standards of the European environmental management system EMAS (which, for example, obliges stadium operators to continuously improve environmental protection) and were officially certificated before the World Cup (in January and May 2006, respectively). EMAS foresees regular monitoring of whether self-determined objectives have actually been achieved. ÖKOPROFIT is a further environmental management system, which, in contrast to EMAS, does not envisage continuous further development of environmental protection. ÖKOPROFIT was implemented in Hamburg and Gelsenkirchen following the opening of new stadiums. In Dortmund and Kaiserslautern ÖKOPROFIT is currently being carried out.

The Arena in Munich has integrated environmental protection into everyday operations. It was certificated according to the European environmental management system EMAS. Bavarian Environment Minister Werner Schnappauf (centre) and Karl-Heinz Rummenigge, President of FC Bayern Munich by the presentation of the certificate.

Football stadiums have heavy operating costs. It can therefore be assumed that even without a formal environmental management system a great deal of care is taken to ensure an economical use of resources in the operation of stadiums. It has been shown, however, that environmental awareness varies widely so far as an efficient use of resources is concerned. In this respect, the stadium in Stuttgart can certainly be regarded as a good model. In co-operation with the city's environment office and energy department, discussions are held to determine how savings potentials can be identified and exploited. Energy and water consumption are continuously monitored by an automated system, and certain measures – for example, the construction of rainwater cisterns – are financed by means of city contracting.

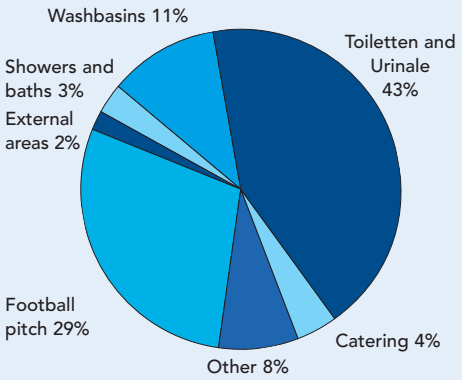
Environmental management has an important role to play, since through improved management continuous optimization of operations can be achieved. On the other hand, depending on the state of planning and existing conditions, further constructional measures can only be realized at considerable additional cost. The example of the Munich Arena highlights the savings that can be achieved through optimized management. Since the Arena was opened, daily demand for electricity has been more or less halved.

In stadiums that came into regular operation shortly before the World Cup additional savings potentials will only be exploited in future everyday operations. This applies in particular to the Olympia Stadium in Berlin, where an energy check was carried out together with an external consultant and clear savings potentials identified, which should be exploited through optimized energy management in the future. The stadium operators in Frankfurt are also being advised on energy optimization by an external consultant. In this case, too, a considerable reduction in the annual demand for energy is to be expected.

4.1 Water

Analysis of World Cup stadiums during Bundesliga operations has shown that water is required for different areas of application and in the most varied quantities. Sanitary facilities – that is, toilets and urinals, washbasins, showers and baths – are the largest consumer of water. In addition, a lot of water is required for watering pitches. Other major areas of consumption are catering and stadium cleaning. Depending on the location and surroundings of the stadium, the watering of green areas or training grounds can also play an important role.

Construction of rainwater cisterns at Nuremberg stadium.



Proportional water consumption in selected World Cup stadiums (Bundesliga operations).

Good Practice

Berlin counts on rain

Experts regard water management in Berlin's Olympia Stadium as an excellent example of rainwater management in modern stadiums. The heart of the system is an underground cistern, which can hold 1,730 cubic metres of rain – enough, in theory, to water the pitch ten times. With a diameter of 21 metres and a height of 11 metres it is the largest cistern in use in European football and one of the most powerful in Germany. The concrete container, which is accessible, has a utilizable storage volume of about 1,400 cubic metres.
Around half of the rain that falls onto the 42,000-square-metre stadium roof is collected in the cistern. Three pumps with an output of around 90,000 litres per hour convey filtered rainwater from the cistern to the sprinkling system. This way, the pitch and especially the green areas around the stadium are watered.
The stadium operator can reduce its water costs, saving, according to initial estimates, around 15,000 cubic metres of potable water each year.

Interior view of the rainwater cistern at the Olympia Stadium in Berlin.

The annual water requirements of a stadium are determined by a series of factors. The number of sporting fixtures and events as well as the number of spectators has a decisive influence. Water requirements for cleaning stadiums, for instance, depend on the number of events, which, together with the type of events, also determine the annual number of spectators. Water requirements for toilets, urinals and washbasins are essentially determined by the number of spectators, with the time they spend in the stadium and their consumer behaviour playing a role. Local rainfall is an important factor with regard to the watering of pitches and external areas. Technical facilities and fittings also influence stadium requirements for potable water. Water management during operations also has a direct effect on consumption. The typical annual water consumption of World Cup stadiums is 10,000 to 20,000 cubic metres.

The great variety of stadiums and the above-mentioned influences result in large fluctuations in consumption volumes. In order to reduce potable-water consumption, one relied during the World Cup on existing infrastructure. For the short period of stadium rental for the World Cup additional measures in stadiums were neither sensible nor necessary. In the case of temporary facilities, such as media tents, sanitary facilities were rented as required.

4.1.1 Action on water

There are many ways of saving water and reducing consumption. Appreciable effects can be achieved with simple and relatively inexpensive techniques. The measures that were implemented in the stadiums are discussed below.

Saving potable water

■ Use of rainwater

The watering of pitches is a major water consumer. The use of free rainwater instead of expensively treated potable water was an obvious solution. In the World Cup stadiums in Berlin, Frankfurt, Nuremberg and Stuttgart appropriate action was taken.

During modernization of the stadium in Nuremberg three underground concrete cisterns with a capacity of just under 1,000 cubic metres were built behind the stands. The cisterns collect water from 17,000 square metres of sporting areas, from the around 12.000-square-meter stadium roof as well as from paths and open spaces. The football pitch and two nearby training grounds as well the VIP car park and the lawns of the neighbouring outdoor swimming pool can be watered from the cisterns.

In the Stuttgart stadium, too, a rainwater-retention tank was built during the course of modernization. It has a storage capacity of 350 cubic metres and collects rainwater from the approximately 14,000-square-metre roof. This rainwater is used to water the pitch and can also be used throughout the year, provided there is enough rainfall, for toilet cisterns and cleaning purposes. Rainwater is also collected from the stadium roof in Frankfurt, about half of which is fed into two retention tanks, which have a utilizable storage capacity of around 200 cubic metres. With this water the pitch is watered and toilets flushed.

The stadium in Hanover is in the immediate vicinity of the rivers Ihme and Leine and the Maschsee lake. The football pitch and two training pitches are watered not with potable water, but with surface water. The same applies to the Hamburg stadium, where the stadium pitch and two additional pitches are watered from renovated wells whose water is not drinkable.
Only half of all World Cup stadiums water their pitches with potable water.

Sanitary facilities

No-flush urinals are a sanitary technique that is not yet common in sports management, although the new system can considerably reduce water consumption. Flushed urinals require for complete flushing between 1.5 and 3 litres of water. Dry urinals were installed, however, in the four World Cup stadiums in Hanover, Kaiserslautern, Nuremberg and Stuttgart. Odours are eliminated through the use of special surface materials, siphons and diaphragms.
Potential savings were also exploited in toilets. 6-litre flushing is common in stadiums. In Gelsenkirchen, however, toilets with a 4.5-litre flush were installed, in Berlin there are 3-litre cisterns, and in Dortmund 10-litre cisterns were replaced with 5-litre cisterns. Toilet cisterns with automatic shut-off are standard in almost all stadiums.

Washbasin taps

Washbasins in all stadiums are mostly equipped with taps that limit and automatically stop the flow of water. Not only self-closing taps but also opto-electronic fittings are used. Up to 50% of water can be saved compared to single-lever mixers or two-grip taps. The example of the flow regulator, which can be screwed onto washbasin taps, shows that water-saving technology need not be expensive and quickly pays for itself. Water flow is reduced to 3 to 4 litres per minute through the use of flow regulators, and half the water normally used can therefore be saved.

Baths with a volume of about 10 cubic metres are at the disposal of players after matches. Depending on their operation, these baths have to be refilled after each match. In Frankfurt, one decided on another approach and installed individual baths, which require less water per bath and only have to be filled when required.

Water management

Technology alone does not lead to achievement of the objective. Successful water management includes regular control and the maintenance of all fittings and facilities. Improved management contributed to water savings in all stadiums. These savings are difficult to substantiate, however, since comparable consumption figures measured over long periods are not available. Optimized control of urinals flushed at regular pre-set intervals makes an important contribution to water management. In the case of games with few spectators, certain sanitary areas can be closed. In Stuttgart stadium, water consumption is continuously controlled and recorded by means of a computer-aided system. This way, damage can be quickly detected and remedied, and not only follow-up costs but also potable-water losses can be reduced.

Rainwater infiltration and desealing

Where rainwater can seep into the ground, groundwater is replenished, a natural water cycle encouraged and sewage systems relieved.

Sanitary facilities are the largest consumer of water in football stadiums.

Good Practice
Frankfurt infiltrates rainwater

Infiltration system at Frankfurt stadium.

Frankfurt has the largest underground system for the infiltration of rainwater of all stadiums, which can collect and store rainwater from roof surfaces. Rainwater is partly used directly in the stadium, but the largest part is fed into a total of four infiltration systems, which consist of 9,000 hollowed-out plastic blocks with a total capacity of 1,715 cubic metres. Surplus rainwater is temporarily stored in these plastic blocks and then slowly seeps into the ground without saturation or flooding. Infiltration blocks are connected with a cistern, and surplus water flows into the underground storage system when a cistern is full. In addition, rain seeps away through synclines as well as on areas and car parks paved with water-permeable materials.

Many stadium car parks are paved with water-permeable materials. In Cologne, lattice mats made of recycling plastic were employed.

In order to limit sealed areas as much as possible, grassed gravel and concrete paving was employed, which lets water seep away..

The technical heart of the infiltration system is hollowed-out plastic blocks, which store and slowly release water. Such a system was installed in stadiums in Frankfurt and Berlin. Infiltration functions differently in the Munich stadium, where rain from roofs and paths flows into underground concrete settling tanks. From here, rain infiltrates through a system of plastic pipes into the ground. In Gelsenkirchen, Nuremberg, Dortmund und Hamburg, rainwater that does not directly infiltrate through water-permeable surfaces is diverted into nearby ponds and streams and thus into groundwater.

The design of free spaces and paths contributes to rainwater infiltration. The use of water-permeable materials is standard, at least on newly-built car parks, and was carried out at the World Cup stadiums, even if to a varying extent so far as types of materials and spaces were concerned. In Cologne, for instance, car parks are surfaced with honeycomb-structured plastic lattice mats, which are filled with sand and earth and planted with grass. In Nuremberg, around 15,000 square metres of new car parks were surfaced with permeable grassed gravel and concrete paving.

Surfaces are generally sealed during the course of construction work. But not in Leipzig! During construction of the new stadium and the scaling-down of the central stadium importance was attached to desealing. The old stadium was built on a huge mound comprising reclaimed building waste, part of which functioned as spectator terracing. The "rampart" was integrated into the new smaller stadium, with steps and paths being removed and desealed areas renaturalized. On the initiative of a municipal Green Goal working group in Dortmund, asphalt surfaces were removed from the area around the stadium, which was thus desealed.

■ Roof greening

The greening of roof surfaces can also be part of modern rainwater management. Greened roofs retain rainwater, and evaporation improves the microclimate. For example, the approximately 70,000-square-metre esplanade over the multi-storey car park of the Arena in Munich was landscaped, and kiosks and workshops in Nuremberg as well as roof surfaces and stadium buildings in Stuttgart were greened.

Trees also play an important role in the natural water cycle; they store and purify water and ensure that the water table does not sink too much. During the rebuilding of the Nuremberg stadium 20 lime trees were uprooted with special machinery and temporarily replanted 300 metres away. Today, the 15-year-old trees stand once again adjacent to the stadium, providing shadow, small green oases and, above all, natural water storage.

During the rebuilding of the Nuremberg stadium 20 old lime trees were saved. The trees were uprooted with special machinery and later replanted adjacent to the stadium following completion of building work.

Summary of action on water

Action	Description	Realization
Cisterns	Use of rain-, well- and surface water in sprinkling systems and sanitary facilities	Six stadiums: B, F, HH, H, N, S
Dry urinals	No-flush urinal systems and urinals using little water	Five stadiums: H, KL N, S and B
Water-saving toilets	Modern 4.5 litre toilets, or toilets with reduced flushing	Three stadiums: B, GE, DO
Flow regulators	Device on washbasin taps to reduce water consumption	Four stadiums: B, HH, LE, S
Baths	Single baths instead of large baths	One stadium: F
Infiltration trenches	System for the infiltration of rainwater from sealed surfaces	Three stadiums: B, F, M
Desealing	Desealing surfaces during stadium construction	Two stadiums: DO, LE
Diverting rainwater	Rain is diverted into ponds or other surface waters	Four stadiums: DO, GE, HH, N
Green roofs	Greened roofs for the retention of rainwater	Three stadiums: M, N, S
Water-permeable surfaces	Use of water-permeable materials at car parks and on other new spaces	To a varying extent at all stadiums

Berlin (B), Dortmund (DO), Frankfurt (F), Gelsenkirchen (GE), Hamburg (HH), Hanover (H), Kaiserslautern (KL), Cologne (C), Leipzig (LE), Munich (M), Nuremberg (N), Stuttgart (S)

Savings of potable water: a summary of results

Savings as a whole amounted to an annual reduction in potable-water consumption of approximately 42,400 cubic metres. Without the implemented savings measures the twelve World Cup stadiums would have consumed a calculated 233,000 cubic metres of potable water instead of 191,000 cubic metres, which represents a saving of around 18%. Savings from improved water management were achieved in a number of stadiums, but they are difficult to determine quantitatively and are therefore not included in the balance. Potable water was further saved through the use of cisterns, but these are not directly attributable to stadium operations and were likewise disregarded.

On the whole, taking account of additional savings through improved water management, the objective of saving potable water was largely achieved. If one applies achieved savings to the period of the 64 World Cup matches, then without the measures taken around 63,000 cubic metres of potable water would have been consumed instead of 51.000 cubic metres. Comparison of annual savings with World Cup requirements further shows that additional consumption brought about by the World Cup will be offset by reduced consumption in Bundesliga operations in the coming two years. From 2008, the implemented savings measures will reduce potable-water consumption on a lasting basis in the World Cup stadiums.

4.1.2 Results for water

Approximately 51,000 cubic metres of potable water were consumed in stadiums and temporary facilities during the course of the World Cup. Average consumption per game was therefore just under 800 cubic metres.
In reference year 2005, by contrast, the stadiums consumed a total of about 191,000 cubic metres of potable water in the course of Bundesliga operations. That is equivalent to about 16,000 cubic metres per stadium and 570 cubic metres per Bundesliga game.

Water consumption during the World Cup was much higher than at normal Bundesliga games for the following reasons:

- Much more water was required for the watering of pitches due to the high summer temperatures.
- Greater numbers of spectators (despite lower capacities compared to the Bundesliga there were more spectators since the stadiums were sold out).
- Additional catering (kitchens for media, volunteer and hospitality facilities, as well as longer periods spent in stadiums)
- Additional groups of people (for example, media, volunteers and additional personnel).

A balance of objectives in the water area, related to total consumption of the stadiums in reference year 2005 (as explained in Section 3.1.6), is provided below. Following that, savings are applied to the period of the World Cup.

Assessment of results
Results and contributions of individual measures for the most important objective for water – the saving of potable water – are discussed below.
In order to protect resources of potable water, water consumption of the stadiums will be reduced by 20%.
Measures in four areas were considered for the calculation of savings of potable water: use of rainwater, dry urinals, water-saving toilets and water-flow regulators. Other activities were not considered in the balance, either because their effects were difficult to substantiate and quantify, or because, although the measure contributed to savings, it remained unclear whether they surpassed the general standard.

- Use of rainwater

In the six World Cup stadiums that replaced potable water with rain-, well- and surface water, a total of about 31,000 cubic metres of potable water could be saved annually.
Since the four cisterns only came into operation in 2005, annual figures on rainwater consumption were not available. Savings of potable water had therefore to be deduced from initial operational figures or from planning data on the basis of cistern capacities and rainfall data. Where not only the stadium pitch and training grounds but also additional green spaces were watered, savings of potable water were considered proportionately, to the same extent that water was used in other World Cup stadiums for the watering of green spaces and other external spaces.

Sanitary facilities

Through the use of dry and economical urinals in a total of five World Cup stadiums some 4,780 cubic metres of potable water were saved. Savings achieved by older dry urinals, which existed before stadium reconstruction, were not considered. Economical flushing of toilets saved an additional 4,670 cubic metres of potable water. The effects of cisterns with a shut-off function were not considered, since these are very difficult to calculate. The percentage savings effect of water-flow regulators on washbasin taps was measured in two stadiums; for the others an estimate was made. The water-flow regulator in a total of four stadiums saved about 1,600 cubic metres of potable water.

Besides the main objective of savings in potable-water consumption, Green Goal set three further objectives with respect to the use of rainwater, limitation of land sealing and a reduction in wastewater and groundwater contamination.

Use of rainwater: 20% of remaining water requirements of the stadiums will be covered by rain-, well- and surface water.

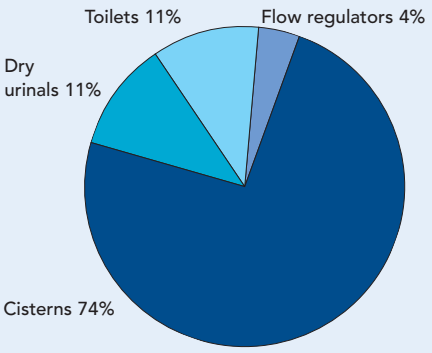
Six of the twelve World Cup stadiums used rain-, well- and surface water for sprinkling pitches and external areas, for flushing toilets and for cleaning purposes. Related to annual requirements of potable water of the twelve stadiums amounting to about 191,000 cubic metres, and an additional quantity from cisterns, wells and surface waters, the 31,000 cubic metres of rain-, well- and surface water represent a share of approximately 14%. A further 10,000 cubic metres of potable water were saved through the use of cisterns. These were used for the watering of green spaces not directly associated with the operation of stadiums, and can therefore not be counted as savings. The 20% rainwater share and thus the objective for rainwater use were not met.
In Dortmund stadium, the possibilities of using rainwater are presently being examined. Had the planned cistern been constructed the objective would probably have been met.

Sealing: To counteract the effect of land sealing and to encourage near-natural rainwater management, water-permeable materials will be used for newly created areas, open spaces and paths.

There was a broad range of measures to counteract land sealing. Car parks, open spaces and paths were paved with water-permeable materials. At two venues, open spaces were purposefully desealed. Rainwater at the majority of venues either infiltrates directly, or it is diverted into surface waters; and roofs were partly greened. Whereas in the case of older stadiums the immediate surroundings are often completely sealed, Green Goal measures made a contribution to modern rainwater management. On the whole, the objective is therefore regarded as achieved.

Reduction of waste and groundwater contamination: To avoid waste- and groundwater contamination, environment-friendly agents will be used as far as possible for stadium cleaning and the tending of pitches. Furthermore, the quantity of wastewater will be reduced to the greatest extent possible.

In the sanitary area, quantities of wastewater could be significantly reduced; furthermore, sewage systems were relieved through extensive infiltration and diversion of rainwater. It turned out, however, that the use of environment-friendly agents for the tending of pitches and for stadium cleaning was not put into practice. The objective was therefore not achieved.



Proportional savings of potable water in World Cup stadiums depending on individual measures.

4.2 Waste

Waste in World Cup stadiums resulted primarily from the provision of catering services for spectators and through the production and supply of the relevant products. Transport and packaging materials as well as bottles and leftover food accumulated in kiosks, cafeterias and restaurants; in spectator areas there were mainly wrappings, serviettes and leftover food. Waste also arose through the supply and sales of merchandise and in the media centres.

