MÜNCHEN 2018
Candidate City

FLAGSHIP 2018:

A CONCEPT FOR SUSTAINABILITY BENCHMARKS FOR THE WINTER GAMES

'THE AIM IS NOT JUST TO ENSURE THAT HOLDING THE GAMES HAS NO NEGATIVE NET IMPACT ON THE ENVIRONMENT, BUT ALSO TO TRY TO IMPROVE THIS ENVIRONMENT AND LEAVE BEHIND A POSITIVE GREEN LEGACY.'

(IOC REQUIREMENTS FOR CANDIDATE CITIES)

FLAGSHIP 2018:

A CONCEPT FOR SUSTAINABILITY BENCHMARKS FOR THE WINTER GAMES

28. September 2010

On the order of Bid Committee München 2018 GmbH

Project management: Prof. Dr. Ralf Roth
(Overall Management of Joint Project, German Sport University Cologne, DSHS)

Dr. Matthias Buchert (Öko-Institut e.V.)

Co-Authors: Frank Armbruster (DSHS Cologne)

Jannes Bayer (DSHS Cologne)

Daniel Bleher (Öko-Institut e.V.)

Christian Hochfeld (Öko-Institut e.V.)

Alexander Krämer (DSHS Köln)

Martin Schmied (Öko-Institut e.V.)

Deutsche Sporthochschule Köln
German Sport University Cologne
Institut für Natursport und Ökologie
Institute of Outdoor Sports and Environmental Science

Deutsche Sporthochschule
Institut für Natursport und Ökologie
Centrum für nachhaltige Sportentwicklung [CENA]
Am Sportpark Müngersdorf 6
50933 Cologne

Tel: (0221) 4982-4240
Fax: (0221) 4982-8480

natursport@dshs-koeln.de
www.dshs-koeln.de/natursport

Editorial Revisions:
Christa Friedl, Science Journalist

Öko-Institut e.V.
Institut für angewandte Ökologie
Institute for Applied Ecology

Öko-Institut e.V.
Freiburg Business Office
P.O. Box 50 02 40
79028 Freiburg. Germany
Street address
Merzhauser Straße 173
79100 Freiburg. Germany
Tel. +49 (0) 761 - 4 52 95-0
Fax +49 (0) 761 - 4 52 95-88

Darmstadt Office
Rheinstraße 95
64295 Darmstadt. Germany
Tel. +49 (0) 6151 - 81 91-0
Fax +49 (0) 6151 - 81 91-33

Berlin Office
Novalisstraße 10
10115 Berlin. Germany
Tel. +49 (0) 30 - 28 04 86-80
Fax +49 (0) 30 - 28 04 86-88

5

6

TASKS AND OBJECTIVES OF THE ENVIRONMENT AND SUSTAINABILITY CONCEPT

1

TASKS AND OBJECTIVES OF THE ENVIRONMENT AND SUSTAINABILITY CONCEPT

Large sporting events have the power to create excitement among millions of people across the globe. At the same time, these types of events also leave their mark. Garbage, noise, emissions of greenhouse gases and air contaminants, the sealing of surfaces and consumption of materials involved in the extension and construction of sports complexes, as well as the consumption of energy and water related to the events themselves create burdens on humans, the environment and nature. This is a reason why the protection of the environment and nature and the sustainable management of resources is becoming an increasingly important factor in the planning and implementation of large sporting events. Winter sports are viewed particularly critically due to their use of large areas and the intervention in nature and in the landscape often related to this.

Sustainable development is based on the assumption that today's generations will utilise natural resources in a manner that ensures a functioning ecological, economic and social structure for future generations. Against this background, sustainability has also become an important issue in the discussion surrounding the Olympic and Paralympic Winter Games and the Olympic legacy.

The IOC has addressed this issue by expanding the requirements for ecological sustainability in connection with the Olympic Games: '*The aim is not merely to ensure that holding the Games has no negative net impact on the environment, but also to try to improve this environment and leave a positive green legacy behind* .' (IOC Requirements for Candidate Cities).

Munich 2018 has translated these requirements into a positive vision of 'Sustainable Green Games', and has prepared a comprehensive Environment and Sustainability Concept for implementation in line with a participatory process. This concept by far exceeds applicable minimum requirements, and consists of the following activities:

- **Environmental screening: identification of the status quo and possible environmental effects of the 2018 Olympic and Paralympic Winter Games**

  Environmental screening is a suitable method for an overall assessment of effects on the environment at this early stage of planning. It can also be used to control planning processes in view of environmental protection aspects as well as to investigate to what extent environmental objectives

- **Identification of action areas**

  The key action areas for environmentally compatible and sustainable large sporting events are well-known due to numerous national and international studies. These insights form the basis for a comparative analysis of the status quo regarding the requirements and possible impacts of the plan. In this context, specific issues with special significance for the Olympic region will be

identified. At the same time, this process also highlights potential areas of conflict as well as various design options.

- **Formulation of concrete objectives**

  Environmental objectives will be specified and (for the most part) quantified on the basis of the data collected. These objectives will finally be declared as binding by the responsible planning committees. The formulation of objectives must be understood as a continuous process, which is adjusted to the requirements of the respective planning phase.

- **Development of an environmental programme**

  Measures and projects are developed and selected to achieve these objectives. Moreover, responsibilities and budgets for the entire programme and individual projects are also defined.

In accordance with IOC requirements, the Environment and Sustainability Concept forms a binding part of the application.

Both the key figures of the Bid Book as well as the Environment and Sustainability Concept form a part of the resolution adapted by the Federal Government, the Free State of Bavaria, Munich City Council, Garmisch-Partenkirchen Municipal Council, Berchtesgadener Land County Council and the decision-making bodies of the German Sport Confederation (Deutscher Olympischer Sportbund, DOSB).

The committees thus underline the significance of environmental and sustainability objectives as an important and binding part of the application and the implementation of environmentally-compatible and sustainable 2018 Olympic and Paralympic Winter Games.

For the purpose of making environmentally-compatible and sustainable Games a reality, the planning and implementation of the 18 lead projects must be understood as a dynamic process. The integration of regions and societal groups will be a crucial factor in the success of the further development process, as the successful integration of local concerns plays a key role in the planning and implementation of lead projects.

THE ENVIRONMENT AND SUSTAINABILITY STRATEGY FOR MUNICH 2018

2

THE ENVIRONMENT AND SUSTAINABILITY STRATEGY FOR MUNICH 2018

Climate protection, water supplies, energy production, land consumption, the protection of species, subsequent use, regional development - the key words 'Environment' and 'Sustainability' encompass a variety of different concerns, issues and challenges. For this reason, one of the main tasks in the preparation of the Environment and Sustainability Concept for Munich 2018 consisted of the identification of issues, guidelines and fields of action that are internationally relevant and significant to the application and implementation, as well as the wording of concrete objectives. This has created a basis of a common awareness and concrete orientation basis for all actors involved in the planning process.

The strategy developed for Munich 2018 is composed of the following elements:

1. **Vision**
2. **Guidelines**
3. **Environmental and sustainability management**
4. **Main themes and lead projects**

The Environment and Sustainability Concept is not a dry planning paper. Representatives of associations and clubs, government authorities and political committees as well as the broader public become involved in the implementation process through an extensive action programme, which ensures that environmental and nature conservation concerns are not merely a focus during the planning and implementation of the Games, but rather create far-reaching effects for the entire region. In the end, a living Environment and Sustainability Concept can be used to develop an 'Olympic legacy' that goes beyond Munich, Garmisch-Partenkirchen and Berchtesgadener Land and which contributes to the wellbeing of people and the environment in the long term.

2.1 THE VISION

Since the adoption of Agenda 21 in Rio de Janeiro in 1992, the protection of natural resources has been inexorably linked with economic and social issues. For this reason, at least since the 2000 Olympic Games in Sydney, large sporting events are now also measured by their environmental standards. The IOC has developed this approach into its own 'Olympic Movements Agenda 21', and is continuously increasing the environmental requirements imposed on the event locations for Olympic and Paralympic Games. Munich 2018 transfers the Olympic Agenda 21 into a vision of 'Sustainable

Green Games'. This concept illustrates how diverse, demanding and living projects can be used to implement ambitious environmental standards, and thus becomes a model for future games.

Munich 2018 expressly commits to a comprehensive sustainability concept. The main idea behind this concept is that environmental and nature conservation objectives must be examined and assessed in association with social and economic requirements. The motto 'green legacy for the next generation' has resulted in a number of different impulses for the sustainable development of sports and clubs in Germany. The vision for Munich 2018 links a positive environmental balance sheet with the strength of local and regional value chains and associated workplaces.

Sustainability is maintained through involvement, thus the intention to establish a positive legacy for the environment through the active integration of the population, associations and clubs, and many other groups of society. In this way, the Games can have strong positive effects on key segments of society such as popular sports, youth development, education, regional economy, tourism, health and nutrition etc. - not only in the region but across Germany.

The population of Munich, Garmisch-Partenkirchen and the Berchtesgadener Land has shown considerable sensitivity for environmental and nature conservation issues and sustainable development for many years - an awareness that is taken up and addressed by numerous political initiatives, programmes and projects in the Federal Republic of Germany, the Free State of Bavaria as well as in the cities and municipalities of the region. This is fertile ground for the idea of 'Sustainable Green Games'.

It is also the reason some lead projects are already being implemented at this time. A series of initiatives will already be implemented years before the actual start of the the 2018 Olympic and Paralympic Winter Games, regardless of the outcome of the application process. This will strengthen identification on the part of the population and sporting organisation with the application, and also result in effective and deeply embedded activities by 2018 in line with the vision of 'Sustainable Green Games'.

2.2 GUIDELINES

The IOC requirements create different objectives for an environment concept in the application document:

Preventing environmental damages, reducing effects and mitigating inevitable impacts

An awareness of the protection of the beauty and diversity of natural resources and nature is deeply anchored in the German populace and policies. The federal government would like to take on a global leadership role in developing methods to implement the guiding theme of sustainable development. Legislation requires the diligent management of nature, landscapes and environmental protection at the highest level. The Environment and Sustainability Concept for Munich 2018 supports the planning committee and specialist departments in complying with these high standards, and highlights ways of surpassing statutory standards for important key issues in the application.

The IOC-honoured 'Green Champions for Sports and Environment' guideline from the year 2007 forms an important basis of Munich 2018. Additional sustainability aspects have been added taking the

Olympic Environment and Sustainability Concept into account. Guidelines have been formulated for twelve central areas of action on the way to 'Sustainable Green Games', which specify a binding framework for all planning decisions (see Table 1). These twelve areas of action including: energy, water supplies, catering, merchandising, education and regional development - which are affected by the Olympic and Paralympic Winter Games. The guidelines are then combined into a catalogue of measures that is adjusted to the respective planning phase.

Table 1: Environment and sustainability guidelines for Munich 2018

Field of action:	Guideline:
Construction and resources	Munich 2018 always subjects its event location planning to a critical requirements review, and ensures an ecologically and economically balanced concept for (subsequent) use.
Nature and landscapes	Munich 2018 avoids interference in nature and landscapes, and protects biological diversity.
Climate and energy	Munich 2018 develops energy saving strategies by means of modern technical and organisational measures, and utilises energy that has been produced in an environmentally compatible manner. Munich 2018 will be the first large climate-neutral sporting event.
Transportation	Munich 2018 will provide for ecological and efficient inbound, outbound and local transportation.
Waste	Munich 2018 avoids and reduces waste and ensures the environmentally-friendly recycling and proper disposal of non-preventable waste.
Water	Munich 2018 will provide for the gentle and diligent handling of drinking water.
Catering	Munich 2018 will rely on regional organic food which has been produced by appropriate means.
Noise	Munich 2018 will limit noise pollution and protect sensitive environments.
Merchandising	Munich 2018 will draw on environmentally compatible fair-trade merchandising products which are free of contaminants.
Education	Munich 2018 promotes the acquisition of knowledge for the development of individual design competence in terms of sustainable development.
Participation	Munich 2018 continuously interacts with different stakeholders and allows for active participation in the application process.
Sport and regional development	Munich 2018 implements processes and projects for sustainable sport and regional development.

2.3 ENVIRONMENTAL AND SUSTAINABILITY MANAGEMENT

Munich 2018 is committed to integral and holistic environmental and sustainability management, which takes into account environmental and nature conservation concerns in all of its projects and plans for the implementation of the Olympic and Paralympic Winter Games. This approach prevents environmental damages, reduces impacts and mitigates unavoidable ecological burdens.

Following the EU Eco Audit Regulation, environmental management comprises that part of overall comprehensive management, e.g. organisational structure, responsibilities, formal procedures, processes and tools for the definition and implementation of environmental policies. A requirement to prepare and develop a comprehensive environmental management system in accordance with ISO 14001 ff, which explicitly includes the nature and landscape segment, already applies during the application and concept phase. Environmental management warrants the binding nature of set goals by avoiding planning that results in contrary effects and guaranteeing the continuity of the Environment and Sustainability Concept from planning to external representation. A new sustainability management standard for events, which is currently being prepared by the International Organization for Standardization (ISO 20121), is following a similar path. It will go far beyond established environmental management systems and address specific issues related to the sustainable planning, preparation, implementation and post-processing of events.

Environmental and nature conservation comprises a cross-sectional task that begins with the selection of sports venues and extends to ecological construction, prevention of waste, transport issues, image-making and marketing strategy. Specific areas found at the centre of the Munich 2018 sustainability concept are the selection, allocation and subsequent use of sports venues and issues of accommodation and transport, as well as the implementation of 18 innovative lead projects which enable the sustainability of the Olympic and Paralympic Winter Games in Munich, Garmisch-Partenkirchen and Schönau am Königssee.