Significant waste, according to fraction and origin:

- Plastics, light packaging material (for example from catering and merchandising).
- Paper, cardboard packaging materials (delivery of drinks, food and fan items).
- Glass (wine bottles from catering in hospitality areas).
- Biowaste (leftover food from hospitality areas)
- Residual refuse (for example, serviettes and refuse from waste bins and stadium cleaning).

The hospitality area comprises spectators in boxes and VIP areas as well as guests of honour, sponsors and other spectators with special tickets.
Two further fractions are cut grass and green waste as well as fat used in the preparation of food. Viewed over a football season as a whole, considerable quantities of waste products arise.

Since they are unavoidable and are disposed of through established recycling processes in normal stadium operations, these fractions were not considered in detail within the Green Goal framework. Batteries, medicaments, waste metal and other waste from the operation of stadiums were separately collected but not further considered.

Voluntary helpers wear T-shirts in Frankfurt stadium with symbols for separate waste collection.

Temporary buildings, including their equipment for the World Cup, were a separate area. Additional premises were necessary at each location for hospitality, the media presence and volunteers as well as accreditation centres. In addition, there was the International Broadcasting Centre (IBC), which was set up in the exhibition halls of the New Munich Trade Fair Centre. Waste from temporary facilities mainly comprised building materials, equipment as well as decorative and packaging material. Since this area concerned only the World Cup, comparative data was not available and the balance drawn was solely of a qualitative nature.

4.2.1 Action on waste

Realization of the waste concept was mainly achieved through the organization of the catering area. The Organizing Committee (OC) developed together with Coca Cola and Anheuser Busch – the official partners with respect to drinks – an identical system of measures for all twelve stadiums. The OC also recommended separate collection of waste in the stadiums.

The OC informed football fans about returnable beakers in stadiums.

Good Practice

Football première for the returnable beaker

Within the framework of Green Goal, and for the first time at a World Cup tournament, returnable beakers were used for the sale of drinks. Neither at a World Cup tournament nor at the Olympic Games had such a multiple-use system been previously operated. The World Cup in Germany thus played a pioneering role. The use of returnable beakers was the most important measure in the area of waste within the framework of Green Goal. As a result, a decisive contribution was made to a low-waste World Cup, reduced litter and clean stadiums. The returnable beaker was therefore a symbol for waste avoidance and for a successful overall waste and environment management concept.

The returnable beaker was made of polypropylene, and they were printed by the official FIFA partners, Coca Cola (0.5-litre beaker for non-alcoholic drinks) and Anheuser Busch (0.4- litre beaker for beer). German beer from the Bitburger brewery (not an official FIFA partner) was sold in unprinted 0.4-litre beakers. A deposit of 1 euro per beaker had to be paid for drinks in spectator areas. The customer was repaid the deposit on returning the beaker to the kiosk or to special collection points. After use, the beakers were washed in a special unit and then used again at subsequent matches. The logistics (manufacture of the beakers, supplying stadiums, distribution and washing of used beakers, including the required transportation, were carried out by a company employed for this purpose.
With regard to waste avoidance, the use of returnable beakers was a matter of top priority for the cities involved. On the initiative of Green Goal, in nine of the twelve host cities returnable beakers were used at officially organized open-air events. In Dortmund, for example, the municipal Green Goal working group ensured that returnable beakers were used at all official events. Only three cities - including however Berlin, with its large and numerous events, Leipzig and Nuremberg - used non-returnable beakers. In some cities there were not only public-viewing events for football fans but also so-called "fan miles" (routes to the stadiums for example), where returnable beakers were also partly used.

Waste avoidance

- Multiple-use systems

In spectator areas, non-alcoholic drinks were almost exclusively poured from 0.5-litre PET returnable bottles into returnable beakers. Only two of the drinks on offer (with a share of only about 5%) were supplied in 0.5-litre non-returnable bottles. Around 70% of beer was supplied in barrels (returnable) and about 30% in non-returnable bottles. In hospitality areas, lemonade and water were served in returnable glass bottles and beer in non-returnable glass bottles.

Drinks were served in PET returnable bottles to the media and volunteers as well as in accreditation areas, where the pouring of drinks into beakers on the grounds of security was not necessary. In hospitality facilities, drinks were served in bottles and glasses, and food on china with metal cutlery. In the respective cafeterias, media representatives and volunteers were served food mostly on china with metal cutlery. Non-returnable plates and cutlery were used by volunteers in Berlin, Frankfurt and Cologne as well as by the media in Gelsenkirchen and Kaiserslautern, and to a lesser extent in Dortmund.

A multiple-use system was also introduced for the delivery, storage and sale of bread rolls and pretzels. Plastic containers were used for transport packaging instead of cardboard materials.

The paperless office – in media centres it was a reality. Journalists received all information electronically. Very little information was available on paper; and this was not distributed, but available when needed.

■ "Put it in a roll"
Fried or grilled sausages, frankfurters, veal or pork schnitzels and beefburgers were also the classic food for football fans at the World Cup. They were all sold in bread rolls - with a serviette but without an additional cardboard plate. Kiosks thus made an important contribution to waste avoidance and cleanliness - also through the provision of mustard and tomato ketchup in dispensers instead of in single portions.

■ Dispensing with flyers
The distribution of flyers and give-aways by sponsors and companies often adds considerably to litter in stadiums. At the World Cup, partners had the use of a so-called "commercial display area", where advertising stands could be set up. Few partners distributed flyers or similar products, and with those that did, the quantity was very limited. Even the stands were designed for reuse (for example, mobile stands mounted on lorries).

■ Paperless media
The World Cup organizers offered representatives of the media the use of an electronic "Media Channel", where all information could be accessed by computer at workstations. Very little information was made available on paper, which was not physically distributed but displayed for individual needs.

■ Temporary facilities
Additional tents were required for the media, volunteers and guests in hospitality areas at World Cup venues. For the International Broadcasting Centre (IBC) in Munich a complete "media village" had to be erected in the exhibition halls of the New Trade Fair Centre. In addition, facilities for accreditation, the media and volunteers had to be provided at all venues, and the same applied to studios and media stands.

In erecting these temporary facilities, attention was paid to subsequent dismantling and reuse, and a contribution thereby made to waste avoidance. High-quality products and systems were made use of, which could later be simply dismantled and reused.

An example of this were so-called "presenter studios" in the stadiums – a total of 48 lightly constructed studios with integrated glass fronts. Their substructure was built as a frame, and the studios themselves erected as a superstructure in a modular system. Individual elements were suitable for reuse, which would not have been possible in the case of traditional studios. For example, walls and roofs comprised sandwich elements from container construction, which could be reused after the World Cup.

The builders were also generally instructed to take away packaging and other materials, as a result of which the quantity of waste in stadiums was also reduced.

Wherever possible, temporary facilities, building elements, materials and equipment were either rented or else sold, auctioned, given away or stored for future use. For example, tents and furniture, technical devices such as notebooks and printers, but also catering and kitchen equipment, floor coverings as well as platforms for photographers at the side of football pitches were all rented.
The period directly following the World Cup brought benefits for numerous social organizations, which received the proceeds from the auctioning and sale of a multitude of TV equipment, including counters, desks, benches, lamps, table-

With temporary facilities, such as presenter studios in stadiums, care was taken to ensure the possibility of dismantling and re-use. The studios were lightly constructed in a modular form.

football games, flags, decorative material and plants. The municipal Green Goal working group in Dortmund converted the banner that stretched along the long "fan mile" to the stadium into 100 top-quality bags, which were then sold and the proceeds donated to charitable organizations.

Some of the media stands were donated to stadiums for their league fixtures. In Berlin, the complete media stand will be used in future for a range of events. Under the motto, "rent, sell, donate", a great contribution was made to waste avoidance; and at the same time it was ensured that at the end of the World Cup only a comparatively small quantity of waste would be left behind from temporary buildings. A quantitative record of the amount of waste and avoided waste was not possible in this area. Temporary buildings were therefore successfully addressed, but are not reflected quantitatively in the waste balance.

Separate waste collection

Waste was separately collected to enable as high a recycling quality as possible. At the same time, waste separation played an important role in increasing the environmental awareness of spectators.

With separate collection in and directly around stadiums (within the external security ring) a distinction has generally to be made between areas accessible to spectators and the backstage area (caterers, retail outlets, offices). The collection of the four waste fractions glass, paper, (plastic) packaging material and residual refuse was planned in spectator areas. Waste-collection islands for the different fractions were placed at regular intervals and at central points.

Good Practice

Media centre built on ecology

During the World Cup, the IBC was the central "powerhouse" for television broadcasting to a billion people. In the International Broadcasting Centre, occupying an area of 30,000 m^2 in the New Munich Trade Fair Centre, thousands of journalists, cameramen and technicians did everything to ensure that millions of fans around the world could watch the matches on their television screens.
The Television Centre was built using recycling-friendly construction methods with regenerative raw materials. Ceiling beams were made of solid wood, and walls of glued, multi-layered coniferous wood. A total of 966 tonnes of wood – 40 lorry-loads – were used to build the Television Centre. At the end of the World Cup, the greater part of the material was not waste but recyclable material. The wooden elements of the studios will be used in the construction of 60 houses. Moreover, the IBC left behind no cable waste, which is difficult to dispose of; the required 12 kilometres of cable were only rented, and can be used again at other events.

4.2 Action on Waste

Separate collection began at some stadiums already at entrance controls.

Waste-collection islands in stadiums separated waste into four fractions: paper, packaging materials, glass and residual refuse

Security control took place at entrances to the external security ring. These guaranteed that no external waste got into the stadium and its immediate area. Waste glass was therefore found in spectator areas only at entry control points. In the stadium itself (access to the stands) no separate collection was intended, since here relevant quantities were not to be expected. Furthermore, waste separation in this area would have functioned to only a limited extent.

In the backstage area, waste primarily comprised cardboard packaging material and large quantities of glass from catering in the hospitality area. Besides the four fractions, biowaste, in particular, had to be considered in the hospitality area. In the backstage area separate collection generally played a more important role, since here, on the one hand, more recyclable material was found, and on the other hand, by providing employees with specific instructions the quality of separation could be ensured.

Special Green Goal symbols for separate collection were designed for the four important fractions glass, paper (paper, cardboard packaging materials), recycling (plastics and other packaging materials) and residual refuse. In addition, notice boards in the stadiums drew attention to the separate collection of waste and to deposits on beakers. The stadiums were urgently requested by the OC to ensure that separate collection took place, but there were no binding guidelines

Green Goal symbols for glass, paper, recycling and residual refuse

Car parks, roads to the stadiums, places of public viewing and the "fan miles" were the responsibility of the respective municipalities, and were therefore not part of the Green Goal concept. In the period leading up to the World Cup, however, the host cities were informed about the waste concept and encouraged to put it into effect within their fields of responsibility – not least to bring about uniform waste separation not only in the stadiums but also in the cities.

Varied importance was attached to the subject of waste in the Host cities. Dortmund and Hanover, for instance, acted exemplarily. Both cities placed waste-collection islands with Green Goal symbols for separate collection along the "green mile" from the respective station to the stadiums as well as at open-air public-viewing events. In Dortmund, municipal dustcarts also carried the Green Goal logo. In Kaiserslautern, there were waste-collection islands at open-air events parties and along the "fan mile" with symbols designed by the city council and the Green Goal logo.

Catering personnel in all stadiums were informed about waste avoidance and separation. In each of the twelve host cities 300 trained volunteers were also employed to answer questions about Green Goal objectives and programmes and, in particular, about the waste concept. Employees in spectator areas did this very graphically by wearing Green Goal T-shirts, which drew attention to the separate collection of waste.

Summary of action on waste

Action	Description	Realization
Returnable beakers	Deposit on plastic beakers	OC (all stadiums)
Multi-use systems for the supply of drinks	Returnable PET bottles for nearly all non-alcoholic drinks; for the most part beer in barrels	Partners: Coca Cola, Anheuser Busch (all stadiums)
Multi-use transportation system	Plastic baskets as multi-use system for the transportation of bread and pretzels	Caterers (all stadiums)
"Put it in a roll"	Grilled sausages, schnitzels etc. are sold in a bread roll without a cardboard plate; large dispensers for mustard and ketchup	Caterers (all stadiums)
Returnable plates	In media and volunteer centres, meals are provided on returnable crockery.	OC / caterers (most stadiums)
Dispensing with flyers	Flyers and give-aways are distributed by sponsors only in limited quantities	OC / partners (all stadiums)
Paperless office	Electronic "Media Channel" in the media centres	OC (all stadiums)
Temporary facilities	"Rent, sell, donate" – for the further use of temporary facilities	OC (all stadiums/IBC)
Separate waste collection	Separately-collected waste fractions in backstage and spectator areas	OC / caterer (caterers all stadiums, otherwise not generally)
Instruction on the waste concept	Catering employees and volunteers are instructed on waste management	OC / caterers (all stadiums)

4.2.2 Results for waste

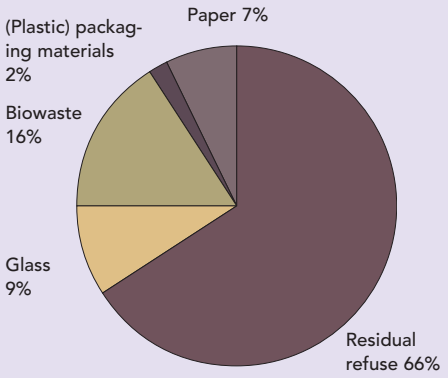
The initial impression during the World Cup confirmed that for football matches, and for such a huge sporting event, the stadiums were extremely clean, with comparatively little litter. Returnable plastic beakers, food with very little packing, the limited quantity of flyers and give-aways as well as controls at the entrances were all having an effect.

The heart of the waste concept – the returnable beaker – proved to be particularly successful. Fears that a multi-use system would result in a lower turnover in drinks, that foreign guests would not cope with a deposit system or that long queues would form for refunds could be refuted. Litter in the stadiums was also negligible. Plastic beakers that had been left on the terraces after matches were collected by visitors or helpers and returned. Beaker losses could therefore be ignored.

The printed beakers also became a popular and cheap souvenir for many football fans. With every third or fourth sale of a drink the beaker was retained. A thoroughly desirable effect was that, on the one hand, deposit receipts helped to finance the system, and on the other hand, keeping beakers was also ecologically beneficial, since they would then be used at home.
Unprinted beakers will be used at other events. In the case of unused printed beakers, it is being examined whether they can be printed over and further used.

The four waste fractions glass, paper, recycling and residual refuse, as well as biowaste, were analyzed for the Green Goal waste balance. The result: During the four-week tournament a total of about 1,494 tonnes of waste were collected. Noticeable in this respect is that more than half of all waste arose solely in the

Most spectators returned beakers, or took them home as souvenirs. The terraces were impressively clean after matches at the 2006 FIFA World Cup.



Average share of separately collected waste fractions during the World Cup.

hospitality area, where there were comparatively few guests. 238 tonnes of separated biowaste were attributable to the hospitality area. This large quantity also resulted, however, from the fact that biowaste, in contrast to the other fractions, contains a very large share of water.

The large share of glass is primarily attributable to the large proportion of glass in hospitality areas. Bottles were collected separately and – similar to paper/cardboard/cardboard packaging, plastic packaging and biowaste – made available for high-grade recycling. Separate collection and recycling of biowaste is all the more important since classic measures aimed at a quantitative reduction are in this case ineffective.

Residual refuse collected for disposal, which amounted to 979 tonnes, is more relevant from an environmental point of view. An average of 15 tonnes of residual refuse was collected at each World Cup match. Comparison with Bundesliga operations shows that, as expected, much higher quantities arose. There were various reasons for this. On the one hand, a certain amount of waste from the erection and dismantling of temporary facilities found its way into residual refuse. Such waste does not occur during normal league games and can also not be quantified in the waste balance. Furthermore, the hospitality area, which was specifically designed for the World Cup, was responsible for a large part of residual refuse. Further reasons are:

- A larger number of spectators that remained longer and consumed more in stadiums.
- Additional areas and staff; for example, the media, volunteers and accreditation.
- Additional events in the stadiums (opening and closing ceremonies)
- An extensive supply of merchandise and promotional articles on offer.
- Augmented operations, not only on match days, on the part of the organizers.

Assessment of results

Measures for the avoidance of waste were a top priority in the Green Goal waste concept:
Measures will be taken for the greatest possible avoidance of waste not only in the stadiums, but also in the area around stadiums.

The extremely clean stadiums provided impressive proof of extensive waste avoidance. In addition, utilization of temporary facilities according to the motto, "rent, sell, donate" testifies to successful waste avoidance. Measures such as the electronic "Media Channel", which led to the "paperless office" in media areas, also contributed to the successful achievement of this objective.

The key objective of the waste concept, based on avoidance measures and the use of multi-use systems, was waste reduction: Packaging-free and multi-use systems will be used as far as possible in all areas to reduce quantities of waste. The quantity of waste in and around stadiums will be reduced by 20 %.

A total of about 4.4 million drinks were sold in spectator areas during the World Cup. Since returnable beakers were used, the disposal of the same number of plastic non-returnable beakers could be avoided. Based on the weight of a non-returnable beaker, a total of some 51 tonnes of plastic waste could thus be avoided. Related to the residual-refuse fraction in stadiums – excluding hospitality areas - dispensing with non-returnable beakers resulted in a reduction in refuse of

about 9%. A reduction in plastic waste is significant, since this not only saves crude oil but also avoids emissions in the manufacture of plastics.

Cardboard packaging was not used for the delivery of bread rolls and pretzels. With approximately 18,000 deliveries in multi-use containers, a total of about 18 tonnes of cardboard packaging was saved.

In media and volunteer centres about 160,000 meals were prepared, around 80 % of which were served on reusable crockery. Here, the use of china and cutlery replaced in each case a non-returnable set of knife, fork and plate, so that around 130,000 of these sets – that is, about 3.2 tonnes of plastic waste - were avoided. With sales of about 750,000 grilled sausages, schnitzels and similar items of food, the "put it in a roll" action resulted in the saving of about 5,3 tonnes of cardboard, which would otherwise have accumulated as residual refuse.

Partners dispensed with distribution of an estimated 900,000 flyers and giveaways, which are equivalent to about 9 tonnes of paper that would otherwise have been collected during cleaning and landed in residual refuse.

The serving of wines necessitated the use of non-returnable systems. While Coca Cola almost exclusively used returnable bottles (PET or glass bottles), Anheuser-Busch could only partly deliver beer in returnable barrels. Through the use of multi-use systems, a total of around 109 tonnes of PET non-returnable bottles and 86 tonnes of glass bottles could be dispensed with. In addition, 23 tonnes of cardboard packages were saved, in which bottles of beer would normally be delivered. The drinks system contributed considerably to total quantities of waste, but due to the large number of bottles also had a decisive influence on the reduction in the glass and plastics fraction.

Waste reduction: summary of results

The World Cup produced 1,494 tonnes of waste glass, paper and cardboard packaging as well as plastic and packaging waste, biowaste and residue refuse. Multi-use systems and waste reduction measures reduced the total quantity of waste by around 305 tonnes. Without these measures around 1,799 tonnes of waste would have accumulated. This is equivalent to a statistical reduction in waste of 17%. However, not only stadium waste is included in waste balances, but also waste from the erection and dismantling of temporary facilities, which was addressed separately. Had this special waste not been mixed with stadium waste, the percentage reduction in waste would have exceeded 17%. The waste reduction objective was therefore largely achieved.

The most important measure for waste avoidance – with particular regard to its exemplary character for Bundesliga games and other major sporting events – was the returnable beaker. The use of multi-use systems, bearing in mind the framework of the 2006 FIFA World Cup™, was achieved as far as possible. Classic multi-use systems for drinks had the greatest share of waste reduction.

Media representatives and voluntary helpers were served on returnable crockery - a contribution to waste avoidance.