Olympic sports venues and their impacts on nature and on the environment are at the core of the plans for Munich 2018. In particular with respect to the selection and possible rebuilding or new construction of sports venues, measures for the minimum requirements related to the facilities were already defined and prepared at an early stage in the planning (see Table 2).

Table 2: Programme of measures - Munich 2018 sports venues planning (modified according to BMU & DOSB 2007).

What	Steps and measures
I. General	
Requirements review	▪ Use of existing facilities, possible construction of temporary facilities ▪ Development of subsequent use concept
Site selection	▪ Observation of nature conservation, protection against noise, energy supplies and public transport connection
Statutory requirements	▪ Compliance with all environmental protection and nature conservation relevant laws and regulations
Environmental criteria for tenders	▪ Anchoring of binding environmental requirements
II. Building materials	
Renewable resources	▪ Preference for renewable resources for construction and rebuilding
Reclaimed building materials	▪ Preference for recycling materials
Materials low in harmful substances	▪ Avoidance of use of environmentally damaging materials that may pose health risks ▪ Observation of municipal material bans
III. Transportation	
Connection of local public transport	▪ Increase line capacity of rail-bound public transport ▪ Extension of stops/train stations (public transport)
Use of environmentally-friendly vehicles	▪ Electric vehicles, use of renewable fuels
IV. Energy	
Solar power	▪ Construction of photovoltaic facilities
Heat	▪ Energy-efficient heating facilities ▪ Use renewable energy carriers ▪ Optimum insulation for heated areas ▪ Natural ventilation
Lighting	▪ Use of energy-saving bulbs ▪ Installation of energy-saving floodlight facilities ▪ Use of energy-efficient LED Technology
V. Water/Wastewater	
Substitution of drinking water	▪ Use of surface, well water or rainwater for toilets
Water-saving facilities and equipment	▪ Flow controllers on water taps ▪ Dry urinals or water-saving toilet flushing
Seepage and transformation of sealed surfaces into porous surfaces	▪ Use of water-permeable materials for paths and spaces
VI. Nature and landscapes	
Compensation concept	▪ Preparation and implementation of a compensation concept under nature conservation law
Ecological building supervision	▪ Supervision of building projects by ecological experts
Space consumption	▪ Minimising the amount of sealed surfaces
VII. Noise	
Active noise protection	▪ Placing speaker systems so as to minimise noise contamination
Passive noise protection	▪ Compliance with statutory requirements

Environmental and sustainability management is a continuous process. Only an integrated management approach, which combines the different management levels and planning areas, and which is actively integrated into the design, planning and implementation of the Games, can ensure the implementation of sustainable Games. To this end the application company (Bewerbungsgesellschaft) has appointed a manager for 'Environmental Issues'; in addition, an 'Environment' expert commission with 32 members has also been convened for the purpose of accompanying the planning process (see Table 3). Among other things, the experts of the Environment commission determine the contact partners for the 18 specific lead projects and hence ensure that the projects are planned and implemented using knowledgeable management.

Table 3: Members of the 'Environment' expert commission

Person	Institution
Christoph Abress	Landkreis Berchtesgadener Land
Stephanie Anders	ARGE München 2018
Frank Armbruster	Deutsche Sporthochschule Köln
Jannes Bayer	Deutsche Sporthochschule Köln
Daniel Bleher	Öko-Institut
Dr. Matthias Buchert	Öko-Institut
Christine Eben	Naturfreunde
Andreas Eitzenberger	Gemeinde Oberammergau
Wolfgang Hartmann	Bundesministerium des Inneren
Meike Henning	Deutscher Olympischer Sportbund
Christian Hochfeld	Öko-Institut
Frank Kaiser	Deutscher Olympischer Sportbund
Andreas Klages	Deutscher Olympischer Sportbund
Herbert Köpnick	Bayerisches Staatsministerium für Umwelt und Gesundheit
Tobias Lienemann	Deutscher Skiverband
Joachim Lorenz	Landeshauptstadt München
Gernot Lutz	Bayerisches Landesamt für Umwelt
Dr. Christian Mikulla	Bayerisches Staatsministerium für Umwelt und Gesundheit
Katrin Ninck	ARGE München 2018
Cornelia Plätzer	Bewerbungsgesellschaft München 2018
Michael Pütsch	Bundesamt für Naturschutz
Prof. Dr. Ralf Roth	Deutsche Sporthochschule Köln
Manfred Scheuermann	Deutscher Alpenverein
Michael Schödl	Landesbund für Vogelschutz, Deutscher Naturschutzring
Matthias Schöner	ARGE München 2018
Johann Schraml	Naturfreunde
Bernhard Schwank	Bewerbungsgesellschaft München 2018
Boris Schwartz	Bewerbungsgesellschaft München 2018
Prof. Dr. Wolfgang Seiler	Marktgemeinde Garmisch-Partenkirchen
Martin Waldhausen	Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit
Jörg Weber	Landeshauptstadt München
Sonja Ziesack	Verkehrsclub Deutschland

In addition to representatives of Bewerbungsgesellschaft München 2018 GmbH, ARGE München 2018 as well as the expert institutes commissioned with the Environment and Sustainability Concept, the relevant ministries, associations and external experts and guests are also involved in environmental management. The integration of the Environment expert commission (see Figure 1) and comprehensive planning ensures that environmental and sustainability aspects are integrated into all relevant decision-making processes. In addition, local Agenda 21 processes are also taken into account as a result of the participation by individual members and municipal bodies in the Environment commission, which is of key importance for the coordinated implementation of projects which have a local impact.

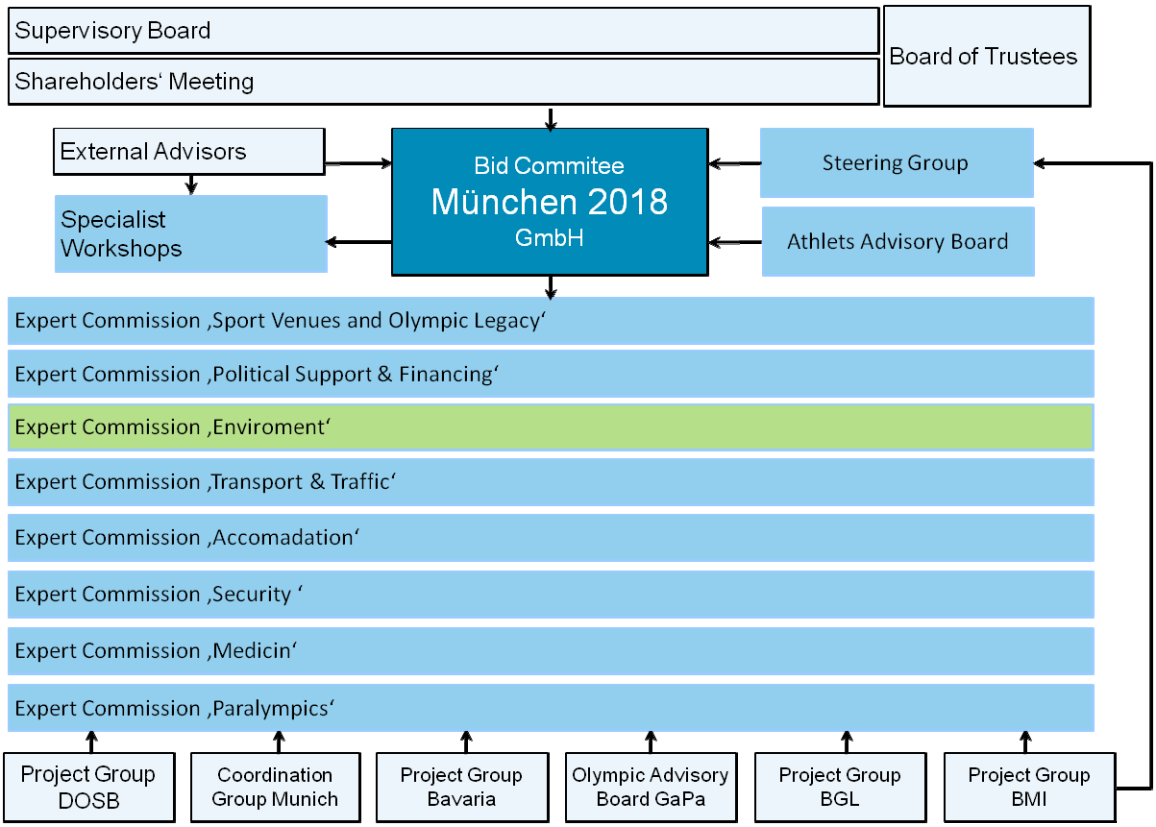


Figure 1: Structure for Munich Bid Commitee 2018 GmbH

Clear responsibilities and transparent communication paths are essential for efficient planning and decision-making processes. For this reason, the organisation of environment and sustainability activities for Munich 2018 has been based on the clear allocation and coordination of several committees (see Figure 2). The establishment of agencies which have a leading role enables and facilitates the coordination and accompanying evaluation of all project-related activities.

At the same time, the coordination of the implementation of the entire Environment and Sustainability Concept is also a requirement. A project sponsor group was formed to ensure an exchange relating to individual projects. This body obtains regular information regarding project progress, which will result in a full overview of the implementation of all lead projects for all participants. The organisation committee, which manages the project sponsor group, is thus included in all important decisions and can inform the public regarding the entire sustainability area on a continuous basis.

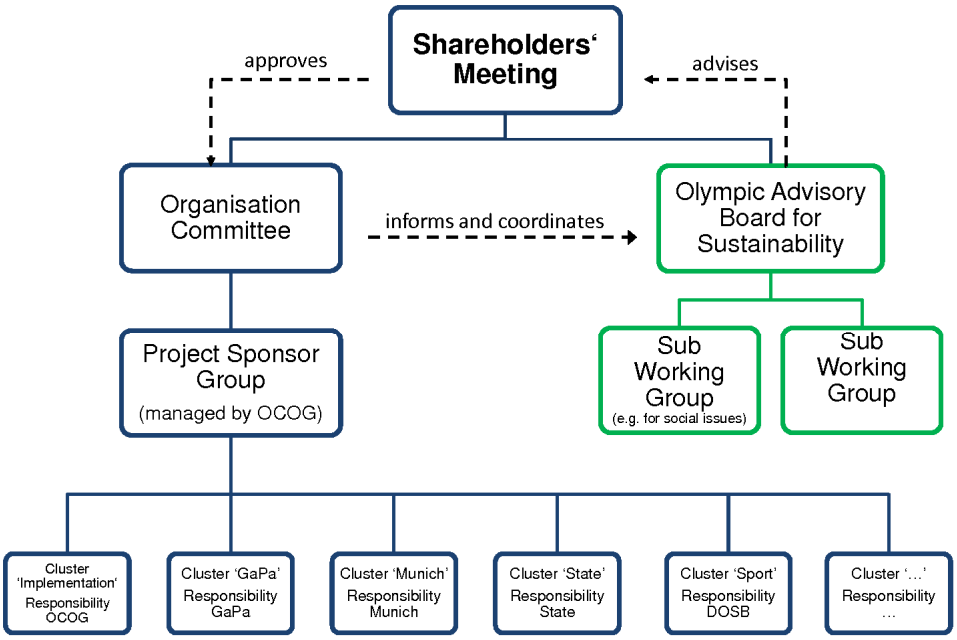


Figure 2: The future organisation of environmental and sustainability activities for Munich 2018

An 'Olympic Sustainability Advisory Board' will be established to drive forward the trans-disciplinary sustainability approach (see Figure 2). This body, which is made up of national and international experts, will directly advise the members of the organisation committee, and accompany preparations for the Olympic and Paralympic Winter Games in all areas of sustainable development. The organisation committee will function as the business office for the Board, and provide comprehensive information regarding developments, goals achieved and required additional steps. An 'Environment and Sustainability Management' department will be created within the organisation committee, which combines information from the member meeting, the shareholders' meeting, the sustainability advisory board, lead projects and the public. The department is then responsible for summarising all information, implementing the concepts with project sponsors, defining the objective and reporting on it.

In order to strengthen the transparency of implemented measures and to advertise the vision of 'Sustainable Green Games', the representatives of the application for the Games will actively represent the environment and sustainability issue both internally and externally. In addition, mechanisms that ensure that environment and sustainability become a regular part of public relations activities will also be established.

2.4 MAIN THEMES AND LEAD PROJECTS

Munich 2018 would like to turn the vision of a 'Green Olympic Legacy' into reality. To this end, the guidelines for the different fields of action have been consolidated into four regionally, nationally and internationally significantly main themes:

A. Protection of the climate (the first climate-neutral Olympic and Paralympic Winter Games)

Munich 2018 is committed to offset the greenhouse gas emissions caused by the Games in Germany with climate protection projects in the region. Global emissions (particularly through air travel) will be balanced out with international environmental projects of the highest quality. These types of projects cost money - a portion of required funds will be secured by the 'München 2018 klimagerecht' association (Fair Climate Association Munich 2018), which will supplement public funding with fundraising activities. Compensation measures have been designed for the long term, to ensure that CO_2 reductions can be secured beyond 2018. It also ensures that the emissions that are offset will actually exceed the emissions generated by the Olympic and Paralympic Winter Games.

B. Protection of natural resources (land-neutral and nature-compatible Winter Games)

Munich 2018 will maintain and protect biological diversity and prevent the further fragmentation of habitats. The Games will avoid additional intervention in protected areas, mountain forests and important biotope areas. Water consumption and waste will be minimised, and unavoidable intervention will be offsetted by the renaturalisation of affected areas.

C. Sport and regional development (Games for sustainable sports and areal development)

Munich 2018 creates open spaces which can be used for sports, youth work and education, recreation and health. This promotes the integral development of rural areas with multi-faceted significance to tourism, the economy and maintenance of natural resources. This process is carried out through the interplay between land protection, improvement of recreational quality, influx of investors and the promotion of sustainable workplaces. It promotes the long-term development of sport and associations in Germany.

D. Education for sustainable development

Munich 2018 aims to create a strong awareness of the protection of the environment and a sustainable healthy lifestyle among the general public, organisers, athletes and guests - in terms of the UNEP, including the Olympic Idea and using the popularity of Olympic sports. This has led to the specific development of projects and activities which generate knowledge and information related to personally sustainable lifestyles to a broader public.

While the main theme of 'Protection of natural resources' focuses primarily on the ecological dimension, and 'Sustainable sport and regional development' on economical and social dimensions, the main themes of 'Protection of the climate' and 'Education for sustainable development' highlight the trans-disciplinary approach of the Munich 2018 Environment and Sustainability Concept (see Figure 3).

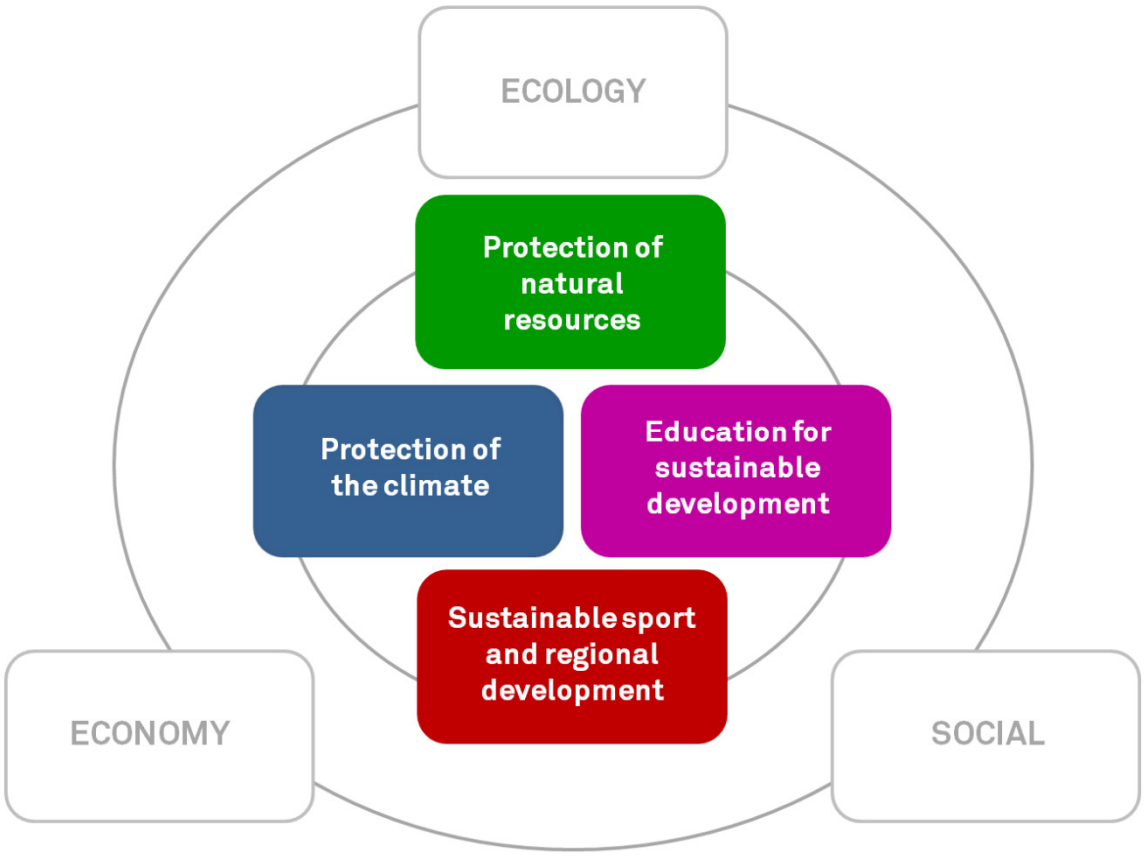


Figure 3: Integration of the main themes of Munich 2018 into the sustainability concept

Creating sustainable Olympic Games means more than merely implementing environmental protection in the world of sports. The Olympic idea of sustainability contains enormous innovation potential for the economy, the environment and for society. The core of this concept consists of 18 innovative projects which implement the ecological guidelines and programme of measures, and ensure that Munich 2018 is able to fulfil the requirements which cover the minimum statutory specifications (see also Section 5):

- Site selection is based on the compact “two park concept”, meaning that the various disciplines in the Olympic and Paralympic programme will be grouped to be held at two locations - the Garmisch-Partenkirchen Snow Park and the Munich Ice Park. This concept reduces the transportation burden and the occurrence of permanently sealed surfaces, and lowers costs in comparison to other models.
- By including nature conservation aspects into sports venue planning, it was possible to prevent the additional use or impairment of high-quality nature conservation areas.
- The Olympic Village in Munich and the permanent buildings of the Olympic Village at the Garmisch-Partenkirchen Snow Park will be planned and constructed so as to create plus-energy villages when in use.
- The Olympic sports venues of 1972 will be renovated while adhering to and strengthening the unique character of the Olympic Park. Existing structures such as the Olympic Stadium,

Olympic Pool and Olympic Building are planned to feature at least 30% lower greenhouse gas emissions as compared to 2010 (lead project 'Sustainable Olympic Park 2018').

- Ecologically advantageous building materials such as wood and low-CO_2 cement will be used for all building projects. All tenders will emphasise the use of as much recycling steel (electric steel) as possible, as the production of this steel generates significantly lower greenhouse gas emissions. In general, recycling materials must be given preference where possible (lead project 'Green building materials 2018').
- The lead project '100 sports clubs reduce 2018 t CO_2/a' is used to carry the strategy for the Environment and Sustainability Concept for Munich 2018 across the region and into the entire country. The objective: offsetting a portion of remaining greenhouse gas emissions[1] with renovation projects in the popular sports area, and securing the involvement of the associations as multipliers for climate protection under the umbrella of the DOSB.
- Unavoidable greenhouse gas emissions (approx. 284,000 tonnes) generated by the air travel of athletes, officials and private guests will be offset by investments in additional global climate protection projects (lead project 'Climate compensation for international air travel').
- The association 'München 2018 klimagerecht' will be formed to finance the offsetting of unavoidable CO_2 emissions (lead projects 'Positive national climate balance sheet 2018' and 'Climate compensation for international air travel'). These projects will overcompensate for those greenhouse gas emissions which cannot be avoided by savings measures or renewable energy carriers.
- Cars and buses used to transport athletes, coaches, IOC, IPC, NOC and IF delegations and media representatives will only be equipped with alternative engines and supplied with energy from renewable production. The P+R shuttle buses in Garmisch-Partenkirchen, Schwaiganger und Schönau am Königssee also meet these requirements (lead project 'Green fleet 2018: efficient and renewable').
- More than 50% of visitors are expected to be travelling to Munich, Garmisch-Partenkirchen and Schönau am Königssee on public transport (lead project 'Visitor mobility: Right of way for public transport').
- The biotopes and diversity that exist in the affected areas will be protected and maintained. The lead project 'Improving the biotope quality of Alpine sports venues' represents a specific contribution to the maintenance and development of natural resources and biodiversity, the permanent maintenance of the region's attractiveness and not least for the purpose of achieving environmentally-compatible Games. It serves as a specific contribution towards maintaining the Alpine convention and supports the common goals espoused by nature conservation and sports clubs.
- Landscape-compatible methods and resource-saving materials for the temporary conversion of agricultural areas are being developed and tested (lead project 'Temporary land use').
- Waste generated and the associated consumption of resources will be restricted to a minimum (lead project 'Recycling economy 2018').

[1] This does not affect the compensation of greenhouse gas emissions generated by the inbound and outbound air travel of international guests (see "Climate compensation for international air travel") and the measures undertaken by the "Positive national climate balance sheet 2018" lead project.

- All of the basic food products offered in the athletes canteens and at the sports venues will be produced in the region. Of these, at least 50% will be organically produced (lead project 'Healthy nutrition 2018').
- All fan and merchandising products especially produced for Munich 2018 and which feature the Olympic logo will be produced in compliance with humane working conditions a high proportion of recycled materials (lead projects 'Fair procurement and merchandising 2018').
- A 'Centre for Sustainability' will serve universities and non-university research institutions as a platform for interdisciplinary co-operation in education and research, with a focus on the particularly sensitive Alpine region.
- The ecological, economic and social sustainability of Garmisch-Partenkirchen in the 21st century will be ensured on the basis of a programme that is designed for the long term (lead project 'Sustainable Garmisch-Partenkirchen').
- The quality of Alpine sports and tourism in the Bavarian Alpine region will be developed further in accordance with the three pillars of sustainability - ecology, economy and social aspects. To this end, new concepts and project ideas will be developed, and proven projects will be included, expanded and linked (lead project 'BergTour 2018').
- The various functions fulfilled by Munich's open spaces, e.g. for sports, games, recreation, maintenance of natural space and climate compensation, will be maintained and strengthened (lead project 'Olympic Green: Green moves').
- Young people in clubs and schools will have an opportunity to take part in practical activities in the project area, e.g. habitat maintenance or cross-country track design. Through these activities, youth are able to find out about and internalise the connections between sports and the environment and experience a direct relationship with nature (lead project '360° Olympic und Paralympic Managers').

A common factor that applies to all lead projects and activities is: Munich is able to build on an impressive existing inventory of environmental and sustainability activities in the Olympic region (see Section 3) - a fact that will make a significant contribution to the implementation of this vision, and which creates a lot of benefits for the projects and ideas described in detail in Section 5.

EXISTING RESOURCES AND INFRASTRUCTURE IN THE OLYMPIC REGION

3

EXISTING RESOURCES AND INFRASTRUCTURE IN THE OLYMPIC REGION

The region surrounding Munich, Garmisch-Partenkirchen and Königssee represents an excellent starting location for sustainable Olympic and Paralympic Winter Games: concerns related to environmental protection and nature conservation as well as issues of sustainability development have been addressed in this region for many years, as reflected in the numerous political initiatives, programmes and projects undertaken by the federal government, the Free State of Bavaria as well as cities and communities. Therefore the Munich 2018 Environment and Sustainability Concept is able to draw on a high level of sensitivity on the part of the population and political decision-makers, as well as comprehensive experience. Some of the lead projects for Munich 2018 (see Section 5) pick up on existing activities or supplement the same in an innovative manner. The section below introduces a sample selection of environmental and sustainability activities which already exist.

The national 'Perspectives for Germany' sustainability strategy of the federal government forms an important framework in this regard. It highlights the priorities, objectives and measures for the next years, which can be used to implement the idea of sustainable development at the national level. Local sustainability strategies in terms of Agenda 21 processes form a strong basis for the implementation of these goals.

3.1 PROTECTION OF THE CLIMATE

In October 2000, the Bavarian government approved a climate protection concept, which was continued with the 'Climate-friendly Bavaria initiative' in 2003. The initiative was strengthened by the 'Bavaria 2020 Climate Programme' and expanded into a comprehensive programme of measures. Investments for the energy-related renovation of government buildings, along with the promotion of alternative energies and climate research, have been planned in order to reduce greenhouse gas emissions in Bavaria. In addition, there are also plans to undertake precautionary measures for adjusting to the inevitable effects of climate change.

The state capital Munich is strongly committed to modern and sustainable energy supplies and the reduction of greenhouse gases. As a member of the Climate Alliance (Klimabündnis), the largest European city network consisting of 1400 communities in 17 countries, the city has fully committed itself to climate protection, with plans to reduce CO_2 emissions by at least 50% by 2030 (basis year 1990), and more specifically by 10% every five years (as of 2004). To reach these objectives, renewable energies are being expanded, energy efficiency is increased and energy consumption is being reduced. In early 2010, the city joined the European climate alliance 'Covenant of Mayors', with entailed a commitment to exceed the climate protection objectives of the European Union.

Munich focuses on eco-electricity. As early as 2015, it is envisaged that all private households will receive 100% of their electricity from renewable energy sources generated by Stadtwerke München (SWM, Munich City Works), followed by the tram and subway network by 2018. Finally, all private and business customers would receive exclusively eco-electricity supplies by 2025. This way, Munich would be the first large German city able to meet these objectives in the area of energy production and climate production. A study by the Technical University Munich, which analysed public utility companies across Europe, has awarded the 'pole position' (as regards energy policy) to Munich.

The federal government promotes electro-mobility as a part of its integrated energy and climate programme, and has approved the national development plan for electro-mobility in 2009. The federal transportation ministry declared Munich one of Germany's eight model regions for electro-mobility. SWM - the partner of Bewerbungsgesellschaft 2018 - has assumed the project management function in the Munich model region in consultation with the state capital. This also includes cars public transport and delivery and commercial vehicles, with additional plans to establish a user-friendly and safe loading infrastructure. Garmisch-Partenkirchen will also be developed into a model community for electro-mobility (GAP Emobil 2018).