Waste recycling was a further Green Goal objective:
Separate collection systems will be set up for biowaste, light packaging materials, paper, glass and residual refuse at each venue, in order that these types of waste can be completely separated and made available for high-grade recycling.

The separate collection of waste in the backstage area was carried out, on the whole, to a satisfactory extent. This applied in particular to the hospitality area, and is confirmed by the share of separately collected glass, paper and cardboard (including packaging) as well as biowaste. Residual refuse amounted to 66% of the total volume of waste. Waste glass – primarily from the hospitality area – made up about 9% of total waste, and biowaste approximately 16%. Both waste fractions were consistently collected separately in the hospitality areas of stadiums. Here, paper was also collected separately, but not plastics and packaging materials.

In other backstage areas it was mainly paper and cardboard (including packaging) that was separately collected. Plastics and other packaging materials were separately collected only in one-third of the stadiums. Apart from hospitality areas, in about half of the stadiums waste was not consistently collected separately backstage. And this applied particularly to plastics and packaging materials, which, on the whole, were separately collected to only an insignificant extent. Residual refuse from hospitality areas was refined by a waste-disposal company for the recovery of other recyclable materials. Residual refuse from other stadium areas was recycled in accordance with the respective waste concept of companies and municipalities.

An important lesson from the World Cup is that with consistent realization of waste avoidance measures in spectator areas in and around stadiums there is no need for separate collection. The World Cup also showed that separate collec-

tion is both sensible and necessary at the place where spectators arrive in the direct vicinity of stadiums, namely at admission controls at the external security ring.

As a result of high summer temperatures, most waste that accumulated at admission controls consisted of packaging for drinks. The criticism has to be made, however, that at about half of the stadiums no provision was made at entrances for the separate collection of waste. At some control points there were neither adequate nor a sufficient number of waste bins available. In some Host cities the separation and collection of waste in the extended surroundings of stadiums – for example, along the roads to stadiums – was also insufficient.

A number of host cities successfully involved both the resident population and visitors in their waste management concepts. These included Frankfurt (Green Goal T-shirts for employees, waste-collection islands with symbols at car parks and on the approaches to the stadium), Dortmund (waste-collection islands along the "World Cup Route" to the stadium, logos on dust-carts) and Kaiserslautern (its own waste symbols, waste-collection islands along the "fan mile"). But in order to more effectively sensitize fans and other visitors, they should have been better informed about separate waste collection before the World Cup, for example at the time of dispatching or selling tickets. In addition, stadiums should have been consistently obliged to carry out separate waste collection and to use Green Goal symbols.

In summary it should be said that in the organizational, backstage areas of stadiums separate collection of waste functioned as a whole satisfactorily. In spectator areas, waste avoidance measures as a whole were a success, and separate collection, with few exceptions (admission areas) could have been dispensed with.

A waste-collection island with Green Goal symbols for the four waste fractions.

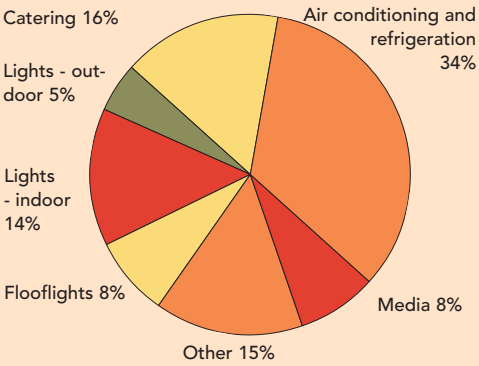
4.3 Energy

Technical demands on the equipment of modern football stadiums are high, often involving considerable energy consumption. Floodlighting systems, for instance, require a lot of electricity, and electricity and heat are also required for the air-conditioning of buildings, for lighting, catering and restaurants. Further demand for electricity during the World Cup was generated by numerous additional facilities (for the media and catering, for example).

Regarded over the year as a whole, heat is required mainly for the heating of buildings and the football pitch as well as for hot water. The major share is attributable to the heating of buildings, which includes not only stationary heating but also the provision of heating through the air-conditioning system. About one-quarter of total heat is used to heat the pitch, since such heating systems generally have long starting-up times and, as a result, are more or less continuously in operation during very cold winter weather. The demand for hot water for sanitary facilities and catering is comparatively low, contributing less than 10%.

Andreas Köpke, goalkeeper trainer of the German team, presents the photovoltaic plant on the roof of Nuremberg stadium.

4.3 Energy



Proportional demand for electricity in selected World Cup stadiums (Bundesliga operations)

Floodlighting systems are the largest consumer of electricity in stadiums. Modern floodlights provide better illumination but use less electricity.

World Cup stadiums vary in terms of size, equipment and utilization. Their energy consumption is therefore also varied. World Cup stadiums have an average annual consumption of around 3.5 million kWh of electricity and about 4 million kWh of heat. Certain stadiums deviate from these figures one- or two-fold in an upward or downward direction, either because, as in Leipzig, they are no Bundesliga operations, or, as in Munich, where the stadium accommodates two Bundesliga clubs, restaurants, spectator boxes, conference facilities, a day nursery, shops and the largest multi-storey car park in Europe, and is in operation throughout the year, also on days when there are no football matches.

The demand for electricity is obviously much greater on match days. However, everyday operations account for a greater share of annual electricity demand than the comparatively few match days, and electricity consumption clearly depends much more on the type and intensity of stadium operation. This applies even more so to the heating demands of stadiums, which are hardly influenced by the number of matches.

In addition to energy requirements for the operation of stadiums, the many and varied facilities for worldwide media coverage of the World Cup had to be provided with energy. The FIFA World Cup is the sporting event with the greatest media coverage worldwide. Related to total energy demand for the World Cup, the International Broadcasting Centre in the New Munich Trade Fair Centre was the main additional electricity consumer. The main priorities were the continuous and secure provision of electricity for media facilities. The use of mobile generating units in the stadiums could not always be reconciled with the environmentally compatible provision of energy. At the same time, extensive hospitality areas and more complex catering facilities (temporary kitchens, mobile refrigeration units etc.) also gave rise to additional demand for energy during the World Cup.

4.3.1 Action on energy

Energy requirements of the stadiums were reduced, on the one hand, through energy-saving and energy-efficiency technologies and, on the other hand, through organizational measures. Regenerative energy sources were made use of either through the installation of plant on site (for example, photovoltaic plants) or through the external supply of "green" energy (for example, certificated green electricity).

Energy efficiency

As a rule, the most modern and energy-efficient technology was installed in the newly constructed or modernized World Cup stadiums. All floodlighting systems are equipped with floodlights with about 2 kW, for example. In contrast, old stadiums had floodlights with at least 3 kW, which provided poor illumination and consumed more electricity. Furthermore, heating and hot-water pipes as well as hot-water tanks in all stadiums are insulated to reduce heat losses.

Such technologies, which were largely utilized, are frequently based on conventional technical developments and are not special measures to increase energy efficiency. They are listed below for the purpose of completeness, but they were not normally considered in the balance of Green Goal objectives:

- Use of central building control systems for the control and monitoring of the technical equipment of stadiums.
- Grouping and control of individual areas of consumption (for example, spectator boxes).
- Speed-controlled ventilators in air-conditioning systems and speed-controlled circulating pumps in heating systems.
- Dispensing with electric water-heaters mounted under washbasins in sanitary facilities.
- Passive solar protection measures; for example, external blinds to reduce cooling requirements.
- Utilizing night temperatures to cool buildings.
- Adjustment of heating regulators (for example, reduction at night, reducing temperatures in partly-heated rooms).
- Adjustment of the heating curve to the actual operating profile.
- Controlled heating of pitches dependent on external temperatures.

Apart from these conventional techniques and activities, a number of additional measures were implemented, which, for Green Goal purposes, went beyond the usual standard and appear in the balance as savings.

Optimized light management

Around 20 % of the electricity used in stadiums in World Cup stadiums is accounted for by lighting. Energy-saving light bulbs and detector alarms as well as time and twilight switches to shorten the duration of lighting contribute in all stadiums, if to a varied degree, to reducing demand for electricity. In Kaiserslautern and Stuttgart, for example, the latest fluorescent lamps (T5 technology) were used, which save up to 20% compared to previous models. In Dortmund, the number of lights was reduced as a result of measurements of illumination intensity.

Air-conditioning and refrigeration

Cold air for the air-conditioning of rooms is usually produced, also in football stadiums, by means of electrically operated compression-type cooling systems. In the Stuttgart stadium, on the other hand, cold air is partly produced adiabatically through the evaporation of water. Moreover, some rooms have no cooling at all, and in sanitary facilities there is no intake-air equipment. In the Frankfurt stadium, not all areas are cooled by technical means, and the total operating time of central cooling systems is reduced through the use of individual air-conditioning units. In Munich, the ambient air-conditioning system is controlled by means of CO_2 probes; this means that fresh air is supplied, depending on air quality, only as required. Each spectator box can be individually controlled, which saves both electricity and heat.

Heat recovery

A large proportion of heat is distributed from the boiler room to many different consumers through the use of ambient air conditioning systems. Heating energy, which would otherwise be lost as waste air, is recovered by means of heat exchangers in the stadiums in Frankfurt, Gelsenkirchen, Cologne, Munich und Stuttgart, as well as to a limited extent in Hamburg.

Condensing boilers

Compared to low-temperature boilers, condensing boilers have a 5 to 10 % higher efficiency. With conventional technology, the energy contained in waste gas is lost. In modern condensing technology, water vapour contained in exhaust gas is condensed by means of a heat exchanger and latent heat largely recovered. Gas-

Good Practice

Heat insulation in Stuttgart stadium

Improved thermal insulation of the stadium shell, far beyond the present standard, was carried out in Stuttgart stadium. Walls and ceilings are clad with 15 to 20 centimetre thick mineral fibre mats, and under the ground floor there is an insulating layer of rigid foam. The result: The stadium requires 20 % less heat than specified in the German Thermal Insulation Ordinance and Energy Savings Ordinance. Extensive insulation not only saves heating energy, at the same time it results in a reduction in annual heating costs. With energy costs increasing still further, these savings will be all the more noticeable in the future.

fired condensing boilers are used in the stadiums in Frankfurt, Munich and Nuremberg.

■ District heat from combined heat and power (CHP)
The stadiums in Berlin, Hamburg and Leipzig, and to a certain extent that in Hanover, are supplied with district heat from combined heat and power (CHP) plants. Since in CHP plants both electricity and heat are generated, they are energy-efficient and save primary energy. The stadium in Hamburg is supplied with heat from a neighbouring biogas plant and a waste-fuelled thermal power station. Energy for the Gelsenkirchen stadium is supplied by a local integrated heat supply, partly from a gas-fired block CHP plant. Where energy is not supplied by means of district heat, gas is the main source of energy in all stadiums.

■ Far-reaching isolated measures
Numerous measures were often implemented only at isolated points, but they contribute considerably to energy savings. For instance, the kiosks in Nuremberg stadium use gas for grills and hot water, which is more energy-efficient than electricity. In Berlin, Frankfurt and Stuttgart, pre-set thermostatic valves, which limit maximum temperature, were attached to radiators. The Berlin stadium has an optimized floodlighting system. The number of floodlights and thus the overall output of the system was reduced through the installation and alignment of the lights. Munich and Berlin dispense with diesel generating units during Bundesliga operations; instead, electricity supply is secured in the event of power failure by means of a second independent line from the public supply network.

■ Energy management
Consumption-orientated energy management can make a considerable contribution to energy savings. In Gelsenkirchen and Nuremberg, for instance, operation of the pitch heating system was optimized. Several stadiums have markedly reduced plant operating time and the duration of lighting by, for example, shortening the running time of detector alarms, bringing forward night-time reductions in heating, closing or shutting down unused areas, or by radio-controlled operation of plants with a central building control system.

■ Involvement of Green Goal partners
Deutsche Telekom presented environment-friendly technology for the future in a range of demonstration projects. In several World Cup stadiums and cities, hydrogen-operated fuel cells were used for the emergency operation of communications technology, for power supply for telephone cells and for "cargo bikes".

Coca Cola provided for the first time in all twelve stadiums around 2,000 energy-efficient refrigerators, which operate with carbon dioxide as cooling agent. The refrigerators have an innovative control module, which considerable reduces energy consumption. What is more, disposal of the equipment results in fewer greenhouse gases. Coca Cola was awarded the international environment prize, "Cooling Industry Award 2006", for the use of climate-friendly refrigerators during the World Cup.

■ Temporary energy supply during the World Cup
Diesel generators are normally used to ensure an uninterrupted supply of electricity for complex television broadcasting technology. In the International Broadcasting Centre in Munich such units would have been in operation around-the-clock during the World Cup, used approximately 400,000 litres of diesel and caused local air emissions as well as noise and odour nuisance. The OC found a clean solution that also protected the environment: A company developed power generators especially for the World Cup and the IBC that replaced diesel units.

The new generators ensured that television equipment would be supplied without interruption from the conventional power supply of the New Munich Trade Fair Centre. For technical reasons (a reliable safeguard against possible power failure), diesel generators in World Cup stadiums could not be dispensed with for the supply of power for television broadcasting.

Security requirements could be adjusted in hospitality areas, however, and power supply with diesel generators was largely dispensed with. Temporary generators were used in individual stadiums when the required additional demand could be met neither by the existing network nor by utility company networks. The World Cup also demonstrated, however, that advance forecasts of additional electricity demand had been too high. Diesel generators were partly in operation without users, which led to unnecessary additional consumption.

Renewable energy

Renewable energy played an important role in Green Goal. It contributed to reducing greenhouse gas emissions, thereby supporting the objective of a climate-neutral World Cup. Furthermore, the solar plants on stadium roofs will produce electricity for many years to come, and therefore contribute also in the long term to climate protection.

Solar plants

Photovoltaic plants were installed for electricity generation in and around stadiums in Dortmund, Gelsenkirchen, Kaiserslautern und Nuremberg. They include the three largest plants in German football. In Kaiserslautern (800 kW_p) and Nuremberg (250 kW_p additional to the existing small plant) the first sections on the stadium roofs were inaugurated shortly before the World Cup began, and the plants should be completed by the end of 2006. In Dortmund, photovoltaic plants with about 550 kW_p are installed adjacent to the stadium on the roofs of an ice rink and an exhibition hall. The second plant with 306 kW_p on the roof of the exhibition hall was installed within the framework of Green Goal. The operators of the photovoltaic plants in Dortmund were awarded the European Solar Prize in 2005 for their commitment to the promotion of solar energy.

Good Practice

Sun over Kaiserslautern

The largest photovoltaic plant ever installed in a German stadium is being built above three stands of the Kaiserslautern stadium. By the end of 2006 5,000 modules will have been installed on the stadium roof. Together they cover an area of 6.000 square metres, and lying close together they would more than cover a football pitch. The plant will provide on sunny days an output of up to 800 kW_p and generate 720,000 kWh of electricity per year, enough to supply around 200 detached houses with electricity for a year.
In May, just before the beginning of the World Cup, the first phase went into operation on top of the West Stand with an output of 230 kW_p. Engineers had long worked on the technical realization; stadium roofs are mostly open and relatively fragile structures, and a load of 5,000 solar modules had to be well planned.

Installation of the photovoltaic plant on the roof of Kaiserslautern stadium.

4.3 Action on Energy

The utility EnBW promoted its involvement in Green Goal and its green electricity in large-format advertisements.

Good Practice

Green electricity for the FIFA World Cup

It had been estimated that stadiums, media centres, hospitality areas and the International Broadcasting Centre would consume about 13 million kWh of electricity during the four-week World Cup. The utility EnBW (Energie Baden-Württemberg) provided certificated green electricity ("OK-power") in its capacity as "national supplier". It was not possible, however, to supply stadiums directly with green electricity, since stadium operators already had contracts with their respective energy suppliers. A "substitution solution" was therefore evolved. Before the World Cup, EnBW fed 13 million kWh of green electricity into the normal German supply network, thereby displacing conventionally produced electricity. This certificated green electricity was wholly generated in a Swiss hydropower plant, part of which is recognized as a new plant in accordance with "OK power" criteria. The increased costs were borne by EnBW. This "substitution solution" had the same ecological effect as the direct supply of stadiums with green electricity during the World Cup.

The city of Kaiserslautern supports energetic renovation with a programme entitled, "2006 euros for your house". House owners, who renovate their houses so that they consume, at most, half of the energy previously required, receive a grant of 2006 euros from the city.

The city of Kaiserslautern took up the Green Goal idea of climate protection and put it into municipal practice in an exemplary manner. The city started the programme, "With solar energy into the 2006 World Cup", in the course of which a large number of photovoltaic plants were installed on public and industrial buildings as well as on private houses. By 2008, within the framework of the Green Goal initiative, photovoltaic plants with a total capacity of 6,500 kW_p should be installed. There are 215 solar-thermal plants for producing hot water with an area of 1,700 square metres, which were largely installed within the scope of the solar programme.

Gelsenkirchen also puts its money on solar energy. Besides the existing solar plants (87 kW_p) on the pedestrian bridge to the stadium, the city inaugurated a further photovoltaic plant just a few days before the start of the World Cup on the modernized main station. Both plants can be clearly seen by visitors and passersby and act as the city's ecological landmark.

On the initiative of Green Goal, Berlin and Stuttgart are examining the construction of large solar energy plants in the immediate area of the respective stadiums.

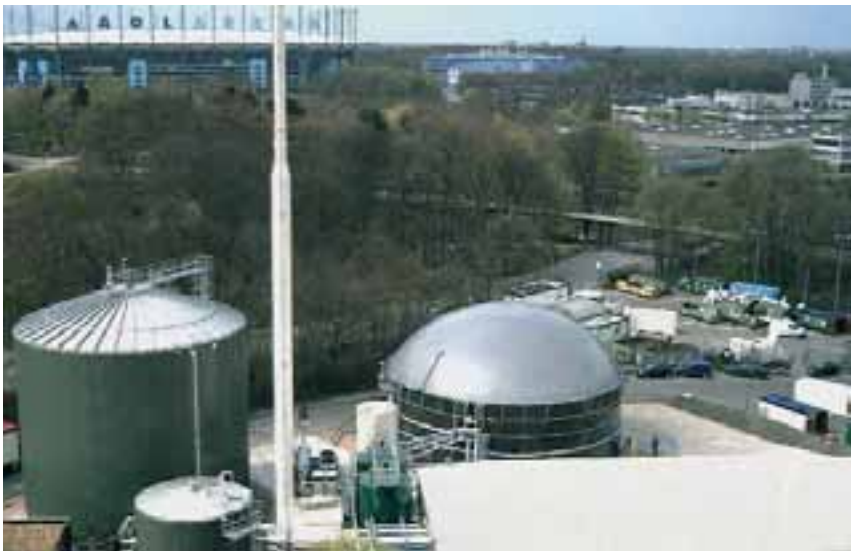
■ Biomass

The Hamburg stadium obtains part of the heat it requires from one of the largest and most modern biogas plants in Northern Germany. The plant, which was inaugurated within the framework of Green Goal, produces electricity and heat from around 20,000 tonnes of biowaste each year.

■ Green Goal working groups in host cities

With solar plants in Dortmund, Gelsenkirchen and Kaiserslautern as well as the biogas plant in Hamburg, Green Goal working groups made a significant contribution to the use of renewable energy. A further Green Goal initiative in Kaiserslautern is the programme entitled, "2006 euros for your house". The city supports the energetic renovation of residential buildings. Up to now, 27 houses have been renovated within the framework of the programme.

Hamburg stadium covers its demand for heat from a nearby biogas plant.



Summary of action on energy

Action	Description	Realization
Optimized light management	Energy-saving light bulbs, detector alarms and measures to reduce the duration of lighting	All stadiums, to varying degrees
Air-conditioning and refrigeration engineering	Dispensing with air-conditioning plants, adiabatic cooling, CO2 probes for air monitoring, individually controllable spectator boxes, further isolated measures	To a special extent three stadiums: F, M and S
Operation with gas instead of electricity	Converting kiosks to gas (grills, hot water)	One stadium: N
Floodlighting systems	Energy-saving floodlights	One stadium: B
District heat from CHP	Efficient energy use by means of combined heat and power (CHP)	Five stadiums: B, HH, H, LE and GE
Condensing technology	5 to 10 % higher efficiency for gas boilers	Three stadiums: F, M and N
Heat recovery	Heat exchangers in ambient air-conditioning systems	Six stadiums: F, GE, C, M, S und HH
Heat insulation	Better insulation of walls, ceilings and floors	One stadium: S
Temperature control	Limiting maximum ambient temperatures (for example, with pre-settable thermostatic valves)	Five stadiums: B, F, S, GE and M
Optimization of pitch heating systems	Reducing operating times of pitch heating systems, particularly through organizational measures	Two stadiums: GE and N
Green electricity	13 million kWh of certificated green electricity	EnBW
Solar plants	Solar plants for producing electricity and heat in and around stadiums as well as in host cities	Four stadiums: DO, GE, KL and N two cities: GE and KL
Biogas plant	Heat supply from biogas	One City: HH

Further technical and organizational measures are mentioned in the text. Berlin (B), Dortmund (DO), Frankfurt (F), Gelsenkirchen (GE), Hamburg (HH), Hanover (H), Kaiserslautern (KL), Cologne (C), Leipzig (LE), Munich (M), Nuremberg (N), Stuttgart (S)

4.3.2 Results for energy

The energy consumption of the World Cup was determined by the energy requirements of the twelve stadiums and their peripheral areas (including extensive hospitality areas), as well as by the additional use of diesel for power generators, the power consumption of the IBC and the heat requirements of stadiums. On the basis of data provided by stadiums and the IBC, stadiums consumed 7.9 million kWh and the IBC 1.9 million kWh of electricity. Diesel consumption was about 660,000 litres and heat consumption of the stadiums amounted to 1.4 million kWh. The result, taking account of diesel-operated generators, was electricity consumption of about 12.6 million kWh. Applied to a single game, electricity consumption amounted to an average of 170,000 kWh. By contrast: In Bundesliga operations the twelve stadiums consumed a total of about 44 million kWh of electricity and around 47 million kWh of heat in reference year 2005. This is equivalent to an average of around 130,000 kWh of electricity per Bundesliga game. The calculation of demand for heat for a single game serves no purpose, since demand is hardly dependent on the number of games. The differences between consumption figures for the World Cup and those for the Bundesliga have mainly to do with additional demand for electricity for the media presence, in particular television broadcasting, and hospitality areas.

The calculation of energy objectives is related to the annual energy consumption of stadiums in reference year 2005.

4.3 Results for Energy

Assessment of results

The exploitation of efficiency potentials provided the basis for Green Goal objectives for energy:
Savings and efficiency potentials will be determined and exploited at all venues.

Resources and operating costs can be saved by means of a package of technical, investive and organizational measures already during the planning and construction of stadiums. Working together with stadiums has shown that distinct savings potentials existed, whose exploitation in the course of planning and construction work frequently proved to be difficult. For instance, heat recovery plants, condensing boilers and energy-saving lights could have been utilized to a much greater extent than actually happened. In a number of cases, the necessity of reducing construction costs was not reconcilable with expenditure on energy-saving technology, with the result of great consumption of resources and higher costs in later operation.

Exploited potentials can be best assessed in attainment of the energy-savings objective:
Energy consumption in World Cup stadiums will be reduced by at least 20% through the efficient use of energy.

The main areas of action were:

- Optimized light management

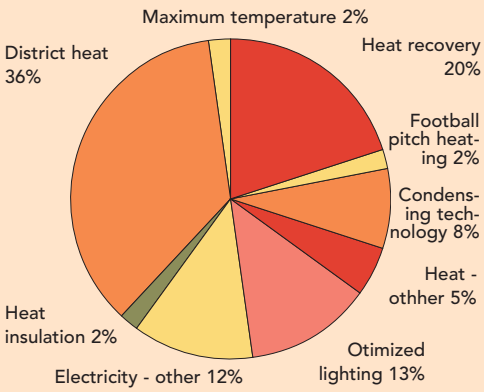
Lighting is responsible for around one-fifth of a stadium's total electricity demand. Optimized lighting is therefore one of the most important energy-saving measures. In this area, a cumulative annual total of about 1.7 million kWh of electricity are saved in World Cup stadiums, as a whole, as a result of a broad range of measures. The effect of energy-saving lamps was estimated in terms of reduced specific electricity demand for a given lit-up area, taking account also of the duration of lighting and the share of energy-saving lamps. Reduction of the duration of lighting – of detector alarms, for example – was considered in the balance.

- Other energy-saving measures

Other efficiency measures in the area of electricity together accounted for around 12% of total savings. Many isolated measures in stadiums concerned air conditioning and refrigeration. An important measure to save electricity was the switching of kiosk operations to gas (in Nuremberg).

- Energy supply

District heat and energy from block CHP plants is a particularly efficient form of supply. In order to draw up an energy-saving balance in this case, it was assumed that cogeneration replaces traditional supply with electricity from a modern coal-fired power plant and heat from a gas boiler. Comparison on the basis of electric and thermal efficiency shows, for example, a saving of 31% of primary energy for a block CHP plant. The use of renewable energy is judged to have a neutral effect on the climate and is regarded as energy-saving, compared to the natural gas commonly used in stadiums. District heat from biogas plants and waste-fuelled power stations – where co-generated heat is regarded as a by-product of waste disposal – is therefore shown in toto in the balance as energy saving. Primary-energy savings of just under 5 million kWh through the use of district heat (Berlin, Hamburg, Hanover and Leipzig, including the block CHP plant in Gelsenkirchen) make up more than one-third of overall savings.



Proportional energy savings in World Cup stadiums depending on individual measures (Bundesliga operations)

Condensing boilers save about 5 to 10 % of energy compared to conventional boilers. The condensing boilers in three stadiums contribute to an annual saving of just under 1 million kWh of gas.

■ Heat recovery
The recovery of heat from ambient air conditioning plants also makes an important contribution. In six stadiums a total of about 2.7 million kWh of thermal energy are saved annually. The figures are based on data from stadium operators. Where specific data was not available, savings were estimated on the basis of existing stadium data.

■ Other heat-saving measures
Insulation of the stadium shell is of great significance. This is substantiated by experiences in the Stuttgart stadium, where annual savings through extensive insulation amount to around 300,000 kWh of heat.

Comparatively large effects are achieved through reductions of temperature in heated areas. One generally assumes a saving of 6% from a reduction in temperature of 1 degree. Maximum temperature is limited through the use of pre-settable thermostatic valves on radiators, and these valves are activated by minimal fluctuations in temperature. In all, measures to control ambient temperatures in Berlin, Frankfurt, Gelsenkirchen, Munich und Stuttgart result in annual savings of about 300,000 kWh of heat.

Plants for the heating of football pitches are large consumers of energy and, as a result, savings are appreciable. Through a reduction in the operating time of recirculating pumps (Gelsenkirchen) and optimized operation of heating operation (Nuremberg) an annual total of approximately 250,000 kWh of electricity and heat are saved. All other savings in the heating area are together responsible for around 5% of total savings.

It is difficult to quantify all energy-saving measures, due to the complexity of energy-relevant technical systems in stadiums. It cannot be ruled out that individual measures were either not considered or overrated.

The use of renewable energy was a major Green Goal objective:
The efficient supply of energy for the 2006 FIFA World Cup will be provided as far as possible from renewable energy sources.

A decisive contribution was the supply of 13 million kWh of certificated green electricity from hydropower. This quantity of electricity exceeds the total energy requirements of the stadiums and their additional facilities for hospitality and the media as well as the International Broadcasting Centre (IBC) during the World Cup.

Equally significant were the numerous solar plants initiated by Green Goal, since their long-term production of solar energy – at least for the next twenty years – will make an important contribution to the "sustainable legacy" of Green Goal and to climate protection. Up to June 2006, photovoltaic plants with a capacity of more than 2,800 kW_p had been constructed within the framework of Green Goal. This is equivalent to an area in excess of 20,000 square metres, and would cover the annual energy requirements of a stadium.[1] The plants produce an annual total of around 2.5 million kWh of electricity – in terms of figures, enough to cover during the next five years the total requirements of the 2006 FIFA World Cup.

With the use of green electricity, the construction of photovoltaic plants and the biogas plant the Green Goal objective for renewable energy was achieved.

Energy saving: summary of results

In all, around 13.6 million kWh of energy are saved annually in the twelve World Cup stadiums, with about 75% of savings being attributable to the production and use of heat and 25% to the use of electricity. Related to total energy consumption this amounts to a saving of about 13%. A good third of this – around 36% - are savings of primary energy that result from the use of district heat. A further 8% is achieved through the use of efficient condensing boilers for the supply of stadiums. The remaining 56% of overall savings is attributable to the use of energy in stadium operations.

Even when important measures were implemented exemplarily in a number of World Cup stadiums, it has to be stated that as a whole the energy-saving objective was not achieved. Efficiency potentials established in World Cup stadiums were not exploited to the extent expected.

Many of the World Cup stadiums were only opened in 2005 following conclusion of construction work. It may be assumed that within the scope of active energy management based on greater operational experience, especially against the background of rising energy costs, further savings potential can be exploited.

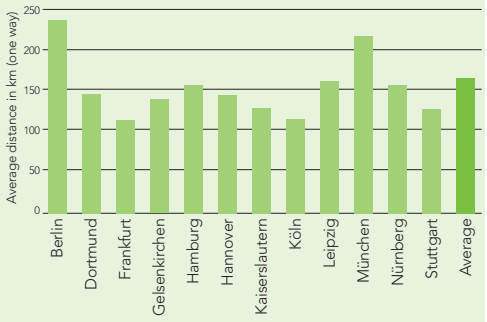
[1] In the balance of electricity production from photovoltaic plants it has to be born in mind that direct supply of stadiums with the corresponding electricity does not takes place. Rather, and as a result of the Erneuerbare Energien Gesetz (EEG) (Renewable Energy Act), electricity from photovoltaic plants (also the cost of production) is distributed among all power suppliers in Germany. CO2 credits for this electricity are accordingly not shown in the balance

4.4 Transport

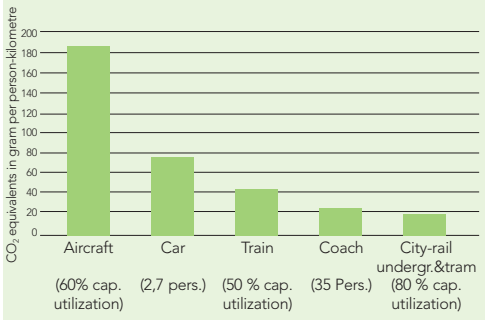
3.4 million football fans, journalists, sponsors, representatives of national and international football associations, VIPs and guests of honour watched the 64 games of the 2006 FIFA World Cup, of whom more than a million came from abroad. Another 18 million visited the open-air public-viewing events in Host cities. The “fan mile” along the “Strasse des 17. Juni” from the Brandenburg Gate alone attracted 9.5 million visitors.

4.4 Action on Transport

Average journeys of German spectators to World Cup matches (calculated according to the place of residence of ticket holders).



Comparison of greenhouse gas emissions (calculated as CO_2 equivalents) of various means of transport, taking account of capacity utilization during the 2006 FIFA World Cup™.



These figures demonstrate that for Germany the World Cup was a mass movement on an unprecedented scale. Associated with this were unavoidable emissions from journeys to and from World Cup stadiums and cities. World Cup visitors covered around 1.1 billion person- kilometres during the tournament in Germany. In addition, there were journeys made to and from Germany and the journeys of visitors to and from open-air events (which, however, were not the responsibility of the OC). By way of comparison: Spectators at the 64 games of the First Bundesliga cover around 0.6 billion person-kilometres each year. German spectators travelled around 160 kilometres to World Cup stadiums, on average more than 50 kilometres further than to Bundesliga games.

4.4.1 Action on transport

At the centre of Green Goal activities was the transport of visitors to and from host cities and World Cup stadiums, which was intended to be as environmentally compatible as possible. Since cars and aircraft, compared to public means of transport, produce considerably more exhaust gas, climatically harmful emissions and noise, a key objective was that as many spectators as possible should use bus and rail transport. Furthermore, as many visitors as possible should be encouraged to go on foot or by bicycle to stadiums.

Open-air, public-viewing events were not directly addressed by Green Goal transport measures. However, visitors to these events also used buses, trains and bicycles, or went on foot. Besides transport to stadiums (the responsibility of the OC), the environmental concept thus had a lasting effect even during the World Cup. Realization of transport measures was only possible with the active participation of all relevant parties. Apart from the activities of the OC, the contributions of the Federal Ministry of Transport, the federal Länder, Host cities, the Deutsche Bahn (DB) (as "national supplier"), municipal transport companies and the Verband deutscher Verkehrsunternehmen (VDV) (Association of Germany Public Transport Organizations) were also very important.

Increased share of local public transport

■ Improvement of connections to stadiums

Stadiums in many cities were well integrated into the local public transport network even before the World Cup. Local public transport services were expanded for the World Cup to improve capacity and passenger comfort. The Federal Ministry of Transport put the total invested in infrastructural measures for the benefit of local public transport at 802 million euros.

Measures ranged from the construction of new routes (for example, extension of city-rail line 1 in Cologne) to improving the capacity and efficiency of particular routes (for example, city-rail services to the Olympia Stadium in Berlin) and improving bus and tram stops (for example, alterations to platforms to accommodate longer trams at Gelsenkirchen main station). A number of stops were also improved to permit the use of wheelchairs. Due to the World Cup all infrastructural measures had a high priority, but they would also have been necessary without the World Cup. In all, around 50 infrastructural projects were carried out in host cities to improve public transport.

Selected measures for improving local public transport connections to World Cup stadiums

World Cup city	Project
Berlin	Improving the efficiency of the city-rail link between "Bahnhof Zoo" and "Olympiastadion"
Dortmund	Extension and modernization of Dortmund-Westfalenhalle station; adjustment of signals to increase efficiency
Frankfurt	Speeding up tram line 21 to the stadium; alteration and modernization of the "Stadion" city-rail station
Gelsenkirchen	Main station: alterations of tram platforms; extending the stadium tram stop by an additional track
Hamburg	Modernization of the "Stellingen" and "Eidelstedt" city-rail stations at the stadium; extending footbridges and access to shuttle-service buses to the stadium service
Hanover	Construction of "Linden/Fischerhof" city-rail station with direct access to the stadium; new link established between city-rail and the tram service
Kaiserslautern	Alterations to the main station, with direct access by foot to the stadium; extension of the city-rail route over Kaiserslautern to Homburg
Cologne	Construction of "Weiden-West" city-rail station and extension of tramline 1 to this new station.
Leipzig	Extension of tramline 15 between "Angerbrücke" in the west and "Südfriedhof" in the south-east, with optimization of the direct link from the main station to the stadium
Munich	Extension of "Fröttmaning" underground station at the stadium; upgrading underground line 6 to the stadium to a capacity of 20,000 passengers per hour
Nuremberg	Extension of "Frankenstadion" city-line station (construction of a special platform and increasing capacity to 15,000 passengers per hour)
Stuttgart	Expansion and modernization of "Gottlieb-Daimler-Stadion" city-rail station and construction of a new platform

Nine of the twelve World Cup stadiums were connected to the respective main station by at least two rail-based local transport systems (for example, city-rail and underground) or by two local lines of the same transport system. In Munich (underground) and Gelsenkirchen (city-rail) the efficiency of the services was markedly increased, and in the case of disrupted rail services a sufficient number of buses were available to bring spectators to the stadiums. The stadium in Kaiserslautern can be reached on foot from the main station, so that the DB also provided an efficient rail link.

More frequent and extended services

The frequency of local transport services was greatly increased on match days in all host cities. In Munich, for instance, the underground ran every minute to the stadium, the Berlin city-line brought spectators every two-and-a-half minutes to the Olympia Stadium, and in Gelsenkirchen, 47 instead of the usual 14 city-rail trains were operated at peak-times between the city centre and the stadium. In Nuremberg, city-rail capacity between the main station and the stadium was doubled on match days. Some cities also offered extended or even around-the-clock services.

More frequent services and longer operating times required the operation of additional trains. The Deutsch Bahn, for instance, operated 10,000 more trains in regional and city-rail services than usual. In North Rhine-Westphalia, the state government and DB agreed on 400,000 additional train-kilometres, in order to be able to operate more trains on heavily frequented lines between Hamm and Düsseldorf and between Dortmund, Gelsenkirchen, Düsseldorf and Cologne. This was only possible because many host cities co-ordinated the timing of their regular replacement of buses and rail-stock with the World Cup, with all vehicles remaining in service until the end of the tournament. This way, uneconomic purchasing of additional vehicles could be avoided, which would have been a heavy long-term financial burden on local public transport companies.

4.4 Action on Transport

Good Practice

"KombiTicket" boosts local transport

For the first time at a FIFA World Cup, tickets were also valid for local public transport without additional payment. The "KombiTicket" (combined ticket) not only enabled ticket holders – as in the case of Bundesliga games – to free travel to and from the stadium; they could also use them from the start of services in the early morning of match days until the early morning of the following day on all buses and trains of the respective transport networks, and often beyond city boundaries. In the case of Berlin, for instance, the entire integrated Berlin-Brandenburg transport network was at their disposal, so that ticket holders could also visit Potsdam and other areas around Berlin.

For the first time at a World Cup the Kombiticket allowed free travel on local public transport on match days.

To supplement "KombiTickets", the FIFA, the VDV (Association of Germany Public Transport Organizations) as well as transport companies and integrated transport services reached agreement that the 15,000 World Cup volunteers could use buses and trains free of charge on days when they were on duty. The cost of "KombiTicktes" and special tickets for volunteers amounted, according to initial estimates, to more than 8 million euros.

Self-explanatory "Routes at a glance" in Berlin

■ Guidance for local public transport

In order to make the use of public transport as simple and as relaxed as possible for visitors, and in particular for foreign visitors, a special routing system – "Routes at a glance" – was developed. The self-explanatory modular system of signs comprised three fields. The first field contained the World Cup logo, the second showed the way to the stadium, station or transport and the third provided information on corresponding transport.

Reducing the effects of transport on the climate

Only around 6% of transport undertaken during the World Cup was for journeys within host cities. Transport to and between host cities was of greater relevance for emissions. In order to reduce the climatic effects of these journeys, it was intended that as many visitors as possible use buses or trains, and Green Goal made use of the fact that all host cities were connected to the Deutsche Bahn ICE and IC network and could thus be reached quickly and comfortably. The DB - official transport and logistics supplier of the 2006 FIFA World Cup as well as Green Goal supplier – had also expanded its services especially for the World Cup.

■ Special and charter trains

The DB operated around 300 additional long-distance trains during the World Cup with a capacity of more than 300,000 seats. The use of additional trains ensured, among other things, that visitors to a total of 28 evening games could travel home even after midnight. Mexican and Brazilian fans chartered 13 special trains, and Swiss, Polish and Australian visitors also travelled in special trains. In addition, the national teams of Costa Rica, Mexico, Croatia and Sweden used the railway for journeys within Germany.

The Deutsche Bahn put into effect an extensive special passenger transport programme, essentially comprising three pillars:

- Additional capacity and services for the period of the World Cup for long-distance and suburban transport as well as in conurbations.
- Additional services on match days to cover peak demand.
- Charter services for football teams and large groups of fans.

Shuttle buses after the end of a match in Hamburg stadium.

■ Special railway tickets for the World Cup
In order to attract as many visitors as possible to rail travel, the DB developed special offers for the World Cup: the "World Champion Ticket", the "World Champion Pass" and "World Champion Surf & Rail".

The "World Champion Ticket" was valid for all holders of tickets for a World Cup game. It cost, depending on distance, 54, 74 or 90 euros for a second-class return ticket. With these special prices the Deutsche Bahn reminded customers of the years when the German national football team won the World Cup: 1954 in Berne, 1974 in Munich and 1990 in Rome. The "World Champion Pass" was valid from 7 June to 11 July 2006 throughout Germany in suburban and long-distances trains of the Deutsche Bahn. It was not linked to an admission ticket and cost 349 euros and 549 euros for second-class and first-class, respectively.