The market town of Garmisch-Partenkirchen and many parts of Berchtesgadener Land with Schönau am Königssee have been known as spa resort locations on the basis of their excellent air quality. Different projects contribute towards ensuring that this quality will be maintained in the future. In this vein, 40% of households in Garmisch-Partenkirchen are already being supplied with electricity from CO_2-free energy. In addition, the market town has an environmentally-friendly fleet of natural gas-powered garbage trucks and buses. Moreover, close co-operation e.g. through the Berchtesgaden national park or with Deutsche Bahn (German Rail) as part of the 'Travel destination nature' project, contribute towards minimising CO_2 emissions even as guests travel to the region.

3.2 PROTECTION OF NATURAL RESOURCES

In 2008, the Bavarian Council of Ministers approved the Bavarian biodiversity strategy under the motto 'Natur.Vielfalt.Bayern' (Nature.Diversity.Bavaria). Its most important objectives consist of securing species and varietal diversity, maintaining the diversity of living spaces, improving ecological permeability of migration barriers and the communication of environmental knowledge. In this context, the Free State relies on its positive experience with concepts that allow for the equal use and protection of living spaces and combine contrary user interests.

The fauna-flora habitat areas protect species and living spaces in the EU as part of a biotope network that spans across countries. In Bavaria, there are 745 Natura 2000 regions with a total area of 802,000 hectares, which corresponds with 11.3% of the state's area.

An ecology guideline for the urban development concept PERSPEKTIVE MÜNCHEN (PERSPECTIVE MUNICH) was prepared for Munich as early as 1998. It has a strong focus on the maintenance of natural resources. It informs citizens about development trends, strategies and measures, and provides an orientation framework for community action and the assessment of projects for urban development. An extensive urban development programme which addresses all key areas of sustainable urban development exists. Some examples include:

Soils: includes the maintenance or restoration of natural soil function and reduction in space used

Water: includes the improvement of the quality of surface water, regeneration and reactivation of springs and the ecological management of water catchment areas

Climate and air: includes the maintenance, securing and improvement of climatic compensation and regeneration areas as well as securing and improving large- and small-scale air exchange and addition of fresh air

Flora and fauna: maintenance of species diversity and biological diversity, permanent guarantee and improvement of living conditions for wild animals and plants and maintenance of the diversity inherent in the natural scenery

The area around Garmisch-Partenkirchen features large areas that have been designated as nature conservation or protected landscape areas or have been legally safeguarded in another form. The individuals in charge were well aware of the importance of intact and hence attractive scenery for tourism purposes at a very early stage. For this reason, the market town now has comprehensive knowledge of the local environmental situation (based on extensive inventory taking), and is able to implement this expertise to diffuse conflicts between economic use and the protection of its valuable natural spaces.

The 'Nationalpark Berchtesgaden', which was established in 1978 and which is the only large-scale Alpine protected region of this highest category in Germany, is located in the Berchtesgadener Land. In addition, the national park also represents the core and maintenance zone for the biosphere reserve of the same name (founded in 1990), which also includes the foreland. Visitors are offered environmentally-aware and nature-compatible experiences, which meet the strict criteria of the 'Alpine Pearl' network. All municipalities in the district have made an application to extend the biosphere reserve, which UNESCO has already approved. As a result, in the future the biosphere reserve will extend over the entire district under the new name 'Biosphärenreservat Berchtesgadener Land' (Berchtesgadener Land biosphere reserve). These efforts highlight the success of large-scale nature conservation in connection with sustainable regional development.

3.3 SUSTAINABLE SPORT AND REGIONAL DEVELOPMENT

With the Berchtesgadener Land and Garmisch-Partenkirchen, the Munich 2018 sports venue concept also includes the rural areas, which characterise many parts of Bavaria. The 'Aktionsprogramm Bayerns ländlicher Raum' (Action Programme for Bavaria's Rural Areas), which was approved by the Bavarian government in 2007, is a comprehensive concept that aims to create or maintain equal living and working conditions in all parts of Bavaria. The twelve action areas include, among others, the tourism economic sector, a future-oriented agricultural, forestry and food industry, a modern network of transportation, communication and energy infrastructure, and regional development initiatives.

Sport creates many different ways of meeting and communication. It not only strengthens motor, creative and social skills, but also assists in establishing contacts and reducing prejudices. It creates mutual trust that builds bridges between cultures and strengthens a feeling of community. For this reason, one of the central themes in Munich's sport area is integration through sport for people with migration backgrounds and people with disabilities.

Sport can be used to set the stage for successful social and societal integration at a very early stage. Against this background, the sport integration prizes awarded by the state capital are directed at schools and sports clubs, but also institutions outside of the associations, which promote integration into society via sport and movement. The list of initiatives, projects and measures is long. Some examples of this are: in 2009, the 'Diversity as opportunity' project promoted integration initiatives for people with a migrant background, the 'Disability is not an obstacle' initiative was directed at programmes for the promotion of health and joint sport experiences for people with disabilities. The programme 'Sport for all children' provides free membership in Munich sports clubs to children and youths from low-income families.

The Deutscher Olympischer Sportbund (German Olympic Sport Confederation) and its member organisations and clubs are committed to the general principle of nature-compatible sports and sustainable development. Sport under the umbrella of the DOSB promotes the environmental compatibility of the site, construction and maintenance of sports facilities and nature- and landscape-compatible sports. To this end, clubs and associations as well as the DOSB cooperate with environmental and nature activists, conduct specialist events, release publications and technical information services, are active in education and continuing development as well as consulting, and implement promotional programmes for relevant topics.

The interaction between sport and environment has already been an important topic in the German sports world for 25 years. In 1985, the Deutscher Sportbund, one of the predecessor organisations of the DOSB, established the 'Sport protects the environment' initiative. The Environmental Advisory Board of the Deutscher Ski Verband (German Skiing Associaton) was established in 1987, and 1993 was the start of the annual 'DOSB - Symposia for sustainable sports development' which are still held today; the cooperation 'Sport and environment' between the Deutsche Bundesstiftung Umwelt (German Federal Environment Foundation) and the DOSB ran between 2004 and 2010.

The list of model initiatives and publications and which have attracted a lot of attention is a correspondingly long one. Some examples include: 'Environmental protection in sports clubs' competitions at national and state level, climate and resource protection consultations by associations and communities in the sports venue area, handbooks and guidelines such as the (co-)publication of the Green Champions guideline for environmentally-friendly large sporting events, which was awarded the IOC environmental prize by the IOC in 2009, the guideline for Natura 2000 and sport, the development of information systems in the area of outdoor sports.

These activities are supplemented by innovative model projects, such as the environmental management of golf courses, discussion of environmental education topics or climate protection and sport. A series of these projects and activities have received international awards, such as the project of the UN decade for sustainable development, or the IOC environmental prize. More recent activities have added new accents, e.g. co-operation with environmental protection and nature conservation associations or professional TV contributions on the topic of sport and environment.

3.4 EDUCATION FOR SUSTAINABLE DEVELOPMENT

The General Assembly of the United Nations has designated the period 2005 to 2014 as the global decade of 'Education of sustainable development'. It stresses the importance of regional and local stakeholders, in accordance with the motto 'Think globally, act locally'. Working in schools, communities and clubs, they communicate and promote awareness of sustainable consumerism and sustainable living, illustrate the relationship to daily life and highlight where and how each one of us can act sustainably and in an environmentally-compatible manner. The German National Committee is available as the most senior national organisational instance for the activation of new partners, and offers assistance to the different players.

Bavaria is also committed to education for sustainable development. The 'Action Plan Education for Sustainable Development in Bavaria' continuously accompanies the general principle of sustainable development in the entire educational sector, brings stakeholders together, and develops the action plan and catalogue of measures. These measures include the quality circle '21 Communities - Good examples for sustainable community development': Leeway for action and the conditions of community sustainability are highlighted on the basis of 21 Bavarian communities which are considered models as a result of their sustainable development.

The regional competence centres (Regional Centre of Expertise - RCE) form an important element of the UN decade. An alliance of Munich educational and know-how carriers established the BenE Munich association in Munich. RCE BenE München e.V. links players that are active in Munich, and thus ensures the communication of existing educational offers and their further development through comprehensive partnerships. In addition, BenE identifies key issues from the Munich area for current new educational projects. Every year, Munich honours projects which have achieved successful trans-disciplinary linkages and demonstrated enormous appeal as beacon projects. The successful candidate in 2009 was the 'Münchner Klimaherbst' (Munich Climate Fall Season). This event series, which has been held since 2007, brings together important players from business, politics, science and education, in order to highlight urgent issues related to social responsibilities and identify adequate approaches for solutions. One of its goals was to make the projects of the Munich Climate Alliance for CO_2 reduction available to a broader public.

ENVIRONMENTAL SCREENING

4

ENVIRONMENTAL SCREENING

4.1 ECOLOGICAL SCREENING OF EVENT LOCATIONS

The extent to which Olympic and Paralympic Games intervene in nature and ecosystems is mainly determined by the selection of sites for the competitions and Olympic Villages. In the case of Munich 2018, site selection will be based on the compact 2-park concept (see Figure 4). It reduces the transportation burden and the occurrence of permanently sealed off surfaces, and lowers costs as compared to other models. The use of existing sports venues in Munich, Garmisch-Partenkirchen and Schönau am Königssee as well as the (merely) temporary use of areas around the Schwaiganger stud farm near Ohlstadt will ensure that permanent interference in nature and ecosystems can be minimised.

Munich 2018 is undertaking all efforts to minimise the consumption of land, particularly surfaces that have not been (extensively) sealed to date. In this vein, the environmentally-related surveys of these areas as part of the master plan currently represent the preliminary status. The surveys mainly include the planned sports venues in Munich, Garmisch-Partenkirchen, Schwaiganger and Schönau am Königssee, the Media Centre, the Olympic Village, open space and parking areas. The sports venues were subjected to an environmental screening in the summer of 2009, which was updated as the plans became more specific. Also, additional venue variants were investigated for cross-country skiing, biathlon and Alpine competitions in co-operation with ARGE München 2018.

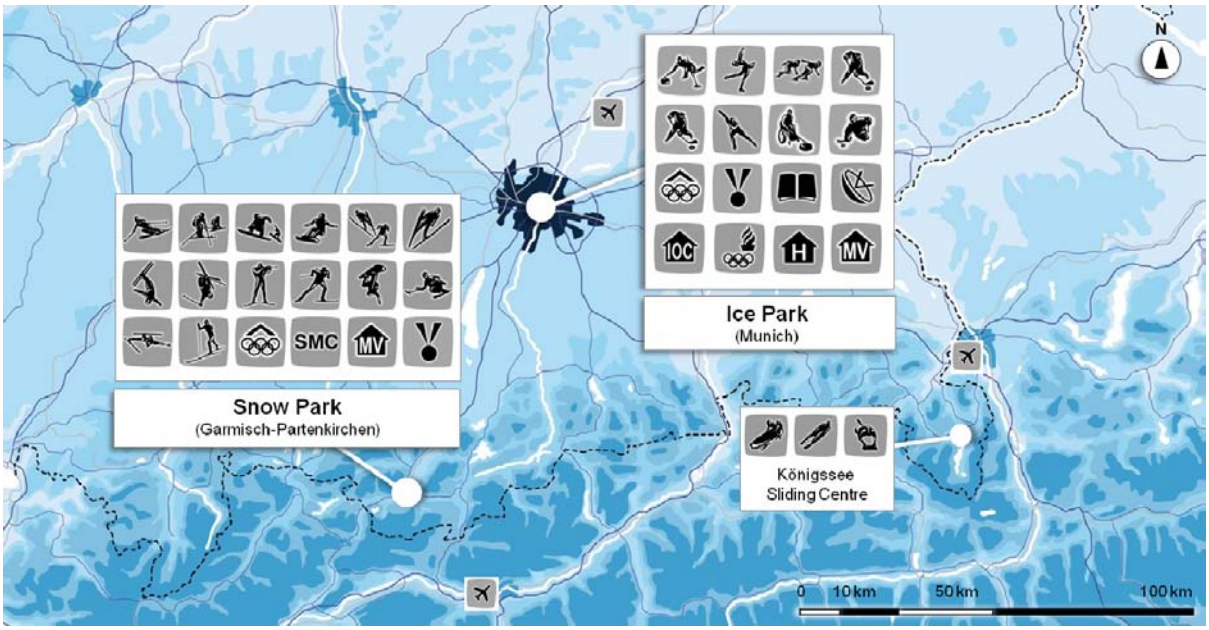


Figure 4: 2-park concept for Munich 2018 (Source: ARGE München 2018 – AS&P/ProProjekt, as at July 2010)

Objects under protection as part of the environmental assessment legislation (Gesetz über die Umweltverträglichkeitsprüfung (UVPG)) formed the subject of the environmental screening process. With respect to the environmental screening requested by the IOC, experts were able to draw on extensive experience from earlier planning related to ski areas, cross-country track centres and ski jumping facilities, as well as the implementation of earlier large sporting events. As a result of these experiences, the focus (as regards contents) was placed on issues of vegetation, fauna, soils and water supply. The protected object climate/air and particularly CO_2 emissions will be the focus of a separate climate screening (see Section 4.3).

The ecological screening process is divided into two sub-parts: area survey and determining the ecological potential for conflict.

With respect to the status of Olympic planning (September/October 2009 with updates conducted until August 2010) which applies at the time of preparation, the area survey will determine which areas will be used by the competitions sites themselves, which are used by additional functions such as parking spaces, training areas and other buildings, and how these are currently used. They will then be divided into several categories, depending on the extent of required building measures and land use (see Table 4). The area survey was conducted in the geographic information system, which allows for precise statements regarding temporary land use and the sealing of surfaces as one of the key target variables for the protected objects vegetation and soils as well as water supplies.

Table 4: Explanation of colours regarding the infrastructure in the environmental screening

Explanation of colours for infrastructure (see pictograms and maps)	
	Existing infrastructure, no permanent structural adjustments are required
	Existing infrastructure, structural adjustments are required
	Planned infrastructure (independent of the Games)
	Additional permanent infrastructure (contingent on the Games)
	Temporary sports venues for the Games

The numerous functional areas in the area of the competition sites are not subject to this IOC representation requirement. However, ARGE München 2018 nevertheless provides for the temporary preparation of all functional areas for use during the Olympic and Paralympic Winter Games; they will subsequently be restored to their original condition. Because of the high level of existing construction work for the sports venues and their environs, and the unique nature of the 'Olympic and Paralympic Winter Games' event, such a course of action is also expressly required in view of reducing the utilisation of land as part of this Environment and Sustainability Concept.

A second sub-part of the environmental screening calculates the ecological potential for conflict based on a reconciliation of planning with particularly significant areas. In this context, the following protected area categories have been taken into account: Natura 2000 areas, i.e. FHH areas and bird protection areas, national parks, biosphere reserves, nature conservation and landscape protection areas as well as especially protected biotopes.

By conducting a precise analysis of possible conflict potentials, environmental screening is able to verify that the objective of the Olympic application, namely 'to avoid the additional use of or negative impacts on high-quality ecological areas' can be achieved. In addition, it highlights the modifications that will be required during the course of subsequent and spatially differentiated planning steps, or where measures for the prevention and minimisation of negative impacts on the ecosystem and scenery must be developed.

At this point, it is mentioned that environmental screening is a suitable method at this early planning stage to assess the overall effects on the environment at this early planning stage, to control planning processes in view of environmental protection aspects and not least to review to what extent environmental objectives formulated for the application can be implemented.

However, regardless of the above, there are also statutorily prescribed approval procedures which must be conducted when implementing the plans:

Environmental assessments (UVP) according to the provisions of the Bavarian Administrative Procedures Law (BayVwVfG), environmental assessments (UVP) are required) for any planned snow-making facilities, lift facilities or clearing activities as of certain technical thresholds pursuant to Art. 35 (4) of the Bavarian Water Act (BayWG), Art. 21 of the Bavarian Train and Cable Car Act and Art. 39a of the Forest Act for Bavaria (BayWaldG).

A prohibition on deterioration applies to Natura 2000 areas, i.e. FFH areas and bird protection areas. With respect to projects in or in the vicinity of these protection areas, an FFH compatibility review pursuant to Section 34 of the BNatSchG (Federal Nature Conservation Act) must assess whether this will result in significant negative impacts on the area as regards components that are significant to maintenance goals or the purpose of the protection.

In addition, compliance with special species protection legislation (Sections 42 and 43 BNatSchG) is also a criterion for obtaining project approval under nature conservation laws. As part of a special review under species protection legislation (saP), a review pursuant to Section 42 (1) in connection with Section 5 and (if applicable) Section 43 (8) BNatSchG must be conducted.

Planning of a certain size category regularly represents an intervention in terms of Section 18 BNatSchG. A landscape management plan must be prepared for approval purposes, which illustrates and assesses the negative impacts on the ecosystem and landscape that result from the planning, and identifies measures for the prevention and minimisation of negative impacts as well as compensatory and replacement measures.

As is also shown in the lead project for the improvement of the biotope quality of Alpine sports venues, it is a given, in terms of this Environment and Sustainability Concept, that these statutory requirements will be met and ideally implemented during subsequent planning phases, and that this process will also result in ecological improvements beyond what is statutorily prescribed as a result of the planned lead projects.

4.1.1 MUNICH ICE PARK

4.1.1.1 COMPETITION SITES IN THE ICE PARK

At the Munich Ice Park, the majority of competitions and events will be held in existing sports venues or current sports buildings (see Table 5 and Map 1). Existing infrastructure comprises an area of 81%. No permanent structural changes have been planned for the Olympic Stadium, Olympic Building and Olympic Pool - these venues, with a floor plan totalling around 9.6 hectares, will be temporarily prepared for hosting the respective competitions or other events (Olympic Overlay). On the other hand, the event arena as well as the Olympic ice sports centre will be replaced by new buildings, which will affect an area of 2.6 hectares, whereby the training hall at the ice sports centre along the Lerchenauer Strasse will be retained. These two permanent buildings are already eligible for planning approval based on existing legally valid building plans, or based on their current condition.

The speed skating centre is to be temporarily established over an area of 2.8 hectares. Planned locations include areas on the campus of the Technical University of Munich in the Olympic Park. Parking space totalling approximately 12 hectares can be found to the north-west of the Olympic Stadium - which means that adequate parking space already exists for this location. Already existing buildings inside the Olympic Park will for the most part be integrated into the intended purpose; in addition, existing sports fields west of the Olympic Stadium and environs of the temporary speed skating building will be used on a temporary basis as functional area.

Some vegetation situated in the parkland area, which is particularly protected, is not affected by these plans, and there are no protected natural areas in the environs of the areas.

In general, the following applies to the utilisation of space at the Munich Olympic Park: The concept of the Munich 2018 Olympic application must be evaluated as positive, since the majority of space to be used is already being used as a sports area, for related functions or as parking space, and there will not be any permanent new developments beyond the extent of the Games.

Table 5: Area survey of the competition sites in the Ice Park

Competitions	Ceremonies, figure skating, speed skating, short track, ice hockey, curling
Elevation	514 metres above sea level
Spectator capacities	Olympic Building - Ice arena: 12,000 spectators Olympic Pool - Curling arena: 4,000 spectators Event Arena - Ice hockey arena 1: 11,000 spectators Olympic Ice Sport Centre - Ice hockey arena 2: 7,000 spectators Speed Skating Oval: 8,000 spectators

	Sports venues Functional area	Competitions/ Function	Area [ha]	Utilised area [ha]					Legally protected biotope pursuant to Art. 13d BayNatSchG [ha]	Permanent new development [ha]
				Infrastructure	Parking space/ Road	Sports fields	Other open space	Forest		
	Olympic Stadium		6.34	6.34	-	-	-	-	-	-
	Parking area	Parking area	11.90	-	11.90	-	-	-	-	-
A5	Werner-von-Linde-Halle	Preparation	0.68	0.68	-	-	-	-	-	-
C4	Tennis courts/Warm-up area	Sponsor areas	1.77	-	-	1.77	-	-	-	-
D1		Media area	0.33	-	-	0.33	-	-	-	-
E1		Function	0.43	-	-	0.43	-	-	-	-
	Olympic Building		2.22	2.22	-	-	-	-	-	-
	Olympic Pool		1.04	1.04	-	-	-	-	-	-
B3/ B7		Parking area	0.38	-	0.38	-	-	-	-	-
F		Function	0.72	0.63	0.09	-	-	-	-	-
(F)		Function	1.11	0.26	-	-	0.86	-	-	-
	Event Arena		1.24	1.24	-	-	-	-	-	-
	Olympic Ice Sports Centre		1.33	1.33	-	-	-	-	-	-
	Speed Skating Oval		2.85	-	-	2.85	-	-	-	-
		Functional areas	5.79	-	-	5.51	0.28	-	-	-
		Sports venues	**15.02**	**12.17**	**-**	**2.85**	**-**	**-**	**-**	**-**
		Functional areas	**23.09**	**1.57**	**12.35**	**8.04**	**1.14**	**-**	**-**	**-**
		Total	**38.11**	**13.73**	**12.35**	**10.89**	**1.14**	**-**	**-**	**-**

4.1.1.2 OLYMPIC VILLAGE IN THE ICE PARK

The Olympic Village in the Ice Park directly connects to the competition sites in the Olympic Park via the Tollwood area (approx. 10 ha), which is to be used as functional area (see Map 1). Planning for existing developments has been fully revised, and planned subsequent use as a residential area will only require approx. 6.6 hectares. This type of development is already eligible for approval under planning law, based on existing legally valid development plans. Temporary buildings will be constructed on an area of approx. 6.5h hectares. These areas will be unsealed following the Games, so there will not be any permanent intervention. Especially protected biotopes and protected areas are not located in the planning area.

Table 6: Area survey of the Olympic Village in the Ice Park

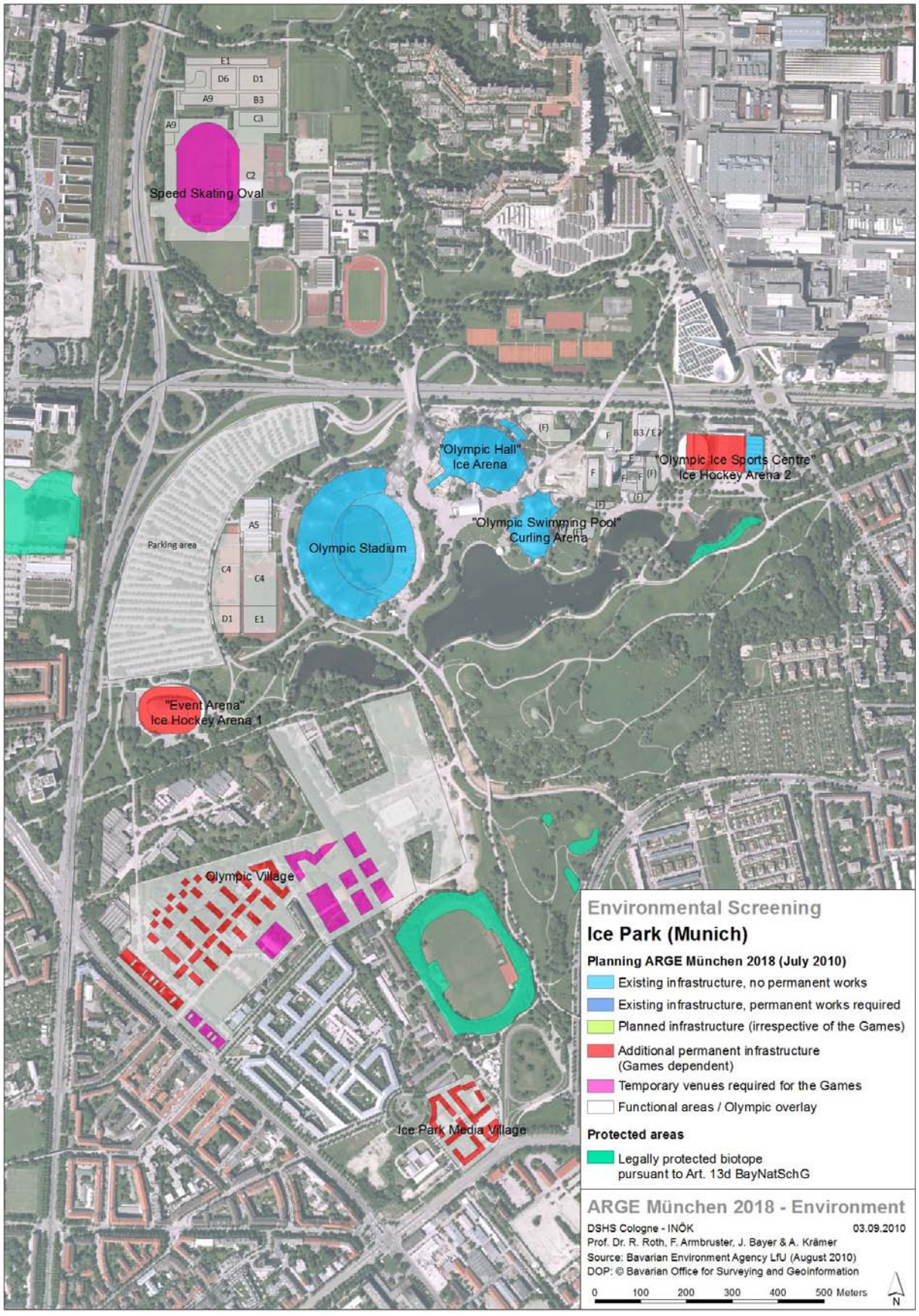
Area categories	Area		Permanent new development [ha]
	ha	%	
planned, permanent residential buildings (development plan or B-plan change procedure)	6.6	29	-
temporary development in currently developed areas	6.5	28	-
Tollwood grounds - functional area	10.0	43	-
Total	**23.1**	**100**	**-**

4.1.1.3 MEDIA VILLAGE IN THE ICE PARK

The Media Village is located south of the Olympic Park, in an area of already developed space (see Map 1). Planned permanent developments are to be implemented on a total area of 2.6 hectares. The legally binding development plan allows for additional areas to be sealed. This maximum admissible degree of sealing is expected to correspond with the degree of sealing required for the future Media Village. Especially protected biotopes and protected areas are not located in the planning area.

Table 7: Area survey of Media Village in the Ice Park

Area categories	Area		Permanent new development [ha]
	ha	%	
planned, permanent residential buildings (development plan or B-plan change procedure)	2.6	100	-
Total	**2.6**	**100**	**-**



Map 1: Environmental screening for Munich Ice Park

4.1.2 GARMISCH-PARTENKIRCHEN SNOW PARK

4.1.2.1 OLYMPIC SKI STADIUM

For the most part, the Olympic Ski Stadium can also draw on existing infrastructure, such as the Olympic ski jumps and related stadium as well as the slope on the Gudiberg, which will be the site of the FIS Alpine Ski World Championships during the coming winter season.