The "World Champion Surf & Rail" ticket entitled holders to travel between 7 June and 11 July 2006 with the ICE or IC to one of the Host cities. Return tickets (second-class) cost between 59 and 89 euros, were linked to a particular train and were only sold online. Foreign travellers were offered special conditions, such as "EuroDomino", "InterRail", "Eurailpass" or "German Rail Pass".

Around 6,000 journalists also profited from special World Cup offers. Together with their accreditation they received a "Mobility BahnCard" with which they could travel throughout Germany free of charge during the World Cup on the suburban and long-distance networks of the Deutsche Bahn. The players and trainers of the German national team had already received "Mobility BahnCards" in November 2005.

■ Travel information for public transport
All ticket-holders received with their tickets a pamphlet in English, German, French or Spanish entitled "Your Way". The pamphlets provided travel advice and information on the "KombiTicket" and environment-friendly journeys with Deutsche Bahn.

In addition, a "Travel Centre" was installed on the Internet under www.fifaworld-cup.com, which provided comprehensive information on public transport in the four FIFA languages, as well as a route planner that included European rail connections and long-distance buses.

Good Practice

BahnCard goes into extra time

For those visitors who travelled around during the World Cup without a stadium ticket – for instance, to the numerous open-air events – the Deutsche Bahn offered a special "Newcomer BahnCard". With the "World Champion BahnCard 25", which could be purchased up to 9 June 2006 for 19 euros (second class), rail travellers obtained a 25% rebate on normal and economy prices from the beginning of April to the end of July 2006. It included the "City Ticket" in more than 80 cities, with which city-rail, the underground, trams and buses could additionally be used.

The particular feature of the "World Champion BahnCard 25" was that it was linked with the success of the German team. With every round that the German team reached after the preliminary round its validity was extended by one month. With qualification for the semi-finals the Card therefore remained valid until the end of October 2006. By comparison, a normal BahnCard 25 costs 51.50 euros for one year. The "World Champion BahnCard 25" was definitely a good buy – thanks to the German team!

Good Practice

"World Cup Mile" to Dortmund stadium

In Kaiserslautern, the main station and the stadium are practically next to each other, and it was obvious that visitors would go on foot to the stadium. In Hanover and Leipzig, too, the stadium could be easily reached in 20 to 30 minutes on foot. In Dortmund a "World Cup Mile" was set up, although the route from the station to the stadium is around 3.5 kilometres long. In order to make the route attractive for visitors, it was upgraded with catering services and cultural events. Retailers, caterers and residents participated in the project. A particular highlight was the "red carpet" that accompanied spectators all the way to the stadium. Routes were marked with official signposts in the four host cities mentioned. In addition, the cities in which stadiums could be easily reached on foot were publicized in pamphlets, on Websites and in newspaper articles.

The "red carpet" on the "World Cup mile" in Dortmund.

■ Passenger information
A special "Welcome Desk" was set up at every railway station for the World Cup, where information was provided in the languages of participating countries. DB employed specially trained personnel (in co-operation with adult education institutions). Announcements at stations and on trains were made in German and English, and generally also in the languages of participating countries. At key stops on the public transport network announcements were also made in several languages.

Reduction in environmental pollution in the area around stadiums

■ Parking management
Parking was rarely available for visitors at stadiums. "Park & ride" facilities were therefore provided in all host cities, so that motorists could transfer to public transport to reach stadiums or open-air, public-viewing events in the cities. A traffic-control system on the motorways directed motorists to designated parking areas. Sufficient parking space was provided for coaches as near as possible to the stadiums, and most cities introduced a registration procedure for coach operators to optimize planning.

■ Resident protection zones and special traffic zones
Despite parking management, residential areas in the neighbourhood of stadiums had to expect greater nuisance from road traffic during the World Cup. Resident protection zones as well as special traffic zones were therefore set up in residential areas near stadiums. In Kaiserslautern, for instance, residents and business people could drive in the city centre and in the immediate vicinity of the stadium only with special permits. In Leipzig and Berlin, too, the stadiums were cordoned off on match days. In Berlin, a special traffic zone was put into effect within a radius of around 1 kilometre of the stadium between 10 a.m. and midnight on match days.

■ Bus shuttle service
To reduce journeys by car to stadiums, a bus shuttle service was set up for VIPs, personnel and journalists at the main hotels in host cities as well as at railway stations and airports. 940 bus-operating days were required for journalists alone, and a further 660 for personnel and the airport shuttle.

■ Promotion of travel by bicycle
With the exception of Kaiserslautern, where the stadium lies on a hill, between 200 and 600 bicycle parking spaces were provided at all stadiums during the World Cup. In Berlin, 424 secured parking spaces were temporarily provided just for the World Cup, but cycleways were not extended especially for the tournament, since the number of visitors that were expected cycle to the stadium from the surrounding area was regarded as too small.

■ Environment-friendly vehicle concepts
In co-operation with TOTAL, the Green Goal supporter, two buses with hydrogen-powered engines were used for the airport shuttle service in Berlin. The buses emit practically no pollutants and already lie below the Euro IV exhaust emission threshold value, which will be binding in Europe only from 2008. In Hamburg, too, World Cup guests were brought to the stadium – for example, from Stellingen city-rail station – in hydrogen buses. Since hydrogen for the fuel cells was produced with certificated electricity from renewable sources, the buses were not only pollutant-free but also CO_2-neutral.

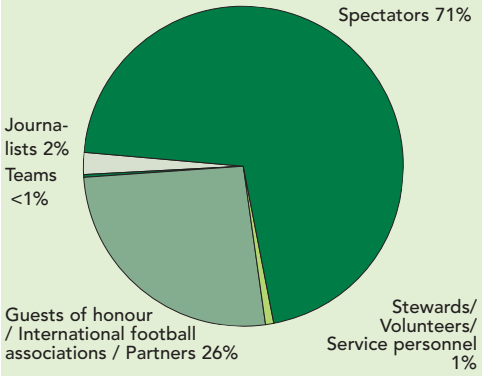
Hydrogen buses promoted low-emission transport in Berlin during the World Cup.

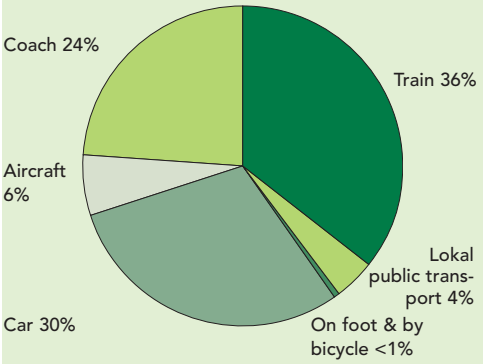
In addition, a number of public transport companies used the opportunity provided by the World Cup to re-fit their vehicle fleets. In Dortmund and Gelsenkirchen, for instance, around 25 vehicles were equipped with diesel soot filters. Hamburg set itself the target, in connection with the World Cup, of equipping all 700 buses of the Hamburg Hochbahn with particulate filters. By the start of the World Cup, 250 buses had already been refitted. The 912 vehicles of the official Hyundai World Cup vehicle fleet met the EU exhaust emission standard Euro IV, but emission reductions – for example, through particulate filters – were not achieved.

Summary of action on transport

Action	Description	Realization
Stadium links	Stadium links to the public transport network were improved through additional infrastructural measures	Federal government, Länder, cities, DB, public transport companies
Expansion of local public transport services	The frequency of local public transport services, including night services, was increased in all host cities	Transport companies, DB, Länder
"KombiTicket"	Stadium tickets were also valid for travel throughout the integrated public transport network	OC, VDV, DB, public transport companies
Guidance for local public transport	Standardized signposting in all host cities and for all carriers	Federal Ministry of Transport, Federal Highway Research Institute, VDV, DB, transport companies, cities
Additional trains	Operation of special trains and charter trains by the DB	DB, Länder
Special DB offers for the World Cup	Sale of special rail tickets (also for non-holders of DB BahnCards)	DB
"Mobility BahnCard"	"Mobility BahnCards" allowed journalists to use the railway network free of charge during the World Cup	OC, DB
Public transport travel information	Official pamphlets and Websites provided information on public transport	OC
Passenger information	Multi-lingual information at railway stations.	DB, public transport companies
Parking management	Setting up "park & ride" facilities	Cities, OC
Resident protection zones	The area around stadiums was closed to normal road traffic on match days	Cities
"World Cup Miles" to the stadium	Setting up attractive routes from main stations to stadiums for visitors on foot	Cities
Promotion of travel by bicycle	Provision of sufficient (secured) bicycle parking spaces	Cities
Operation of innovative,	Operation of vehicles with alternative fuel or engines in public transport and environment-friendly vehicles in the official World Cup vehicle fleet	OC, public transport companies

Share of different groups of stadium visitors and share of different means of transport in total transport provided during the World Cup.





4.4.2 Results for transport

The volume of transport for the World Cup is not comparable with that for the Bundesliga. A special model was therefore developed for the balance of person-kilometres and resultant greenhouse gas emissions, which, among other things, considered the following data: number of games and stadium capacity, capacity utilization of stadiums, shares of groups of visitors (guests of honour, VIPs, World Cup partners and suppliers, spectators etc.), average distance travelled by different groups of visitors, data on the modal split (share of rail, car, aircraft, coach and city-rail transport in the respective total transport volume of individual groups of visitors) as well as specific emission values and capacity utilization of individual means of transport. The following data sources were utilized:

- Analyses of ticket sales and transport by the OC.
- Traffic reports by cities and the police for the National Information and Co-operation Centre (NICC) of the Federal Ministry of the Interior.
- Analyses of transport companies and city officials responsible for transport.
- Deutsche Bahn analyses.
- Results of transport surveys before and during the World Cup.
- Specific emission data for different means of transport from the Federal Environmental Agency,

On the basis of this model, spectator transport within Germany –s that is, within the responsibility of the OC – was calculated at around 1.1 billion person-kilometres. Around 70 % of total kilometres were covered by spectators that had obtained their tickets through public channels, from the ticket contingents of the national associations of participating countries as well as through the hospitality programme. A quarter of transport was undertaken by guests of honour, representatives of international associations and World Cup partners and suppliers (which also included the journeys of those people who had obtained tickets for World Cup games through competitions and the drawing of lots organized by official partners and suppliers). Travel by journalists, service personnel, volunteers, stewards and national football teams did not amount to much. Use of individual means of transport variedly greatly: 36 % of travel was undertaken by rail, 30 % by car, 24% by coach and 6% by plane, with public transport (4%) playing only a minor role.

Assessment of results
One of the two main objectives in the Green Goal transport concept was an increase in the share of public transport:

The share of journeys to World Cup stadiums with public transport will be increased to 50%.

Appeals to leave the car at home and switch instead to bus and rail often went unheard. Expectations for journeys to the stadiums during the World Cup were, however, fulfilled. On the basis of transport reports from the cities and the analyses of transport companies and the DB, the shares of individual means of transport in journeys to and from stadiums could be determined for each of the 64 games. These analyses show that, averaged over all games and cities, around 57% of the 3.4 million spectators used city-rail, underground, trams and public service buses for journeys to stadiums; 52% of spectators used services from the main stations, and 5% from "park & ride" facilities.

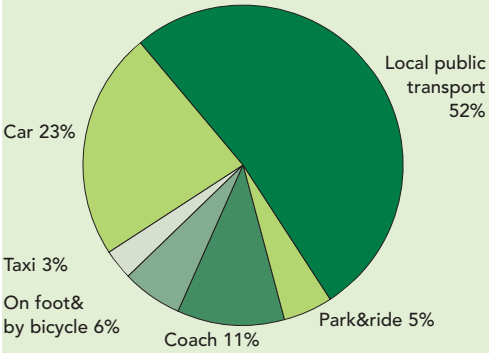
The 50% target was exceeded in certain cities. In Berlin, the public transport share - including "park & ride" – was over 85%, in Hanover, Cologne and Stuttgart at least 60%. In Munich, just under 60% of stadium visitors came to the Arena with the underground (planners had expected 30 to 40%). Approximately double the number of fans travelled to the opening game in the Munich Arena compared to Bundesliga games of FC Bayern.

In Dortmund, Hanover, Leipzig and Kaiserslautern many fans took advantage of the good weather and walked to the stadiums: in Leipzig between 10,000 and 20,000 dispensed with transport, and even in Dortmund, where the route from the main station to the stadium was quite long, up to 20,000 made their way on foot.

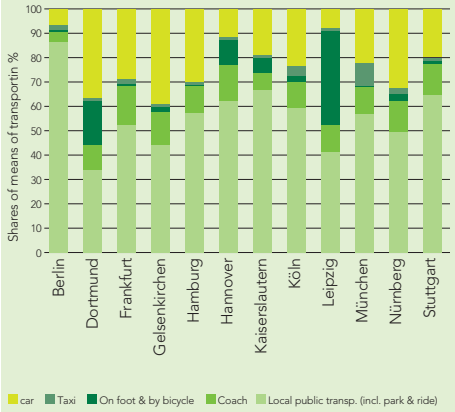
Many fans walked to the stadiums even when cities had not designated and upgraded a "World Cup Route". For the match against the Ivory Coast on 16 June 2006 in Stuttgart, 10,000 Dutch fans walked the 4.9 kilometres from the city centre to the stadium. And also for the match against Portugal in Nuremberg on 25 June 2006 Dutch fans covered the 5.5 kilometres between the inner city and the stadium on foot. Around 10.000 Swedish fans walked half the distance from the city centre to the stadium in Cologne on the 20 June 2006 for the match against England, causing temporary traffic jams but also contributing greatly to the special World Cup atmosphere.

The fine weather during the World Cup encouraged many people to go on foot to the stadiums - here Dutch fans on the way from Leipzig main station to the stadium.

Modal split of journeys to and from stadiums on the average of all host cities.



Modal split of journeys to World Cup stadiums, depending on city.



4.4 Results for Transport

Increasing the share of local public transport: summary of results

On the average of all World Cup games and host cities, around 57% of spectators used public transport to get to and from stadiums (including "park & ride"). A further 6% made their way on foot and around 11% travelled by coach. Environment-friendly means of transport thus accounted for a share of 74%. Only 23% of stadium visitors travelled by car.

The objective of every second visitor travelling to stadiums by public transport was therefore clearly surpassed. At the beginning of World Cup preparations, the share of public transport users was just around 40%. The reasons for the success of public transport were, above all, the integration of stadiums into public transport networks, the good quality of service during the World Cup, little direct parking space at stadiums and the introduction of the "KombiTicket" for the first time at a FIFA World Cup. Public transport benefited also from the high share of foreign visitors who flew to Germany and then continued their journey within Germany by bus and train.

Other spectators and helpers used their bicycles to get to stadiums. At some games, up to 500 cyclists were counted, at the match between France and South Korea in Leipzig more than 700. An average of 250 cyclists per match left their bikes in the secured parking area at the Berlin Olympia Stadium. These figures do not take account of bicycles left attached to fences and lampposts in the neighbourhood of the stadium.

On average, around 170 coaches travelled to each game; at some games more than 400 were counted. Planners had expected many more coaches, but many visitors preferred to travel by train or public transport.

In all, averaged over all games and cities, 74% of all journeys to and from stadiums were made by bus, train and bicycle and on foot. This is an unexpectedly high figure. Only 23% of journeys to stadiums were made by car; and this figure includes journeys by guests of honour, VIPs and journalists, for whom special car parks were made available in the immediate vicinity of all stadiums.

The relatively low share of cars is confirmed by a glance at car park occupancy figures at many World Cup stadiums. In Munich, utilization of public car parks was 45% (maximum capacity: 9,500 parking spaces), in Kaiserslautern 46% (12,000 "park & ride" parking spaces), in Leipzig 27 % (6,850 "park & ride" parking spaces) and in Berlin 25 % (7,200 "park & ride" parking spaces). And merely half of the 3,000 special FIFA parking spaces were used. Only in Dortmund and Gelsenkirchen, where sufficient parking space was directly available at the stadiums, was the capacity of 9,000 and 13,500 parking spaces, respectively, fully utilized at certain games.

1.9 million spectators were conveyed to the 64 World Cup games by public transport. Up to 90% of visitors to open-air, public-viewing events travelled by bus and train. There are several reasons for this readiness to use public transport: the good quality of public transport, adequate capacity of trains and buses as well as limited parking facilities at the stadiums. The "KombiTicket", which was on offer for the first time at a FIFA World Cup, played an important role. In addition, many foreign visitors, who had travelled to Germany by plane, then switched to trains and public transport to get to their stadium.

The improvement of public transport especially for the World Cup also had a further effect. The Association of German Public Transport Organizations (VDV) came to the conclusion that compared to normal transport volume an additional 30 million passengers used buses and trains during the World Cup in the cities involved.

A further key objective in the Green Goal transport concept was a reduction in the effects of transport on the climate: The climatic effects of journeys to and from stadiums during the 2006 FIFA World Cup in Germany will be reduced by 20%.

In all, the transportation of World Cup visitors within Germany, and thus under the responsibility of the OC, gave rise to approximately 70,500 tonnes of greenhouse gases (calculated as CO_2 equivalents). This figure does not include the transport of foreign visitors to and from the German border. An additional 2,500 tonnes arose from the supply of stadiums and the removal of waste and empty containers by lorry. Transport-related greenhouse gas emissions therefore totalled around 73,000 tonnes.

57% of emissions were accounted for by spectators with tickets obtained through official channels, participation national associations and the hospitality sector. Guests of honour, representatives of international associations and World Cup partners contributed around 37%. With 71% of total person-kilometres spectators travelled further than guests of honour, representatives of international associations and World Cup partners and their guests; but since they travelled more often with environment-friendly public transport, their share of emitted greenhouse gas emissions was proportionately much lower. Logistics accounted for around 3 % of emissions, and journeys by journalists made up 2%. World Cup teams contributed around 1% to greenhouse gas emissions, despite the fact that they travelled around 64,000 kilometres between their hotels and World Cup stadiums, with around 100 journeys by plane in Germany.

More than two-fifths of greenhouse gas emissions were accounted for by journeys by car and one-fifth by domestic air travel. Trains and buses contributed 24% and 11%, respectively, to greenhouse gas emissions. Due to the unfavourable greenhouse balance, the shares of cars and aircraft are much higher compared to those of public means of transport, although their share of passenger transport amounted to only 30% and 6%, respectively.

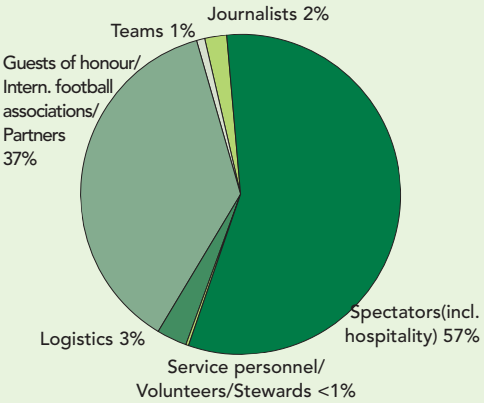
In all, 17,000 tonnes of CO_2 equivalents were saved through Green Goal measures in the area of transport, which corresponds to a saving of 19 %. In detail, savings can be attributed to six different effects:

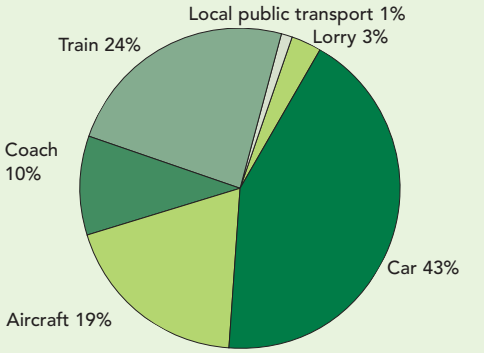
- 7,000 tonnes by guests of honour, representatives of international associations and World Cup partners: Journeys by coach frequently substituted travel by car and plane. As a whole, the share of cars and planes of this group of visitors was around 45%, compared to an expected share of 60%.