The practice ski jump located in the ski stadium will be rebuilt for the Freestyle discipline (aerials). The existing sport infrastructure will be redesigned on an area of 0.28 hectares. Since this space is located in the area of the existing ski jump facility, there will not be any permanent new developments (see Map 2).

Functional areas totalling approximately 11 hectares are planned for the vicinity of the Olympic Ski Stadium, with the majority located on agricultural areas (5.4 hectares) and existing parking space (3.8 hectares).

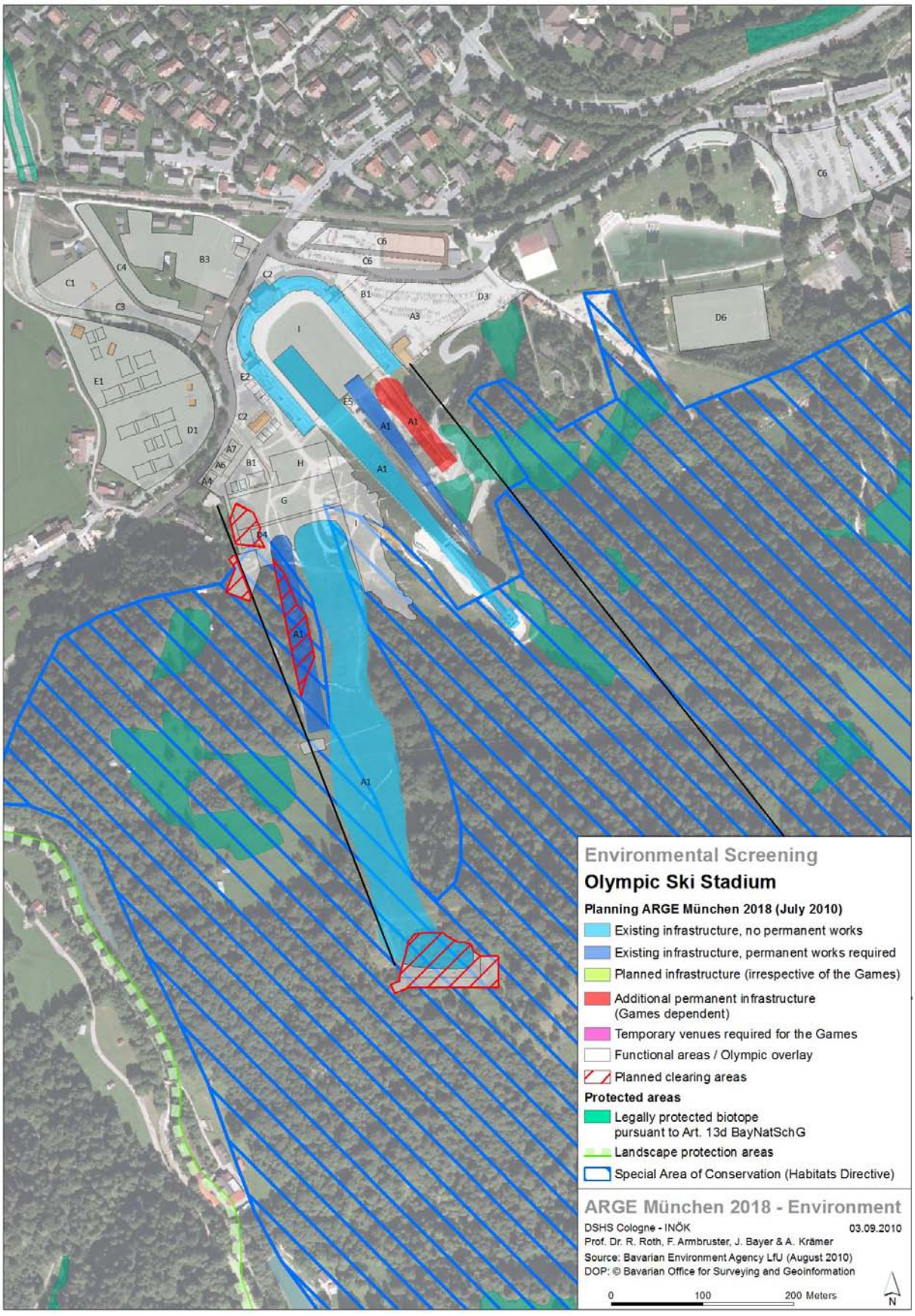
With respect to the Gudiberg ski run, planning provides for the partial expansion of the downhill area through clearing activities: in the start area, the freestyle (moguls) area and at the western edge of the grandstand on the Gudiberg, involving a total clearing area of 0.94 hectares.

There are no nature conservation and bird protection areas on the Gudiberg with the Olympic ski jump. However, the area around the ski run is designated as the 'Mittenwalder Buckelwiesen' FFH area, and parts of the borders for this protected area reach into the area of the downhill slope, so that the majority of these planned clearing areas are located in the area of the FFH zone. The landscape management plan for the double chairlift on the Gudiberg slalom slope (Pröbstl et al. 2009) has designated the forest areas bordering on the slope as relatively young tree stock, which are not allocated to any particular forest type. Based on this mapping, the cleaning measures which were planned for the construction of the lift, and which have now been undertaken (0.6 hectares), did not affect any habitat types in terms of the FFH Directive, meaning that the maintenance goals of the FFH area were not affected and the intervention was approved in view of this aspect. Against this background, and subject to the results of the required approval process, in which the responsible authority is also responsible for clarifying the issue of forest clearing independent of the FFH area, planning appears to be generally eligible for approval considering the respective additional requirements for the prevention and minimisation of negative impacts on ecosystems and landscapes.

Table 8: Area survey for the Olympic Ski Stadium

Competitions	Ski jumping, Nordic combination (ski jumping), freestyle aerials Alpine slalom, freestyle mogul hill
Elevation	707 metres above sea level
Spectator capacities	Ski jumping and Nordic combination: 18,000 spectators Alpine slalom: 18,000 spectators Freestyle: 14,000 spectators

	Sports venues Functional area	Competitions/Function	Area [ha]	Utilised area [ha]						Legally protected biotope pursuant to Art. 13d BayNatSchG (ha)	Permanent new development [ha]
				Infrastructure	Parking space/ Road	Existing slope	Other open space	Forest	Sports fields		
A1	Olympic large hill		0.83	0.83	-	-	-	-		-	-
A1	Normal hill		0.30	0.30	-	-	-	-		-	-
A1	Freestyle aerials		0.28	0.28	-	-	-	-		-	-
I	Olympic ski jump stadium		1.62	1.62	-	-	-	-		-	-
A1	Gudiberg Alpine slalom		2.91	0.01	-	2.65	-	0.25		-	0.25
A1	Gudiberg freestyle mogul hill		0.50	-	-	0.27	-	0.23		-	0.23
	Functional areas		10.84	0.22	3.78	0.03	5.40	0.47	0.94	-	0.47
		Sports venues	**6.44**	**3.04**	**-**	**2.92**	**-**	**0.48**	**-**	**-**	**0.48**
		Functional areas	**10.84**	**0.22**	**3.78**	**0.03**	**5.40**	**0.47**	**0.94**	**-**	**0.47**
		Total	**17.28**	**3.26**	**3.78**	**2.95**	**5.40**	**0.94**	**0.94**	**-**	**0.94**



Map 2: Environmental screening of the Olympic Ski Stadium

4.1.2.2 HAUSBERG SNOWBOARDING AND SKI ARENA

With the exception of the half pipe competitions, the competitions in the Hausberg snowboarding and ski arena will be held on the Hornabfahrt ('Horn' downhill slope). Biotopes under particular protection - pursuant to Art. 13d BayNatSchG are located at the upper end of the intended downhill section. Other than some wetter areas with different vegetation, most of these areas are comprised of Alpine meadows and low-nutrient Alpine pastures. Since no structural changes are planned for these areas, no structurally-related negative impacts are expected for these especially protected biotopes. Since the downhill slope has been used for many years, it is not expected at any additional negative impacts will occur as a result of the Olympic and Paralympic Games.

The construction of a temporary grandstand for 14,000 spectators is planned for the intended finish area. In addition to extensive earth work, this will also require the clearing of adjacent tree stock, approx. 0.2 hectares. It is assumed that this area will be used as a ski run after the Games, which is why this clearing area is considered as a permanent new development.

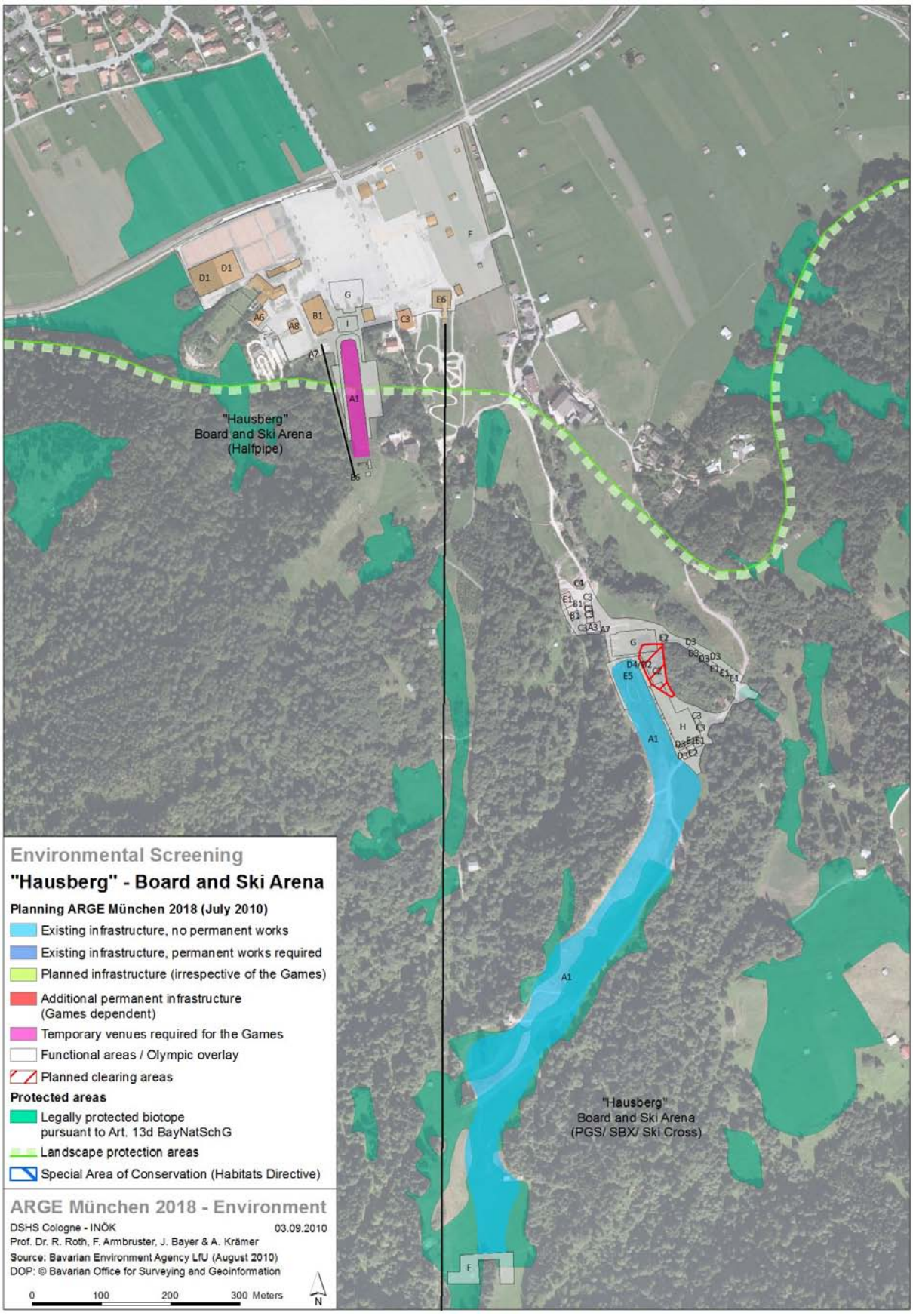
The entire slope has been designated a landscape protection area. There are no FHH areas, bird protection areas or nature conservation area in the environs of the competition sites.

Most of the intended functional areas for the Hausberg snowboarding and ski arena consist of existing parking spaces and adjacent agricultural areas, totalling 12 hectares.

Table 9: Area survey Hausberg Snowboarding and Ski Arena

Competitions	Snowboarding (Snowboard Cross, Parallel Giant Slalom, Halfpipe), Ski Cross
Elevation	730 - 1040 metres above sea level
Spectator capacities	Horn downhill slope: 14,000 spectators Halfpipe at Ami slope: 10,000 spectators

	Sports venues Functional area	Competitions/ Function	Area [ha]	Utilised area [ha]						Biotope pursuant to Art. 13d BayNatSchG [ha]		Permanent new development [ha]
				Infrastructure	Parking space/ Road	Existing slope	Other open space	Forest	Sports fields	on existing ski runs (no additional negative impacts)	additional negative impacts can be expected	
A1	Hausberg Snowboarding and Ski Arena (PGS/ SBX/ Ski Cross)		5.38	-	-	5.38	-	-	-	2.99	-	-
	Functional areas		2.43	0.03	0.21	1.78		0.20	-	0.24	-	0.20
A1	Snowboarding and Ski Arena Hausberg (Halfpipe)		0.40	-	-	0.40	-	-	-	-	-	-
	Functional areas		9.34	0.98	4.45	0.69	2.26	-	0.96	-	-	-
		Sports venues	**5.79**	**-**	**-**	**5.79**	**-**	**-**	**-**	**2.99**	**-**	**-**
		Functional area	**11.56**	**1.01**	**4.66**	**2.47**	**2.26**	**0.20**	**0.96**	**0.24**	**-**	**0.20**
		Total	**17.35**	**1.01**	**4.66**	**8.25**	**2.26**	**0.20**	**0.96**	**3.23**	**-**	**0.20**



Map 3: Environmental screening for Hausberg Snowboarding and Ski Arena

4.1.2.3 KANDAHAR ALPINE ARENA

In the last few years, the Kandahar downhill slope has been expanded for the 2011 FIS Alpine Ski World Championships. The present boundaries between slopes and wooded areas are shown in the areal maps from the year 2009 (see Map 4). No additional extensions or changes will be required for the Games with respect to the downhill slope area. While there are large areas of especially protected biotopes, the areas are frequently being used as competition slopes, therefore no additional negative impacts are expected during the Olympic and Paralympic competitions.