- 5,000 tonnes by foreign visitors: In contrast to the expectations of planners, fewer foreign visitors from neighbouring countries travelled by car to stadiums. Visitors from America, Asia and Australia also made greater use of rail travel than had been expected. The rail share was about 45%, where 25% had been expected. Numerous special and charter trains for foreign visitors, sample census at railway stations and the modest use of car parks underline the success of rail services.

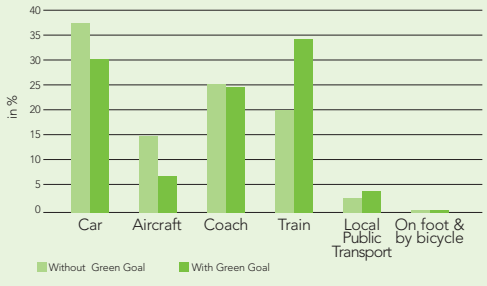
Foreign visitors, in particular, enjoyed travelling with Deutsche Bahn and even chartered whole trains.

Shares of groups of visitors and means of transport in total transport-related greenhouse gas emissions (calculated as CO_2 equivalents) during the World Cup.



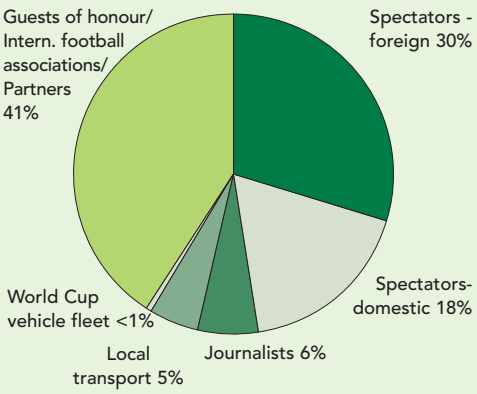


Shares of various means of transport in total journeys of visitors during the World Cup with and without Green Goal measures.



4.4 Results for Transport

Contributions to savings in the case of transport-related greenhouse gas emissions.



- 3,000 tonnes by domestic visitors: While the share of car drivers for normal Bundesliga and international matches is around 50%, during the World Cup car travel accounted for 45%. Rail travel, in particular, benefited from this development, with a share of just under 40%. The trend was confirmed by capacity utilization at "park & ride" facilities and parking areas for coaches, as well as by surveys of visitors in several Host cities.

- 1,000 tonnes by journalists: As a result of the "Mobility BahnCard" for free rail travel, journalists partly dispensed with journeys by car or plane. The share of train journeys was not 50%, as expected, but almost 90%. This trend is confirmed by the capacity utilization of trains and flight bookings with the Travel and Event Services of the OC. Moreover, many journalists made use of night-train services to save the cost of a hotel room.

- 800 tonnes by local transport: As a result of Green Goal measures, the share of environment-friendly transport by bus, rail and bicycle, as well as journeys on foot amounted to almost 75%. Before the World Cup a share of 55% had been expected (including 40% for local public transport).

- 50 tonnes by the official World Cup vehicles fleet: The 900 vehicles in the official World Cup fleet covered a total 2.4 million kilometres. The resulting greenhouse gas emissions amounted to 900 tonnes. Small buses with nine seats partly replaced cars with a lower passenger capacity. As a result, around 50 tonnes of greenhouse gases were saved.

A further objective in the Green Goal transport concept was a reduction in environmental pollution in the vicinity of stadiums: Direct environmental impacts (for example, noise and exhaust gas) in the vicinity of stadiums will be kept to a minimum.

This matter was of particular relevance for Kaiserslautern, Leipzig and Berlin, where the residential areas surrounding the stadiums are exposed to considerable disturbance by vehicles searching for parking spaces. Through the setting up of resident protection zones and special traffic zones, residential areas in the immediate vicinity of the respective stadiums were cordoned off for normal traffic on World Cup match days in all three cities. In Leipzig, as a result of feedback from residents, the cordoning off of residential areas around the stadium was put into effect much earlier in the day after the preliminary round. The burden on residents was also relieved through the high share of public transport, cyclists and pedestrians. The objective was therefore achieved.

The final objective in the Green Goal transport concept was the creation of environmentally-sound transportation services: Offers of environmentally sound transport will be specifically aimed at the main groups of visitors to the 2006 FIFA World Cup – foreign visitors, domestic visitors, journalists, "FIFA Family" and players.

The Deutsche Bahn, in particular, developed specific World Cup offers for visitors: the "World Champion BahnCard 25", the "World Champion Ticket", the "World Champion Pass" as well as "World Champion Surf&Rail". The "World Champion BahnCard 25", whose validity was linked to the success of the German team, was very popular; around 400,000 were sold. 25,000 "World Champion Tickets", 25,000 "World Champion Surf&Rail" tickets and around 10,000 "World Champion Passes" were also sold. In addition, charter trains were booked for large groups of visitors – such as Brazilians and Mexicans - as an integral part of package tours. Besides special offers from Deutsche Bahn, for the first time at a Football World Cup spectators could purchase so-called "KombiTickets", which entitled ticket holders to unlimited free travel on local transport networks on match days.

Other special, environment-friendly offers were created for journalists ("Mobility BahnCard", "Media Shuttle"), stadium personnel (bus shuttle services, free use of local public transport for volunteers). The OC and the Deutsche Bahn put together special offers for national teams for rail travel to World Cup games, which were taken up by four teams.

The objective of developing specific environmentally compatible offers of transport for the main groups of visitors to the World Cup was therefore achieved.

Reduction in the effects of transport on the climate: summary of results

In Germany, journeys by visitors to host cities and World Cup stadiums – together with the supply and disposal logistics of stadiums – gave rise to greenhouse gas emissions amounting to about 73,000 tonnes of CO_2 equivalents. This figure does not take account of emissions arising from the journeys of foreign visitors to and from Germany.

Without the transport measures initiated by Green Goal greenhouse gas emissions caused by the 2006 FIFA World Cup would have been around 90,000 tonnes. Through Green Goal measures about 17,000 tonnes of emissions were therefore saved, corresponding to a 19% saving of transport-related greenhouse gas emissions. The objective of reducing greenhouse gas emissions from transport during the World Cup was therefore largely achieved.

4.5 Climate neutrality

Global climate protection was of great significance for Green Goal. The key objective of the OC and its partners was to organize the 2006 FIFA World Cup in such a way, that for the first time the planning and realization of a World Cup tournament would to the greatest possible extent have no additional effects on the climate; that is, it should be practically climate-neutral. A three-stage strategy was pursued to achieve this ambitious objective:

To begin with, the demand for energy is reduced and energy efficiency increased through the use of emission-reducing and energy-saving technology and the use of environmentally beneficial means of transport. That is followed by the use of renewable energy sources in World Cup stadiums, for instance through the installation of solar plants and the use of green electricity. Finally, unavoidable greenhouse gas emissions are compensated.

4.5 Climate neutrality

With the innovative instrument of voluntary climate compensation, climatically harmful gases, which could not be avoided despite an ambitious environmental programme, could be offset through investment in climate protection projects in other places. Voluntary climate compensation opens up new opportunities for the environmentally sound organization of large sporting events. It represents both a chance and a challenge for organizers of large sporting events – at present and in the future – to keep their environmental "footprint" as small as possible. The OC took on this responsibility for the 2006 FIFA World Cup. The ambitious objective was to bring about such compensation through high-grade climate protection projects.

How did compensation function within the scope of Green Goal? To begin with, the quantity of greenhouse gases to be compensated was calculated. A systematic framework, corresponding to the responsibility of the OC within German borders, laid down the emission-relevant activities that were to be covered. With the aid of an emission model, the quantity of greenhouse gases associated with these activities was then determined.

Experts then set out to search for suitable climate protection projects, with the help of which the calculated quantity of climate gases could be offset. It had initially been examined whether greenhouse gas emissions caused by the World Cup could be offset by projects in Germany. This idea was quickly rejected, since, in the opinion of those responsible for the decision, projects in newly-emerging and developing countries would be not only concerned with relieving the local environment, they would also make a contribution to sustainable development in these countries. With such projects, the FIFA idea of solidarity could be supported and the global spirit of the World Cup conveyed. The flexible mechanisms of the Kyoto Protocol lay down international quality standards for these climate protection projects. The precise idea behind the clean development mechanism (CDM) is the saving of greenhouse gases in developing countries and the offsetting of emissions of these gases elsewhere. It is also the declared aim of the CDM to support sustainable development in developing and newly emerging countries through such projects.

Green Goal went one step further. The main criterion for the selection projects was that they should have a large environmental effect while also offering great social benefits to the local population. Therefore, only those projects were considered that, apart from internationally recognized criteria, also complied with additional environmental and sustainability standards. A guarantor for this is the so-called "Gold Standard", which was developed by the WWF and other environmental organizations and interest groups. It lays down, for instance, that only those projects should be supported that, on the one hand, promote renewable energy sources and energy efficiency, and on the other hand take extensive account of local interest groups. Reafforestation projects, for instance, do not at present meet the standards of environmental organizations. With this demand for quality Green Goal pursued new paths in voluntary climate compensation, in particular with large sporting events. It turned out, however, that very few projects meet these high social and environmental standards. The climate projects selected or initiated by Green Goal are among the first worldwide to be certificated in accordance with the "Gold Standard". The incremental emissions caused by the 2006 FIFA World Cup in Germany can be gradually compensated with the greenhouse gas emissions avoided by these projects.

Binding and transparent procedures have been laid down for all projects – for instance, for determination of annual quantities of saved gases – to ensure that greenhouse gases are in fact saved. Only when independent examiners have verified such savings are they taken into account in the Green Goal climate balance.

4.5.1 Climate balance: greenhouse gases from the World Cup

The climate balance had the objective of estimating, before the event, the incremental greenhouse gas emissions in Germany that would be caused by the World Cup. Following the World Cup, a final balance was drawn up on the basis of newly available data. For this, four areas were considered: the construction and conversion of stadiums, energy consumption through stadium operations and temporary facilities, transport (with travel to and from World Cup stadiums by 3.4 million spectators) and energy consumption resulting from the overnight stays of visitors.

With climate compensation, those greenhouse gas emissions were considered that arose within German borders during the World Cup. Restriction to Germany derived from the organizational accountability of the OC to the FIFA with respect to procedures in Germany. The decision on the balance period was taken at a time when it was not foreseeable who would support the OC initiative.

4.5 Climate neutrality

Many things contributed to greenhouse gas emissions of the World Cup – including the construction of stadiums. For instance, around 320,000 tonnes of building materials were calculated for the construction of the new Munich Arena and converted into CO_2 equivalents.

The estimate of greenhouse gas emissions and their final calculation took place in two steps. To begin with, demand for electricity and heat as well as transport-kilometres and product quantities were calculated appropriate to the groups responsible. Subsequently, greenhouse gas emissions resulting from estimated quantities were calculated with the help of specific emission values for the production of electricity, heat and products, or for transport. This calculation took place with the aid of the process chain model and software tool GEMIS (Global Emissions Model of Integrated Systems). With GEMIS, all upstream process steps are included in the balance for a product. In the case of electricity this means that all emissions, from the production of the energy source to its burning in a power plant, flow into the balance.

Sub-balance for construction

In order to calculate the greenhouse gas emissions brought about by the construction of the twelve World Cup stadiums, an estimate is made based on the stadiums in Berlin, Dortmund, Cologne, Leipzig and Munich. The most important building materials were considered: concrete, steel and, so far as possible, glass, copper and plastics as well as roofing, façades, electric cables and ventilation ducts. In the Munich Arena, for instance, a calculated total of around 320,000 tonnes of building materials were used, from which almost 100,000 tonnes of CO_2 equivalents result, of which 97 % are attributable to the steel and concrete of the shell. Interior fittings, on the other hand, can be ignored.

By contrast, in the Olympia Stadium in Berlin only around half as much greenhouse gases arose as in Munich, and in Cologne a little more that one-third. For stadiums where no data on building materials was available, estimates were made based on their size and type of construction as well as comparison with other stadiums. In addition, underground car parks were also included in the calculation, as far as they were not integrated into the stadium construction. Construction of the multi-storey car park in Munich, which is the largest in Europe, resulted in almost 60,000 tonnes of CO_2 equivalents. For all twelve stadiums a total of about 680,000 tonnes of greenhouse gas emissions arose.
Based on the period from the 1974 World Cup to the 2006 World Cup, it is generally assumed that stadiums have a useful life of thirty years. During this period

an average of 835 large events take place in each stadium. One game accounts for around 65 tonnes of CO_2 equivalents. The share of greenhouse gas emissions for the 64 World Cup games totals about 4,140 tonnes, which includes, proportionately, emissions from the construction of underground car parks.

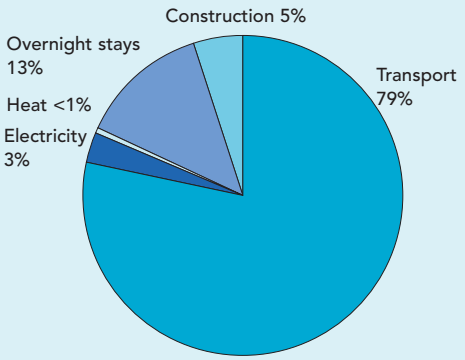
Sub-balance for energy
In the energy area, greenhouse gas emissions are calculated from the electricity and heat consumption of stadiums and temporary facilities. Total electricity consumption during the World Cup amounting to 12.6 million kWh, and substitute supply of 13 million kWh of green electricity from hydropower was taken into account. Whereas conventional electricity production for the World Cup gave rise to around 7,540 tonnes of CO_2 equivalents, the use of green electricity saved about 5,050 tonnes of CO_2 equivalents. For the World Cup there remain, therefore, about 2,490 tonnes of CO_2 equivalents. The total demand for heat of the World Cup, amounting to 1.4 million kWh, resulted in an additional 400 tonnes of CO_2 equivalents.

Sub-balance for transport
The climate balance for transport shows a total of 73,000 tonnes of CO_2 equivalents in respect of the 1.1 billion person-kilometres travelled by 3.4 million World Cup spectators as well as transport with respect to World Cup logistics.

Sub-balance for overnight stays
Specific electricity and heat demand for an overnight stay amounts to about 4.2 kWh of electricity and 3.4 kWh of heat per person. The number of overnight stays was calculated at one per stadium visitor. Greenhouse gas emissions from the overnight stays of 3.4 million stadium visitors therefore amounted to a total of around 11,640 tonnes of CO_2 equivalents.

In all, just under 92,000 tonnes of greenhouse gases were caused by travel to and from stadiums, by the energy consumption of stadiums and temporary facilities, the construction of stadiums and the overnight stays of stadium visitors. Transport was the main polluter, with 79%. As a result of large savings in greenhouse gases in the transport area, the total of greenhouse gases fell clearly below the 100,000 tonnes of CO_2 equivalents that had been originally estimated before the World Cup.

Shares of different areas in the greenhouse gas emissions of the World Cup



4.5.2 Compensation through climate protection projects

More than 30 international climate protection projects were examined to see if they complied with the standards set by Green Goal. The "Gold Standard" criteria and the region in which the project is carried out were the determinants for selection.

In December 2004, a tsunami laid waste the coasts of South-East Asia. With a climate protection project in this region the German Football Association (DFB) and the OC wanted not only to make a contribution to environmental protection, but also to help the people affected to rebuild their lives. In order to establish contact to the host of the 2010 FIFA World Cup, the first World Cup on the African continent, two projects were selected in South Africa.

In the Indian province of Tamil Nadu around 900 dome furnaces are being built, in which farmers ferment their cow dung. The resulting biogas is piped into their houses as fuel for simple gas cookers.

"Family Clean Energy Packages": Biogas plants in Tamil Nadu

Very few families in the Indian Province of Nagapattinam will think back to the World Cup in Germany while doing the cooking. Nevertheless, around 900 farmers and their families will benefit from the World Cup long after the excitement in Germany has died down. The "Family Clean Energy Packages" project, for which the German Football Association provided 500,000 euros, will ensure an environmentally compatible and secure energy supply for several thousand villagers. This project was specially designed by Indian partners for the World Cup and arranged by BASE in Basel, a UNEP co-operation centre.

Work began in May 2006 on building simple biogas generating units in small villages on the coast. The farmers put dung from their cows into closed domed furnaces made of brinks and cement. During fermentation of the dung methane is produced, which is piped directly into houses as fuel for simple gas stoves. These biogas units save greenhouse gases, since the biogas replaces the firewood or other fossil sources that have up to now been burnt on open fires in houses. At the same time, climatically harmful emissions of methane is avoided through the burning of biogas. This way, about 30,000 tonnes of carbon dioxide will be avoided during the next ten years.

Besides avoiding greenhouse gases, the biogas units provide poor families with free, clean gas to cook with. But cooking with biogas also has a further benefit: It protects health, in particular that of women and children, who now no longer have to cook on open fires. Each year more than 400,000 women and children die in India from respiratory illnesses caused by smoke from open fires. This is 400 times the number of deaths claimed by malaria.

The funds made available by the German Football Association pay not only for biogas generation units, but also for the repair of around 100 houses damaged by the tsunami. In addition, needy families are also given cows.

Apart from the project in India, further projects were begun in two regions of South Africa, which were developed by the Swiss myclimate Foundation in Zürich together with partners in South Africa. Project financing was provided by the FIFA, Deutsche Telekom and PlasticsEurope, the Association of Plastics Manufacturers.

A sawmill produces sawdust for the new boiler at the citrus fruit farm in Letaba, South Africa

Processing of oranges at the citrus fruit farm in Letaba, South Africa

Regenerative raw materials for a citrus fruit farm

The beneficiary of this project is a citrus fruit farm in Letaba in the north of South Africa, in the neighbourhood of the Krüger National Park. The farm's old coal furnace, which produced steam for the treatment of fruit, will be shut down and replaced by a new boiler that runs on sawdust. As a by-product of the region's paper industry, sawdust was previously not utilized but dumped. By replacing coal with sawdust around 19,000 tonnes of CO_2 will be saved annually. Furthermore, the depositing of sawdust produces the greenhouse gas methane, emissions of which will be reduced by the thermal use of sawdust. With this biogas project new jobs are also created.

Sewage gas provides electricity in a township

The second climate protection project in South Africa is in Sebokeng Township near Johannesburg. Gas develops in the digesting tower of the local sewage plant, which contains a high proportion of the greenhouse gas methane. This methane has previously escaped unhindered into the atmosphere. In future, methane will be used by a gas engine with a generator to produce electricity. Not only will methane no longer enter the atmosphere; through the production of electricity with sewer gas, other greenhouse gases will be avoided that would otherwise arise in electricity production. Besides annual savings of around 5,800 tonnes of CO_2 this project also creates training opportunities and jobs for local engineers.

About 70,000 tonnes of CO_2 equivalents are credited from the two South African projects to the climate neutrality of the 2006 World Cup. This corresponds roughly with the savings that can be achieved locally within the first three years.

Approximately 50,000 to 60,000 tonnes of CO_2 equivalents are attributable to the production of steam from biomass in Letaba, the remaining quantity to the sewage gas project in Sebokeng.

Sewage plant near Sebokeng Township close to Johannesburg, South Africa

4.5.3 Results on climate neutrality

A total of 1.2 million euros were required within the framework of Green Goal for the financing of the climate projects in India and South Africa. The Indian project, "Family Clean Energy Packages", was financed with 500,000 euros from the German Football Association. The two South African projects were financed by FIFA (400,000 euros), the official Green Goal partner Deutsche Telekom (200,000 euros) and the Green Goal supporter PlasticsEurope (100,000 euros). This sum of 1.2 million euros is sufficient to compensate the 100,000 tonnes of greenhouse gases that arose during the 2006 World Cup in Germany, enabling, for the first time, a World Cup to be conducted with a neutral effect on the climate.
A proportion of the above-mentioned funds was required to finance necessary capital investment before the projects actually began. Since the projects stretch over several years, not all funds were transferred in advance to those responsible for the projects in India and South Africa. Further payments will be made once proof is provided that the intended reduction in greenhouse gases has actually taken place. For this purpose a monitoring plan was agreed on, drawn up in accordance with international standards, with those responsible for the projects, which will be independently verified on an annual basis. Management of the funds has been entrusted to 3C Climate Change Consulting GmbH, which drew up the contracts with the responsible parties in India and South Africa and will undertake the transfer of money during the life of the projects.

The first biogas generation units are in operation in Tamil Nadu. In the period up to October 2006 around 230 units had been built, a number of which are already providing gas for cooking purposes. A further 70 units are currently been built, and they should come into operation by the end of 2006. During the same period, around 100 houses will have been repaired. In the first half of 2007 needy families will receive the cows promised to them. Up to now, small quantities of greenhouse gases have been saved; the full reduction potential can be exploited during the course of 2007.

The citrus-farm project is presently passing through national and international approval procedures for recognition as a climate protection project. Contracts have already been signed with sawmills to secure further supplies of sawdust. Biomass boilers should arrive by mid-2007, so that initial emission reductions can be expected, at the latest, in 2008.

The project in Sebokeng Township was presented to the South African authorities, where it received a very positive response. The piping system has to be renewed in order for sewer gas to be distributed to engines. Once this has been done, engines can be connected and electricity produced. Completion is expected during the course of 2007, so that the first greenhouse gases can be saved in 2008.

Climate-neutral World Cup in Germany – a résumé

With the financial support of the German Football Association (DFB), the FIFA as well as further Green Goal partners and supporters, for the first time a World Cup was organized and run with a neutral effect on the global climate (related to the emissions in Germany, that is within the area of responsibility of the OC). 92,000 tonnes of unavoidable greenhouse gas emissions that were brought about by the 2006 FIFA World Cup in Germany will be more than offset by three climate protection projects in India and South Africa, with which savings of around 100,000 tonnes of $C0_2$ can be avoided. Even the international travel of all the delegations of participating football associations could be included in the calculation, which makes up around 5,100 tonnes of greenhouse gases.

The demanding "Gold Standard" criteria, on which the selection of projects was based, are an important model for the future. The "Gold Standard" guarantees not only the highest environmental standards, but also great social benefits for the local people involved. Green Goal also set standards for the conduct of the projects. As a result of binding procedures and monitoring as well as verification of achieved greenhouse gas savings, the climate protection activities set a benchmark for future large sporting events.

Apart from the total of avoided greenhouse gases, the high standards of the projects represent the key factor in voluntary climate compensation, and therefore also a model and challenge for future large sporting events.

4 Conclusion

In this concluding section, the main results of realization of different aspects of Green Goal are again reviewed and the most important lessons deduced.

With a photovoltaic plant on its new main station, Gelsenkirchen presents itself since the beginning of June 2006 as a solar city.

Water

The outstanding project in the area of water consumption, due solely to the savings it produced, is the rainwater cistern. A particular highlight is the cistern in the Olympia Stadium in Berlin, which is said to be larger than that in any other European stadium. Less conspicuous, but equally impressive in their effect, were measures such as the installation of dry urinals in stadiums. Following the success of water-saving measures in World Cup stadiums, the most important task for the future will be to introduce water-saving technologies as an environmental standard in all Bundesliga stadiums, as well as in amateur football.

Waste

Clean stadiums provided an obvious indication of successful waste avoidance during the World Cup. One example of successful waste avoidance was the use of returnable plastic beakers for the first time at a World Cup. An important lesson learned was that effective waste avoidance makes separate collection of waste in the spectator areas of stadiums superfluous. In all backstage areas (such as kiosks and kitchens), on the other hand, consistent separate collection of all waste fractions is both practical and necessary. Experiences during the World Cup should be made use of in future in the Bundesliga, and consistent separate collection of all waste fractions carried out in backstage areas. A number of World Cup stadiums and cities managed to sensitize visitors for the topic of waste through the setting up of waste-collection islands and the labelling of waste bins with appropriate Green Goal symbols. With a view to more extensive sensitization, it would have been desirable for visitors to be made aware of the World Cup waste concept before the tournament (for example, with the dispatch of tickets), and for Green Goal symbols to be used in all stadiums and host cities. Open-air, public-viewing events, where Green Goal measures were also largely implemented, were not part of the World Cup waste concept initiated by the OC. Because huge numbers of people attended these open-air events, however, a standardized waste concept is required for stadiums and large open-air events. For this purpose, even closer co-operation between the World Cup Organizing Committee and host cities should be aimed for in the future.

Energy

The installation of several thousand square metres of solar cells and the supply of certificated green electricity for the World Cup are examples of the promotion of environmentally beneficial renewable energy through Green Goal. The Green Goal energy concept also demonstrated, however, that substantial energy-saving potentials exist in stadiums that could not all be exploited during the World Cup. It was obvious that the pressure on costs during stadium construction was often at the expense of energy efficiency, which will make itself felt later in the form of unnecessarily high energy costs. The introduction in many stadiums of energy management systems, such as EMAS, and energy consulting offers considerable possibilities for energy saving and cost reduction.

Transport

Substantially more visitors travelled to host cities and World Cup stadiums with environmentally favourable public means of transport – such as by bus or train – than had originally been expected. Moreover, many visitors walked to stadiums. In all, 75% of visitors travelled to stadiums by bus, rail and bicycle or on foot, and 25% travelled by car. The good result is attributable, in particular, to the

"Kombiticket", which was on offer for the first time at a FIFA World Cup, but also to good stadium links with the public transport network and the excellent quality of information on environment-friendly travel opportunities that was available to visitors before the World Cup. The special World Cup offers of the Deutsche Bahn had a major influence on the decision of many visitors to travel by rail and make a contribution to reducing greenhouse gas emissions during the World Cup. More consistent parking management and dispensing completely with parking spaces at all stadiums would have added to the success. The official World Cup vehicle fleet for the transport of VIPs and sports officials fulfilled its exemplary purpose to only a limited extent. For future World Cup tournaments vehicles should only be used that dispose of the best available environmental standards; and all drivers should be obliged to undergo training in fuel-saving driving.

Climate

The adverse effects of transport on the climate resulting from large sporting events will also not be completely avoidable in the foreseeable future. In this respect, the concept of climate compensation represents a path for the future, which should become a standard for large sporting events. The mechanism of compensating greenhouse gas emissions by means of so-called "Gold Standard" projects in developing and newly emerging countries is regarded as a particular opportunity to harmonize the idea of environmental protection with the solidarity concept of the world of sport and the promotion of sustainable development in the respective countries.

Expanding the applicability of climatic neutrality to include the international travel of foreign World Cup visitors is certainly desirable. To meet this challenge, closer co-operation between host countries and organizers, partners, participating national football associations and, not least, World Cup visitors is necessary. Up to now, no large sporting event has compensated a quantity of greenhouse gases that is comparable to that achieved by Green Goal with its "Gold Standard" projects. In view of the sustainable nature of the concept, the quality of compensation had the highest priority in Green Goal.

The communication of Green Goal™

"Sport and the environment go hand in hand". That was the main message in communications concerning the environmental programme. Green Goal was integrated into communications of the Organizing Committee as an element of reporting on the World Cup. The target group was not only those interested in and sensitized for ecology, but rather the population as a whole and, in particular, the world of football, which generally has little contact with environmental issues. At the centre of communications was information on successful projects and measures, as well as campaigns and other activities, which were often specifically target at the general public, football clubs and schools. A further aspect was the presentation of Green Goal as a model for future large sporting events.

Communications need names. Securing the co-operation of Professor Klaus Töpfer, the former Director of the United Nations Environment Programme (UNEP), as first Green Goal Ambassador was therefore a great success. He strengthened the ecological profile of the World Cup through his personality and the great international respect that he enjoys. There was also an agreement on co-operation with UNEP, which distributed information on Green Goal through its own communication channels.

Co-operation with host cities and World Cup and Green Goal partners as well as the support of the Federal Environment Ministry were helpful and necessary, not only with regard to the achievement of Green Goal objectives but also because it played an important role in communications.

Internet presence

The Internet is today the quickest and most popular medium of communication. In April 2005, a Green Goal Website (http://greengoal.fifaworldcup.yahoo.net) went officially online and was presented to the public. The Website presented information on the development, objectives and partners of the environmental programme. An extensive news section regularly reported on new projects, progress and results. Since it went online, more than 120,000 visitors and over 730,000 page-views have been recorded. Even in August 2006 over 30,000 page-views were recorded, which confirms that Green Goal arouses interest even after the World Cup.

Besides the Website, communications were supported through the Green Goal logo, a poster and an illustrated pamphlet on the environmental programme as well as a short film.

"Club 2006" and "Talents 2006"

In order to secure the widest spread of the environmental idea, Green Goal was integrated into two campaigns: "Club 2006" and "Talents 2006".

"Club 2006 - The FIFA World Cup in clubs" was a broadly designed campaign that was supported by the Federal Environment Ministry. Football clubs in Germany were called upon to get involved – under the umbrella of Green Goal – in environmental and nature conservation. The prize offered in the club competition was a game against the German national team or a Bundesliga team. Just under 4,500 clubs took part, and almost 10% of them took up the Green Goal theme. They built nesting boxes, collected waste from club grounds, replaced throwaway with returnable crockery and installed solar plants. Part of the set task was to have reports on activities published in local newspapers.

"Talents 2006 – The FIFA World Cup in Schools" was a competition ran at schools in Germany and abroad, in which schoolchildren were invited to write essays, paint pictures, compose songs and create objects connected in the widest sense with football and the environment. Some school groups, for example, created artistic objects with recycling materials, thereby drawing attention in their own way to the protection of resources.

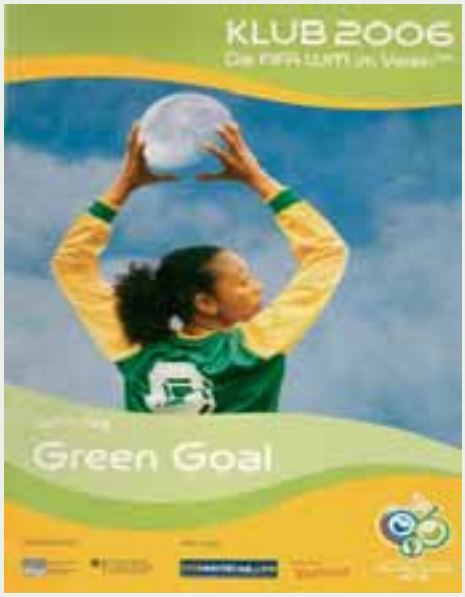
Green Goal in the host cities

Six host cities – Dortmund, Gelsenkirchen, Hamburg, Kaiserslautern, Leipzig and Munich – set up their own Green Goal working groups and initiatives. Many of the municipal measures have already been discussed elsewhere in this Report; further activities are described below.

The Dortmund working group was one of the most active. It organized workshops and conferences at which Green Goal was presented. In co-operation with the local Agenda 21 office, an information evening was held on the topics of Green Goal, fair trade and fair play in the official World Cup Globe, which toured

Hydrogen-powered "cargo bike" from Deutschen Telekom.

"Club 2006" campaign: Günter Netzer, former Federal Environment Minister Jürgen Trittin and Wolfgang Niersbach at FC Delhoven



Green Goal pamphlet for the "Club 2006" campaign

Good Practice
Eco-players in Elbmarsch

The football club Eintracht Elbmarsch is thoroughly committed to the environment, and for this reason it was honoured by the OC within the scope of "Club 2006". A television portrait of the club was broadcast worldwide.
The club grounds are very close to wetlands. Environmental aspects played an important role in the construction of the sports facilities. The clubhouse is of timber construction. A solar plant is installed on the roof, which heats water for economical showers. The floodlighting system is equipped with special lights that attract insects from the biotope to a much lesser extent than the usual lights. As part of the "Club 2006" campaign, the club organized a tournament and a "World Cup Green Goal Day", where only returnable crockery and beakers were used and waste was collected separately. The "eco-players" presented information on placards concerning the biotope and the rich animal and plant life in the region.

around World Cup cities. The working group also initiated a cleaning-up action in a city district, during which Green Goal was also the subject of discussion.
The commitment of the smallest World Cup city, Kaiserslautern, was exemplary. The city and its residents made use of Green Goal to give an impulse to energy saving and climate protection throughout the region. The city organized workshops in 2003, 2004 and 2005, where interested residents were invited to discuss the realization of Green Goal in the city. These workshops gave birth to the programmes, "Green Goal – With solar energy to the World Cup" and "2006 euros for your house". The project that attracted the most attention was the solar plant on the stadium roof, which was inaugurated during a press conference given by the Environment Minister of the State of Rheinland-Pfalz. Kaiserslautern also produced its own Green Goal pamphlet and flyer, which reported on activities in the city.

Other cities initiated environmental projects concerning matters associated with Green Goal. They included the "Solar Cup" in Gelsenkirchen, where players from schools, firms and many other organizations tested their skills in "target footfall"; at the same time money was collected for solar projects. Leipzig carried out "eco-checks" and environmental measures at local sports clubs. And motivated by Green Goal, the State of Rheinland-Pfalz started its own climate campaign for the World Cup.

Green Goal and the role of its partners and suppliers

The essence of the involvement of World Cup and Green Goal partners and suppliers was their participation in the financing of climate protection projects in South Africa. In addition, Green Goal partners contributed to the environment-friendly organization of the World Cup with their own projects. The environmental concept also allowed partners the opportunity to present their own activities. Partners and suppliers reported on their Green Goal involvement at press conferences, in press releases, in their own publications and on their Websites.

Deutsche Telekom AG, the official FIFA and Green Goal partner, provided support not only through its involvement in climate compensation, but also through several projects and actions that gained wide attention. An important project was "Telekom kicks for climate protection", with which the company invited football fans at open-air, public-viewing events in host cities to participate in "target football", where every successful shot was worth 100 kilograms of greenhouse gases, which will be offset by climate protection projects. Deutsche Telekom also presented its Green Goal involvement at numerous events, such as the Hanover Industrial Fair, the Environment Festival in Berlin and its own "Sustainability Day". The first climate-neutral telephone card also contributes to climate protection. All greenhouse gas emissions arising from production and use of the card will be compensated.

Coca Cola, the Green Goal official partner, received the international environment prize, "Cooling Industry Award 2006" in the category, "Green End-user of the Year", for the use of energy-saving refrigerators, which operate without climatically harmful fluorocarbons.

Deutsche Bahn (DB), the Green Goal supplier, integrated the environmental programme into its own public relations activities in a number of ways. Before the start of the World Cup, for instance, action days were held at the main railway stations in the twelve host cities, at which Green Goal was present with its own information stand. Posters drawing attention to climate protection were hung up

at numerous railway stations, and passengers in long-distance trains were informed about Green Goal in "mobil", the DB house magazine. In addition, special travel offers were developed just for the World Cup, with the aim of convincing as many visitors as possible to travel by rail to World Cup games.

The utility EnBW, a further Green Goal supplier, not only supplied the World Cup with green electricity, it also offered normal customers electricity from renewable sources under the name "EnBW NaturEnergie Green Goal". EnBW also promoted its involvement in Green Goal and its own green electricity in large-format advertisements in national newspapers.

PlasticsEurope, the Association of Plastics Manufacturers, supported the environmental programme through its involvement in climate protection projects. PlasticsEurope promoted the idea of a climate-compatible World Cup at a reception in Brussels at the end of May 2006, which was attended by 250 members of the staff of the European Parliament and the European Commission. The guests had the opportunity to test their penalty-taking skills against professional players: Jean-Marie Pfaff, former goalkeeper with Bayern Munich and Davino Verhulst, goalkeeper with KSK Beveren. Each successful penalty kick counted for a symbolic tonne of CO_2, which will be offset by climate protection projects.

The two hydrogen buses of the oil company Total Germany could not fail to be noticed. They were presented to the public before the start of the World Cup in the presence of Federal Environment Minister Sigmar Gabriel, and were used on the streets of Berlin during the World Cup for the media shuttle to the Olympia Stadium.

Green Goal in the stadiums

A short Green Goal film was shown on large screens in all twelve stadiums around thirty minutes before the start of each World Cup game. The spot, which was specially created for Green Goal, promoted environmental protection in a humorous way. In addition, placards and signs on kiosks drew attention to the

PlasticsEurope, the Association of Plastics Manufacturers, promoted the idea of a climate-compatible World Cup at the end of May 2006 in Brussels with a penalty-kicking competition: Each successful shot represented one symbolic tonne of CO_2, which will be compensated by climate protection projects.

The first "climate-neutral telephone card" from Deutscher Telekom

multi-use system, and special Green Goal symbols on waste bins informed visitors about separate waste collection.

Green Goal as a model

The environmental concept was presented at international conferences, including the "World Conference of Sports and Environment" in Nairobi, Kenya, which was organized by the International Olympic Committee (IOC) and UNEP, and at a United Nations Climate Conference in Montreal, Canada. The concept aroused great interest and wide approval. The interest of organizers of future large sporting events confirms the exemplary character of the environmental programme of the 2006 FIFA World Cup. A similar environmental concept is being planned for the 2008 UEFA EURO in Austria. At the end of 2005, a delegation of Austrian organizers of the EURO spent three days in Germany gathering information about Green Goal. Interest on the part of the planners of the 2010 FIFA World Cup in South Africa gives cause for hope that Green Goal will be continued there. That Green Goal is taken up by non-professional football players is shown by an example from Montreal, where, in September 2006, the World Cup was restaged on a small scale and - with reference to Green Goal – environmental issues taken into account in the organization of the tournament.

Green Goal and the media response

The press conferences and press releases of the OC and its partners met with a strong response on the part of newspapers, television and radio. Articles appeared in regional, national and international newspapers and magazines. Television and radio stations in Germany and abroad broadcast reports and interviews.

Green Goal found recognition among interested parties and experts as well as in the media. The campaigns and activities of host cities contributed to the level of awareness of the Green Goal idea. For a large sporting event, reports on Green Goal and the environment at both a national and an international level were on a comparatively large scale.

Environmental programmes, such as Green Goal, have the potential to reach a very wide section of the public and, as a result, to make an important contribution to the promotion of environmental awareness among the population as a whole. Experiences with the 2006 World Cup in Germany confirmed, however, that this great opportunity had not been exploited. Using the popularity of a large sporting event for the sensitization of broader sections of the population therefore remains a challenge for future environmental programmes and World Cup tournaments.

6 Outlook and recommendations

With Green Goal™ the Organizing Committee (OC) of the 2006 FIFA World Cup™ entered unknown territory. Inspired by the Olympic movement, the OC faced the challenge of putting into effect for the first time an extensive environmental programme for a World Cup tournament. The objective was not only to lessen the adverse environmental effects of the World Cup and to sensitize both participants and guests for environmental protection and nature conservation. Green Goal should also make a contribution towards the "sustainable legacy" of the World Cup in Germany, providing, as it were, an incentive and orientation not only for future tournaments, but also for the future of German football.

Looking back, the project was a success. With support from many sides, the OC showed that environmental and resource protection could be an integral part of a large sporting event. Those who organize large sporting events in future should profit from the experiences made, which also indicate where and why such a concept for a World Cup tournament still has its limitations.

Extract from the FIFA Fair Play Code: 10. Use football to make a better world.

Football has an incredible power, which can be used to make this world a better place, in which everyone can live. Use this powerful platform to promote peace, equality, health and education for everyone. Make the game better, take it to the world, and you will be fostering a better world.

"Fair play for the environment": an opportunity for FIFA

FIFA, the Fédération International de Football Association, is in a key position to decide the role that environmental protection will play in international football and thus at future World Cup tournaments.