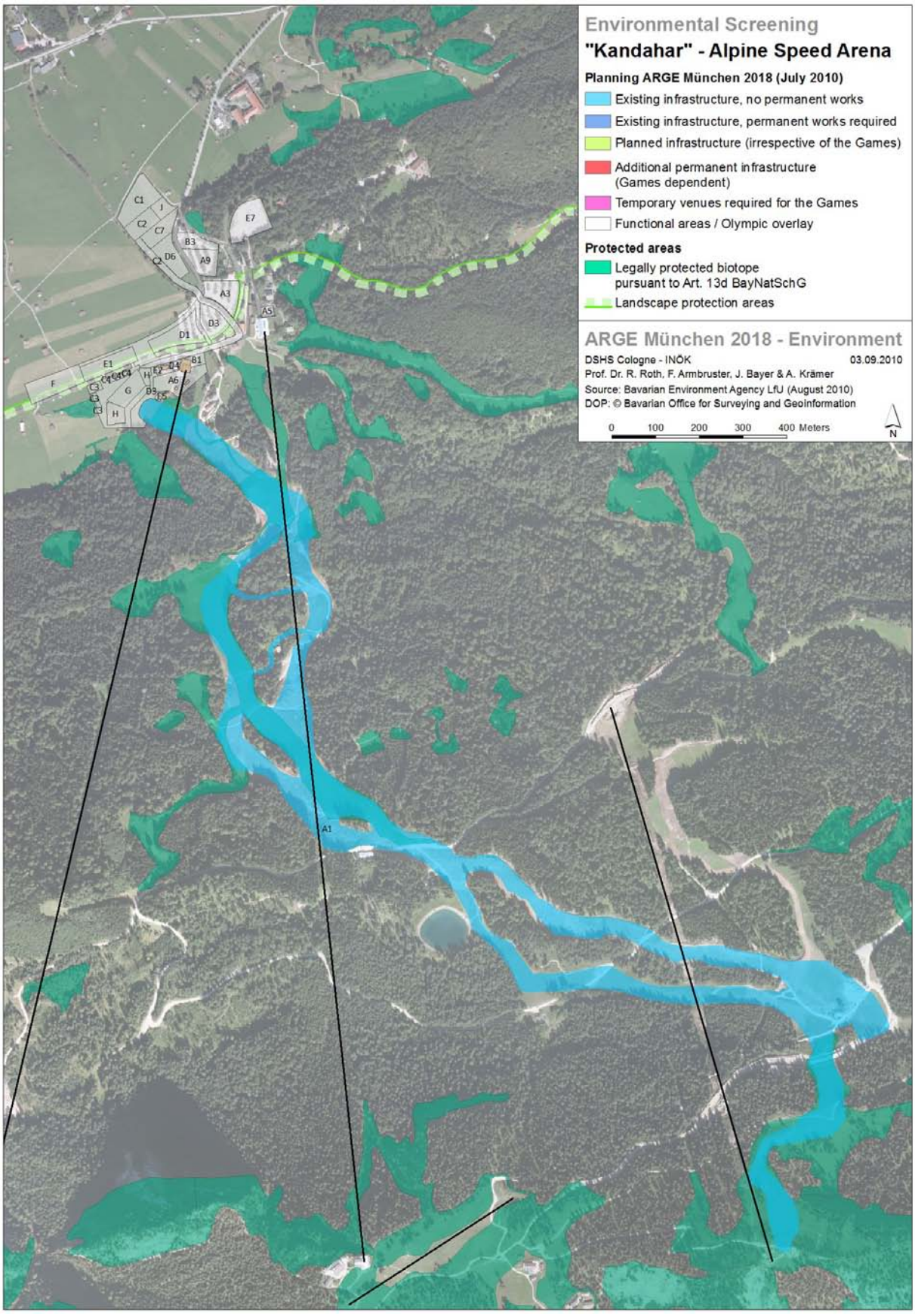
Functional areas of approx. 10 hectares will be required in the finish area of the downhill section. That area is currently made up of 4.2 hectares of existing parking spaces, and 5.8 hectares of open space that is used as agricultural area. A temporary grandstand for 18,000 spectators will be built in the finish area. Based on the current planning status, there will be a small overlap with especially protected biotopes at the western end of the functional areas; however, it is also expected that this overlap can be avoided during the course of implementation planning.

The area south of the railway line is located in the landscape protection area, with no additional protected areas.

Table 10: Area survey of Kandahar Alpine Arena

Competitions	Alpine - Downhill, Giant Slalom, Super G, Alpine Combination
Elevation	770 - 1690 metres above sea level
Spectators	18,000 spectators

	Sorts venues Functional area	Area [ha]	Utilised area [ha]					Biotope pursuant to Art. 13d BayNatSchG [ha]		Permanent new development [ha]
			Infrastructure	Parking space/Road	Existing slope	Other open space	Forest	on existing ski runs (no additional negative impacts)	additional negative impacts can be expected	
A1	Kandahar Alpine Arena 	26.91	-	-	26.91	-	-	9.09	-	-
	Functional areas	10.06	0.10	4.17		5.79	-	0.01		-
	Sports venues	**26.91**	**-**	**-**	**26.91**	**-**	**-**	**9.09**	**-**	**-**
	Functional areas	**10.06**	**0.10**	**4.17**		**5.79**	**-**	**0.01**	**-**	**-**
	Total	**36.95**	**0.11**	**4.10**	**26.91**	**5.87**	**-**	**9.10**	**-**	**-**



Map 4: Environmental screening Kandahar Alpine Arena

4.1.2.4 SCHWAIGANGER NORDIC CENTRE

Alternative sites were investigated and compared with respect to the Nordic disciplines (see Table 11). Potential sites were reviewed in view of sports and nature conservation aspects. The Oberammergau location could not be pursued further due to ownership issues; rather, Bewerbungsgesellschaft München 2018 decided on the main and state stud farm Schwaiganger at Ohlstadt as the location for the Olympic and Paralympic biathlon and cross-country skiing competitions.

Table 11: Variant study for selecting the Nordic disciplines location

Site	Elevation in metres above sea level	Area	Protected areas	Comments
Schwaiganger (Cross-Country + Biathlon)	660-750	> 200 ha (mainly open land)	no relevant protected area categories are directly affected, small areas of especially protected biotopes	good transportation connection, artificial snow concept is in preparation stage
Oberammergau (Cross-Country + Biathlon)	835-905	70 ha (all open land)	no relevant protected area categories are directly affected	Routing required in slope area; water for artificial snow directly from Ammer if required, no
Kaltenbrunn (Biathlon)	860 – 900	26.5 ha (approx. 90% open land)	34% of total space in the area of especially protected biotopes	Spectator access and source of water for artificial snow purposes is critical; direction of shooting range is not favourable
Finzbachtal (Cross-Country)	890 – 1,010	90 ha (of which 90% wooded area)	93% in bird protection area 50% in FFH area 13% in especially protected biotopes	Large-scale clearing required, some difficult-to-access topography
Elmau (Cross-Country)	1,000-1,200	Search area 320 ha, of which approx. 40% open land	almost entire open land is FFH area and especially protected biotopes	Long/difficult access road, source of water for artificial snow is critical

The Schwaiganger Nordic Centre has been designated as a temporary competition site. A cross-country run network that meets the requirements for hosting the Olympic and Paralympic Games has been developed for the cross-country and biathlon competitions in close co-operation with ARGE München 2018, national and international sports clubs and the individuals in charge of the stud farm. In addition, a technical artificial snow concept for this competition site was also developed, and the hydrological basis for the water supply has been prepared.

In addition to the areas that are directly required for the cross-country ski runs and shooting range (11.3 hectares), there will also be a requirement for another 22 hectares of functional area. These areas are mainly located on the meadows and pastures of the stud farm, although the existing parking area east of the stud farm and the riding area will also be used for the Games.

The cross-country ski routes near the forest were placed on existing paths and racks where possible, whereby some widening may be required depending on the detailed plans. Clearing of tree stock (in the shape of a line) over a total area of 0.17 hectares will be required on three sections.

Legally protected biotopes have already been taken into account during the design of the ski runs, which run in the area of designated biotopes in only two locations. However, these areas are on already existing routes and feature a comparatively narrow design since they concern downhill sections. No earth works will be required at these locations. Therefore no negative effects are expected for this biotope.

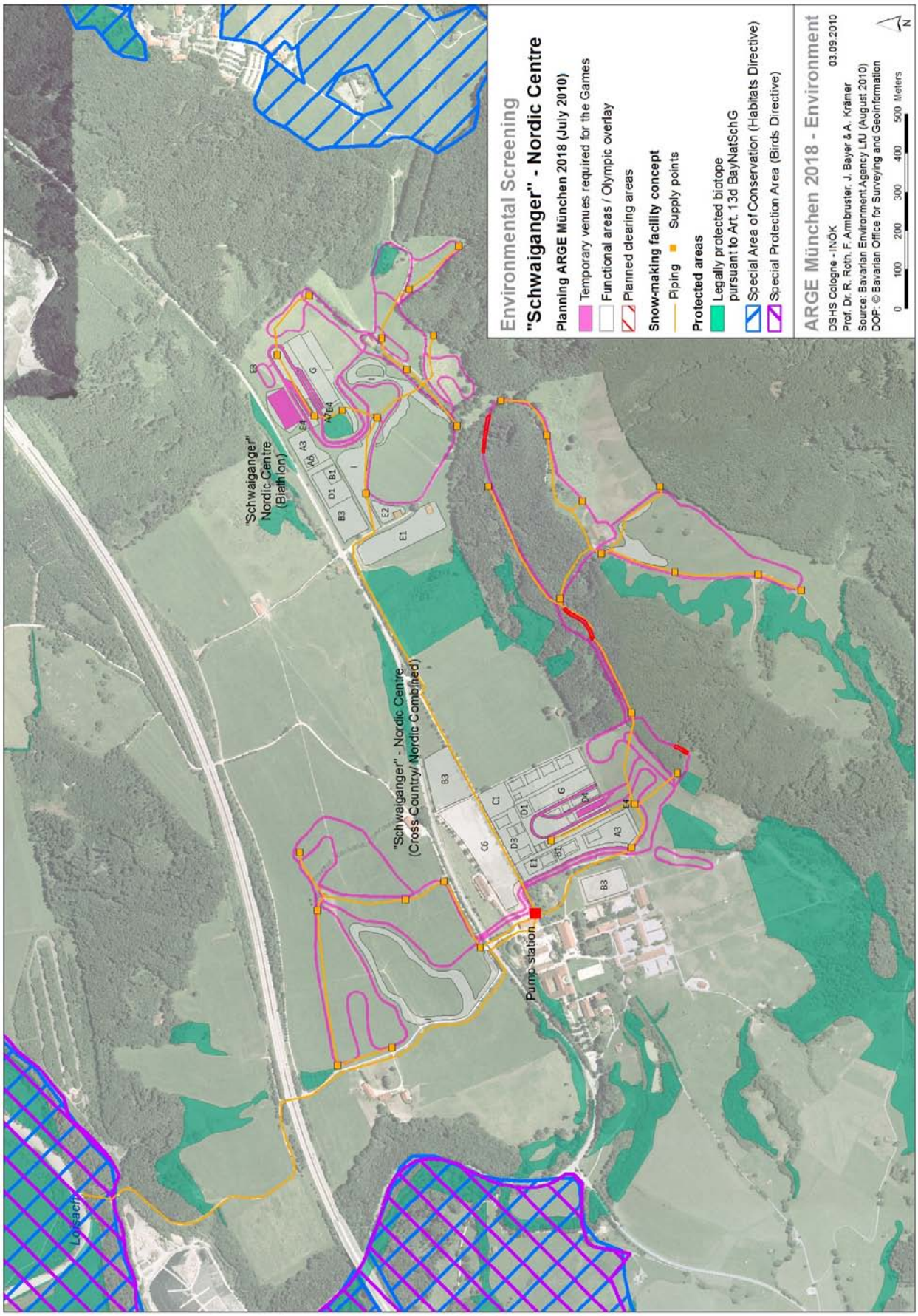
In addition to the cross-country ski run network and functional areas, there are plans to install a 7.6 km piping for artificial snow supplies. Piping configuration is oriented along existing paths and the course of the ski runs. At some locations, the piping affects especially protected biotopes. These sections also contain paths, so that the pipe trench can be guided in or on the edge of the path and thus avoid negative impacts on the biotope.