Besides social responsibility, environmental protection is another essential pillar of sustainable development. FIFA is conscious of its social responsibility. It is the FIFA vision to use the positive power of football to make a better world, a vision that reaches beyond sport and ascribes a responsible and positive role to football in the shaping of our future. FIFA already faces up to important societal challenges. The fight against discrimination, racism and child labour, as well as its efforts towards equal opportunities for girls and boys and social integration are some of the focal points of FIFA's social commitment over many years, which they address with the Fair Play Code and the campaign, "Football for Hope".

In this connection, FIFA has entered into strategic partnerships with such renowned international organizations as UNICEF, WHO, IAO, UNHCR and SOS-Kinderdorf International, in order to put the power of football at the disposal of experienced and qualified people who work day after day for a better world. Greater integration of environmental protection into FIFA visions and the FIFA Fair Play Code as well as the development of strategic partnerships with renowned supranational bodies (such as UNEP) and international non-governmental environmental organizations could be an important step for environmental protection in international football. With clear and unambiguous messages, the enormous influence of football could help to face up to the worldwide challenges of environmental protection. Football also needs a healthy and clean environment.

The Olympic movement already successfully pursues this path with the incorporation of environmental protection into the Olympic Charter, the formulation of its own Agenda 21 and co-operation with the UNEP. Besides sport and culture, environmental protection is the third pillar of the Olympic movement. Since 1994, environmental protection is an obligatory part of applications for the Olympic Games. Environmental concepts are accordingly not only a constituent part of applications; they are also an integral part of the planning and organization of the Olympic Games. The environmental concept of the 2000 Olympic Games in Sydney and the 2006 Winter Olympics in Turin are milestones so far as effective and successful environmental concepts for large sporting events are concerned. They prove the importance of binding guidelines.

In competition for environmental protection: environmental guidelines show the way

There are presently no binding FIFA environmental guidelines for World Cup applications. For future application procedures they would help to ensure that football associations take account of environmental protection in their planning. Organizational latitude is at its greatest during the application phase, when basic decisions are taken for future implementation. Green Goal has shown how particularly important it is take account of environmental guidelines and objectives in the planning of stadium infrastructure. For at the time of awarding a World Cup, the planning and construction of stadiums can be so advanced that environmental measures of a structural nature are difficult to carry out. The introduction of environmental guidelines for application procedures would be an important step towards environment-compatible football tournaments. This way, the dialogue

with policy-makers, the business sector, stadiums, cities and environmental groups could be encouraged with the prospect of environmental specifications for stadiums and an environmental concept in applications.

Environmental protection in official FIFA demands on World Cup stadiums

Official FIFA demands on World Cup stadiums determine to a great extent the design of stadium infrastructure. They describe, for example, the technical features of required equipment and safety precautions. Environmental aspects are not mentioned.

In selecting the twelve World Cup stadiums from the final 16 applicants, the OC extended official FIFA demands on stadiums with an additional environmental chapter; an important new step, which should be retained for future World Cup tournaments. Its binding quality must be much stronger, however, in order that an increase in environmental performance receives the same priority as obligatory technical equipment.

With binding environmental specifications on the part of FIFA, a problem specifically related to the World Cup could possibly be dealt with, namely, that the OC of the responsible football association has no direct influence on the construction, renovation or operation of World Cup stadiums, apart from during the period of the World Cup, when it rents the stadiums. That is an additional challenge, which distinguishes the World Cup from the organization of the Olympic Games. The environmental standard of World Cup stadiums could also be secured or improved in those cases, when public funds are employed in the construction or renovation of stadiums. Were the granting of funds to be coupled with environmental specifications, environmental measures could be guaranteed, which might require additional capital expenditure that, however, would be paid off by way of reduced operating costs.

Environmental protection must be organized: the responsibility of football associations

Apart from the FIFA, the responsible football associations will also be very important for environmental protection at future World Cup tournaments.
A number of suggestions and recommendation for future organizers of World Cup tournaments can de deduced from Green Goal experiences, beginning with the application phase and ending with documentation after the event.
Experience has shown how important it is to embody the vision and principle of sustainability - particularly in the area of environmental protection – in the application phase, where the organizational latitude with respect to future planning is at its greatest. At this point in time, basic decisions for future implementation are made. Here, it would be important to discuss planning issues with potential partners (host cities and stadiums) and to draw up a Memorandum of Understanding. The early involvement of interest groups, such as environmental organizations, could also improve the quality and acceptance of environmental and sustainability concepts.

It is important to create the organizational conditions for successful implementation already at the planning stage. Many of the tasks of an organizing committee touch on environmental issues. In all relevant departments of the OC someone has to be authorized to contribute to and take account of appropriate environmental demands. In addition, sufficient personnel are required who should be primarily entrusted with the environmental concept. The German OC itself suggested a "Sustainable Legacy Department", which would concern itself at future World Cup tournaments with the question: How do these activities contribute to the environmental legacy of the World Cup?

An informal Green Goal project structure took shape in the OC, into which relevant departments were integrated. Systematic environmental management suggests itself for the organization of future championships, also with regard to environment-relevant procedures within the OC. The focus of the environmental programme should, however, be clearly directed at preparation of the World Cup. Basic internal organizational preconditions are very important for the successful implementation of an environmental programme. Furthermore, constant opti-

Members of the staff of the OC.

mization of the overall concept with regard to external demands and acceptance of environmental planning could be secured through the setting-up of an Advisory Board, which would include representatives of environmental organizations.

The Advisory Board could also be a great help with the "Strategic Environmental Assessment", in which the most important points of the environmental programme should be laid down at the beginning of the planning stage: In which planning areas do environmental aspects have to considered most strongly? Which environmental problems are particularly important? On this basis, guidelines should be prepared and applied in specific objectives and a concept for realization. With Green Goal, measurable environmental objectives were laid down for the first time for a large sporting event. They had the primary function of compensating the lack of binding FIFA guidelines, serving also as the foundation for joint action on a voluntary basis. At the same time, they enable subsequent transparent measurement of the success of efforts.

In the realization phase, the exchange of information between participants in the environmental programme is most important, serving not only acquaintance with good practices but also the control of the achievement of objectives. This exchange of information will also be of importance for future World Cup tournaments, and should be arranged by the respective organizing committee. Co-operation and integration are the key to the success of environmental concepts for large sporting events.

Environmental concepts for host cities and official open-air events.

The 2006 World Cup in Germany showed, better than any previous World Cup, that football festivities are no longer restricted to stadiums. With officially sponsored open-air events for football fans, which were staged for the first time in Germany, the World Cup spreads beyond the area of responsibility of the OC. Future environmental concepts will have to take account also of open-air, public viewing events and designated "fan-routes" to stadiums. For this, the co-operation of all relevant parties from municipalities, the OC and stadiums will be necessary. Green Goal has already put this idea into practice with, for example, the development of a standardized waste concept for cities and stadiums, and with measures in the transport sector as a whole. In future, it will be a matter of implementing environmental measures consistently in all areas of responsibility. Environmental concepts have to be designed in such a way that host cities and other institutions can also participate with their own projects. Within the framework of Green Goal, for instance, municipal working groups brought ideas for environmental protection with dedication and imagination to the attention of the population.

Future potential of climate compensation: Green Goal goes for gold!

Experiences with the planning and realization of Green Gold showed that the organizers of a World Cup – especially compared to the Olympic Games – are faced with particular challenges in the area of transport. The World Cup does not take place centrally at one place, but rather at a number of venues. The greatest greenhouse gas emissions therefore arise from the transportation of visitors.

On the basis of an ecologically orientated transport concept and excellent communication of information, large savings were achieved in the transport area during the 2006 FIFA World Cup. From the point of view of climate protection, transport is to be generally regarded as the main issue for environmental concepts for World Cup tournaments. Nevertheless, experiences with Green Goal also showed that the climatic effects of transport during a World Cup cannot be completely avoided.

In this connection, the concept of climate compensation offers a promising path for the future, which should become standard for large sporting events. The mechanism of compensation of greenhouse gas emissions by means of so-called "Gold Standard" projects in newly emerging and developing countries is regarded as a particular opportunity to harmonize the idea of environmental protection with the solidarity concept of the world of sport and the promotion of sustainable development in corresponding countries.

No large sporting event has previously compensated a quantity of greenhouse gas emissions with "Gold Standard" projects comparable to that achieved by Green Goal. The quality of compensation had priority with Green Goal, especially with regard to the long-term viability of the concept. The extension of the applicability of climate neutrality, to take account of the international travel of World Cup visitors, is surely desirable, since the climatic effects of international air transport in connection with the World Cup could be several times greater than emissions in the host country. In order to deal with still greater challenges, close cooperation is required between World Cup organizers, their official partners, participating football associations and, not least, World Cup visitors themselves.

Partners for environmental protection

FIFA official partners and national suppliers of the OC – sponsors of the 2006 FIFA World Cup – play a key role in many environmental areas, especially when they are involved in the organization of the tournament (for instance, in the catering area or as a provider of transportation services). Experience has shown that

early approach and involvement is useful, with classic sport sponsorship and environmental sponsorship being jointly addressed. It is particularly important with large international companies to involve their representatives in the host country, but also the international headquarters and environmental departments of companies.

The formulation of binding FIFA and OC guidelines, along which mutually beneficial co-operation can proceed, is important for the participation of sponsors. Sponsoring contracts can then cover specific activities of the partners within the scope of the environmental concept.

Large sporting events, such as the 2006 FIFA World Cup, are suitable platforms, within a framework of co-operation with partners, for the introduction of environmentally sound technology, products and services, and for their presentation to the public. Environmental guidelines and objectives can support such co-operation. This is confirmed, for example, by the Green Goal activities of Coca Cola and the German utility EnBW, who presented energy-efficient refrigerators and new green electricity.

A challenging task for the future will also be to examine whether and how companies could be involved in the environmental concept that are not official FIFA partners or national suppliers of the OC. A number of ideas were tested, and they contributed to the success of Green Goal.

Sustainable products for merchandising

The same can naturally also be applied to FIFA providers of goods and services. The awarding of licenses in the merchandising area, in particular, can have a sensitizing effect with regard to environmental and social standards, and also promote more sustainable production and consumption. In this area, initial approaches were pursued for the sustainable production of football merchandise and environment-compatible packaging. They provide a basis for application at future World Cup tournaments. It is now up to FIFA to take up these initiatives and to promote their practical application.

The environment in World Cup communications: Do good and talk about it!

It is recommended that the environmental programme, differentiated according to target group, be integrated as early as possible into overall communications, also on the part of FIFA. For with the involvement of FIFA in the communication of an environmental programme, the greatest possible public attention could be aroused. Communications contribute, on the one hand, to the positive image of the whole event. Moreover, broadly targeted campaigns can sensitize the public for environmental issues and encourage environmentally favourable behaviour in everyday life. Examples from Green Goal were the "Club 2006" campaign and the environmental projects of working groups in host cities. Official FIFA partners and national suppliers of the OC should also be encouraged to communicate the message of the environmental programme. The positive experiences of Green Goal can surely be further developed in the future.

Communication of the environment programme by well-respected personalities and football stars, similar to the "no to racism" campaign before World Cup games, would help to attract public interest. The exploitation of such potentials will be the task of future World Cup tournaments. Greater identification of FIFA with the environmental issue would create important preconditions.

Monitoring and a balance for a sustainable legacy

During the tournament itself, well-planned monitoring of the environmental programme is important. In the case of Green Goal, environmentally relevant areas were investigated during World Cup games with the help of checklists. Monitoring of environmental measures during the event enabled, on the one hand, small corrections to be made to improve their effectiveness; and on the other hand, the foundations were laid for the balance of activities at the end of the World Cup.

The first of these effects made possible this report on Green Goal. Documentation of achievements and an assessment of measures provide the basis for the further development of environmental concepts by the organizers of future World Cup tournaments. This had been a problem for Green Goal, since there was a lack of documentation of previous World Cup tournaments, and experiences were no longer accessible. In future, a Legacy Report should therefore be standard for environmental concepts for all large sporting events.

Green Goal – a new impulse for German football

Green Goal can not only be a model for coming World Cup and UEFA EURO tournaments. It can also serve as departure point for future environmental activities of the German Football Association (DFB). With the World Cup environmental concept the DFB acquired considerable competence in the field of football and the environment, which can be expanded and find practical application to the benefit of all football and environment supporters. Going on from the "Club 2006" campaign, the intention must be to firmly establish the environmental idea at a club level. At the same time, environmental protection can be further developed in the Bundesliga. At both levels, the protection of natural resources should make itself felt not only in environmental protection, but also in a reduction in the operating costs of clubs. This way, the DFB can document its continuing responsibility for environmental protection after the end of the World Cup and accept the sustainable legacy of the World Cup.

Joint message from Achim Steiner, United Nations Under-Secretary-General and Executive Director of the UN Environment Programme (UNEP), and Klaus Toepfer, International Green Goal Ambassador and former Executive Director ofUNEP, for the Green Goal Legacy Report

It is now more than a decade since the United Nations Environment Programme began to develop strong relationships with the world of sport. The foundation of this partnership is our belief that sports organizations not only have a responsibility to strive for environmental sustainability in what they do, but can play a significant role in promoting these ideals to a wider public.

The Green Goal initiative of the Local Organizing Committee for the 2006 FIFA World Cup and the German Ministry of the Environment was UNEP's first major collaboration with the footballing world. We believe its success marks a milestone that will leave a lasting legacy, not just in Germany, not just in the world of football, but across the world of sports.

Major sporting events can generate massive amounts of waste and pollution. By taking a holistic view of the environmental impact of the 2006 FIFA World Cup, and providing concrete targets for greenhouse gas emissions, water and energy consumption and waste generation, the organisers have made a considerable effort to minimise the event's environmental footprint. By measuring the success of the Green Goal initiative, and publishing the results, they have provided important lessons from which other event organisers can learn. And by involving spectators-through sustainable transport, recycling and waste reduction schemes, and public information, they have helped to spread the concept of environmental responsibility to people from all regions of the world.

Not long after the 2006 FIFA World Cup ended, the Global Environment Facility – an environment funding mechanism jointly implemented by the World Bank, the UN Development Programme and UNEP – announced a multimillion dollar public transport modernization initiative that will upgrade bus and rail services in South Africa in time for the 2010 FIFA World Cup. We hope this is the beginning of a series of collaborations between FIFA, the United Nations and the private sector that will demonstrate that sports and environment are a winning team that can benefit society and the global environment long after the final whistle has been blown and cheers of the fans have faded to silence.

Achim Steiner
United Nations Under-Secretary-General
and Executive Director of UNEP

Prof. Klaus Töpfer
Green Goal Ambassador and
former Executive Director of UNEP

7 Data and facts


LG
BRASIL
9

Accreditation

Media (print and photo)	about 6,000
RTV/HB (TV and radio)	about 15,000
Service companies	about 65,000
FIFA	about 1,500
Partners	about 9,000
OC	about 1,600
Security	about 50,000
Volunteers	about 15,000

Personnel (selection)

- 279 full-time employees in the OC head office and local offices
- 16,440 stewards in twelve stadiums (an average of 1,370 per game)
- 8,000 employees in medical services
- 50 helpers for referees
- 60 helpers for teams
- 487 personnel for logistics
- 15,000 volunteers
- 800 hostesses
- 1,200 OC drivers
- 1,092 cleaners
- 22,366 iSE hospitality
- 11,713 Aramark catering company
- 6 Green Goal
- 30 in the project team at the New Munich Trade Fair Centre (media centre)

Press & media facilities

- About 50,000 square metres for press centres and the same amount of fitted carpets
- About 4,000 workstations for the press and 1,800 for photographers in stadium media centres
- About 200 offices in stadium media centres
- About 200 kilometres of electricity and data cables
- 17,000 power points for workstations
- 30,000 square metres of studios in the IBC
- 942 square metres was the size of the largest studio (Televisa Mexiko)
- 450 kilometres of laid cabling in the IBC
- 966 tonnes of wood were processed for the studios

Visitors

- Exact number of visitors: 3,407,000
- Average: 53,234
- All 64 games were sold out
- More than 15 million applications for tickets in the five sales phases
- 99.5 % capacity utilization of stadiums

Catering

- 4.4 million drinks (portions)
- 1.056 million litres of beer
- 750,000 sausages
- 160,000 pretzels
- 400,000 portions of ice-cream
- 86,000 meals for volunteers
- 7 euros average expenditure per visitor

Water
- Demand for potable water: 51,000 cubic metres

Waste
- Residual refuse: 979 tonnes
- Plastic packaging: 36 tonnes
- Paper, cardboard, cardboard packaging: 108 tonnes
- Glass: 133 tonnes
- Biowaste: 238 tonnes
- Total waste: 1,494 tonnes

Energy
- Electricity: 9.8 million kWh
- Diesel: 660,000 litres
- Heat: 1.4 million kWh
- Total energy: 13.9 million kWh

Transport
- Journeys of spectators in Germany: 1.1 billion person-kilometres
- Journeys to stadiums: 57 % by public transport, 11 % by coach, 6 % on foot & by bicycle, 3% by taxi, 23% by car
- World Cup car pool: 912 vehicles; 2.4 million kilometres covered; about 292,000 litres of fuel consumed
- Operating-days of OC commissioned coaches: about 3,000

Climate balance for Germany
- Transport: 73,000 tonnes of CO_2 equivalents
- Electricity: 2,490 tonnes of CO_2 equivalents
- Heat: 400 tonnes of CO_2 equivalents
- Stadium construction: 4,140 tonnes of CO_2 equivalents
- Overnight stays: 11,640 tonnes of CO_2 equivalents
- Total: about 91,700 tonnes of CO_2 equivalents

Data and Facts

FIFA World Cup Stadium Hamburg

Green Goal example: stadium covers its demand for heat with energy from biogas
Action: reconstruction, inaugurated on 2 September 2000
Capacity: 50,000
Cost: 97 million euros

FIFA World Cup Stadium Hanover

Green Goal example: dry urinals with new diaphragm technology reduce consumption of potable water
Action: renovation; completed in December 2004
Capacity: 43,000
Cost: 64 million euros

Berlin Olympia Stadium

Green Goal example: largest cistern at any stadium stores 1,400 cubic metres of rainwater
Action: renovation, re-opened on 31 July 2004
Capacity: 72,000 spectators
Cost: 242 million euros

FIFA World Cup Stadium Gelsenkirchen

Green Goal example: ÖKOPROFIT saves water and energy in stadium operations
Action: new stadium, opened on 13/14 August 2001
Capacity: 52,000
Cost: 191 million euros

FIFA World Cup Stadium Dortmund

Green Goal example: two photovoltaic plants at the stadium produce solar energy
Action: Renovation, late summer 2003 and summer 2005
Capacity: 65,000
Cost: 45.4 million euros

Central Stadium Leipzig

Green Goal example: large areas around the stadium were desealed and renaturalized.
Action: reconstruction, handed over in December 2003
Capacity: 43,000 spectators
Cost: 90.6 million euros

FIFA World Cup Stadium Cologne

Green Goal example: car parks were paved with water-permeable recycling materials
Action: reconstruction, opened 31 March 2004
Capacity: 45,000
Cost: 119 million euros

FIFA World Cup Stadium Frankfurt

Green Goal example: large underground infiltration system for rainwater
Action: reconstruction, completed October 2005
Capacity: 48,000
Cost: 126 million euros

Fritz Walter Stadium Kaiserslautern

Green Goal example: largest photovoltaic plant on stadium roofs in Germany.
Action: extension, completed 6 Mai 2006
Capacity: 46,000
Cost: 48.3 million euros

FIFA World Cup Stadium Nuremberg

Green Goal example: first football stadium in Europe with EMAS certification for continuous environmental management
Action: Renovation, completed April 2005
Capacity: 41,000
Cost: 56 million euros

Gottlieb-Daimler-Stadium Stuttgart

Green Goal example: heat insulation of the stadium shell saves energy and heating costs.
Action: modernization, inaugurated on 15 January 2006
Capacity: 52,000
Cost: 51,5 million euros

FIFA World Cup Stadium Munich

Green Goal example: comprehensive rainwater management with infiltration and greening
Action: new stadium, opened on 30/31 May 2005
Capacity: 66,000
Cost: 280 million euros

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