The Loisach can be reached via a 1.75 km pipe along the path, and the highway can be crossed using an existing underpass. The only area that does not contain a path is an approx. 100 metre long section north of the former dump. While this does not affect any especially protected biotopes, this area has been designated an FFH and bird protection area. At this point, it is again noted that ecological aspects must be reviewed in detail as part of the approval process for implementation planning. However, because of the small size and temporary character of this pipe, it is very unlikely that the key components and objectives of the FFH and bird protection area will be subject to any significant negative impacts due to the large water volumes available in the Loisach as compared to the required withdrawal volume (also for operating the facility).

Table 12: Area survey of Schwaiganger Nordic Centre

Competitions	Cross-Country, Biathlon
Elevation	660 - 750 metres above sea level
Spectators	Cross-Country: 20,000 spectators Biathlon: 22,000 spectators

	Sports venues Functional area	Area [ha]	Utilised area [ha]					Biotope pursuant to Art. 13d BayNatSchG [ha]		Permanent new development [ha]
			Infrastructure	Parking space/Road	Other open space	Forest	Riding area	on existing paths (no additional negative impacts)	additional negative impacts can be expected	
A1	Cross-Country ski runs 	6.98	0.01	0.34	6.46	0.17	-	0.02	-	-
	Cross-Country warm-up round	0.23	-	-	0.23	-	-	-	-	-
	Cross-Country functional areas	13.70	-	2.27	10.76	-	0.66	-	-	-
A1	Biathlon ski runs 	3.59	-	0.18	3.42	-	-	0.05	-	-
	Biathlon shooting range	0.49	-	-	0.49	-	-	-	-	-
	Biathlon functional areas	8.21	-	-	8.21	-	-	-	-	-
	Sports venues	**11.30**	**0.01**	**0.52**	**10.60**	**0.17**	**-**	**0.07**	**-**	**-**
	Functional areas	**21.91**	**-**	**2.27**	**18.97**	**-**	**0.66**	**-**	**-**	**-**
	Total	**33.20**	**0.01**	**2.79**	**29.57**	**0.17**	**0.66**	**0.07**	**-**	**-**



Map 5: Environmental screening for the Schwaiganger Nordic Centre with artificial snow concept

4.1.2.5 OLYMPIC VILLAGE IN SNOW PARK

The main building of the Olympic Ice Sport Centre and parts of the Alpspitz wave pool will be modernised and made available for interim use as part of the Games. The second building of the Ice Sport Centre will also be available for interim use.

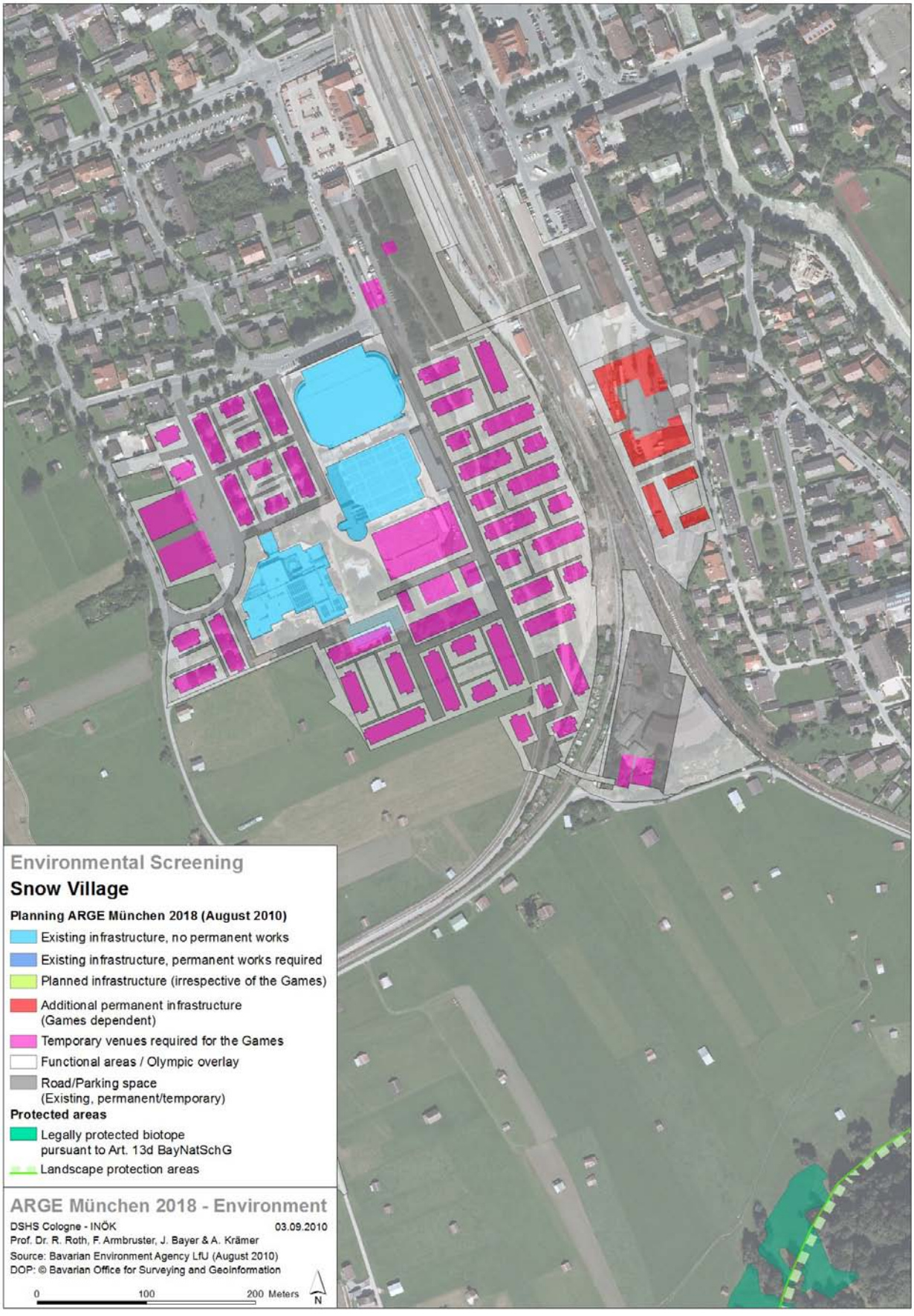
In addition to these existing buildings, most of the infrastructure for the Olympic Village will be constructed for temporary use. Athlete accommodation will consist of modular buildings, which will be dismantled after the Games. Tents will be erected for a variety of other facilities, using mainly those areas that are already developed, or existing parking areas (12 hectares). Agricultural areas will only be used for a small area of 1.9 hectares; this area will be restored after the Games.

Permanent residential buildings will only be constructed on a 1.5 hectare area east of the railway tracks, on the Wannerweg. Since these areas are already developed at present, this process will not involve any new land development overall.

This planning does not affect any especially protected biotopes or protected areas.

Table 13: Area survey of the Olympic Village in the Snow Park

Area categories	Area		Permanent new development [ha]
	ha	%	
Temporary use Ice Sport Centre and Alpspitz Wave Pool	3.0	16	-
Temporary use of space in already developed or parking areas	12.0	65	-
Temporary use of space on agricultural land	1.9	11	-
Permanent building on developed areas	1.5	8	-
Total	**18.4**	**100**	**-**



Map 6: Environmental screening for Olympic Village in the Snow Park

4.1.2.6 SNOW PARK MEDIA VILLAGE AND MEDIA CENTRE

The planning process for media accommodation has not been completed to date. Several site options are currently being studied, including already developed areas, which would be modernised or made available for temporary use as part of the Games, as well as agricultural land which would be restored after the Games. Subject to a detailed analysis following final planning, with respect to these site options it can be assumed that no high-quality ecological areas will be affected, and that the Games will not result in the permanent new development of land.

Table 14: Area survey of site options for the Media Village and Media Centre in the Snow Park (planning stage, see text)

Area categories	Area		Permanent new development [ha]
	ha	%	
Sub-Media-Centre (existing building)	1.3	10	-
Temporary use of agricultural open space/sports fields (Mühlanger)	2.9	22	-
Patton Areal (hotel use and temporary modular structure)	1.2	9	-
Wieland camping site (currently undergoing development plan process)	2.8	21	-
Murnau barracks (temporary use of sports field, parking area and open space)	5.1	38	-
Total	**13.3**	**100**	**-**

4.1.3 KÖNIGSSEE ARTIFICIAL SKATING RINK

The Königssee artificial skating rink is currently being expanded for the 2011 FIBT Bob and Skeleton World Championships, so that this sports venue (approx. 3 hectares) would not require any further extensions for the Olympic and Paralympic Games. In the direct vicinity of this area, planning provides for the creation of approx. 3 hectares of functional area, which would be located mainly on land used for agriculture, with the exception of an area on the Königssee. Protected areas or especially protected biotopes are not affected in the entire environs of this sports venue.

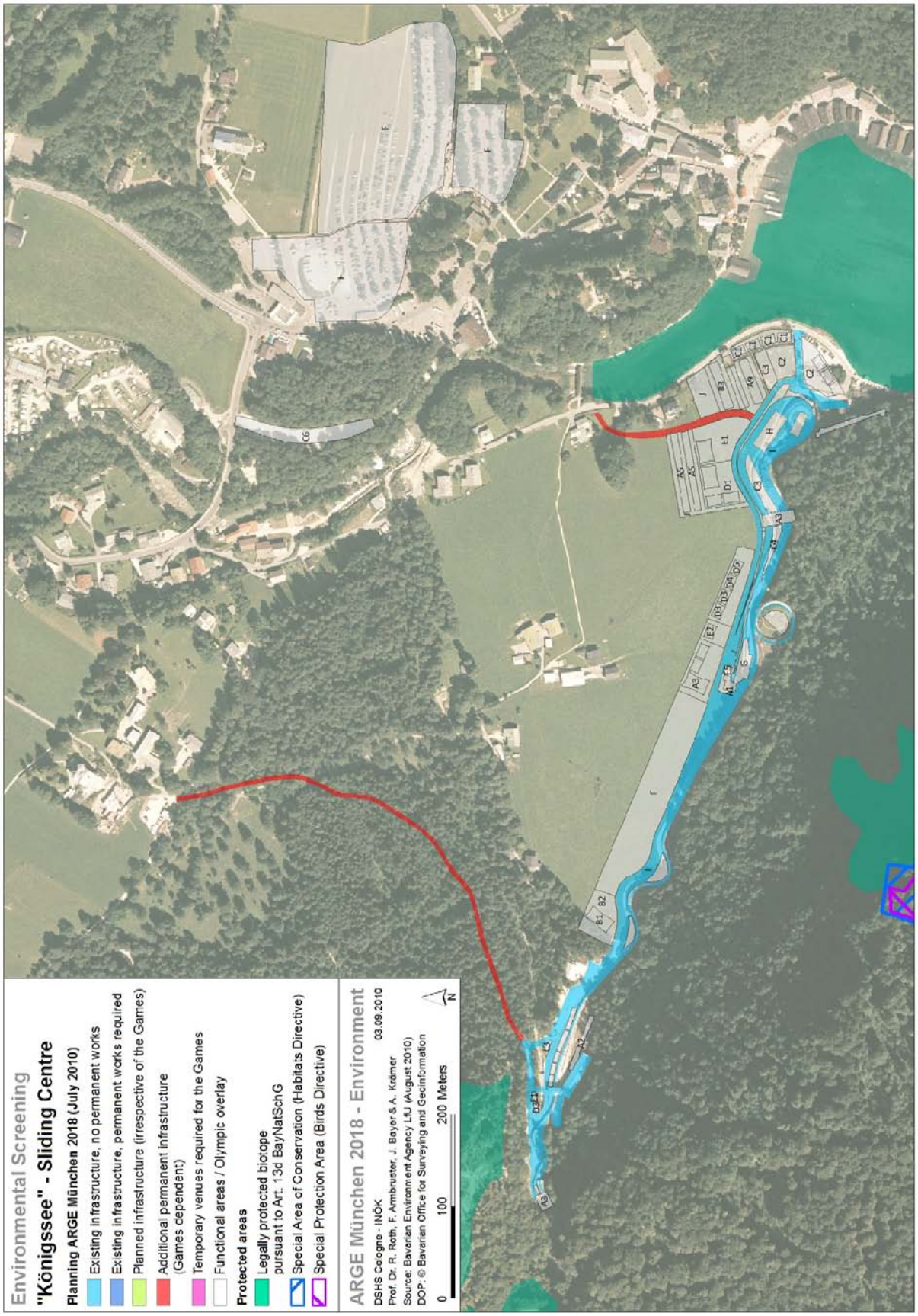
Planning also provides for the construction of an access road to the finish area, whereby an area of approx. 0.13 hectares would be permanently sealed.

Access to the start area of the artificial skating rink is provided by the existing Jodlerweg. This road, which is between 2.5 and 3.0 metres wide, is made of asphalt up to the last yard (farmyard); a water-bound cover has been applied up to the artificial skating rink. The road will be conditioned for the Olympic and Paralympic Games. At the same, it has not yet been decided if the entire road will have to widened, or whether the construction of several bypass sections will be sufficient. To this end, it would already be possible to temporarily widen the road with gravel at some locations, taking into account both terrain and tree stock. Either way, this route will be available for use, i.e. no new construction with large-scale clearing

Table 15: Area survey of Königssee Artificial Skating Rink

Competitions	Skeleton, Bob, Luge
Elevation	600 - 730 metres above sea level
Spectators	12,000 spectators

	Sorts venues Functional area	Area [ha]	Utilised area [ha]					Biotope pursuant to Art. 13d BayNatSchG [ha]		Permanent new development [ha]
			Infrastructure	Parking space/Road	Existing slope	Other open space	Forest	on existing ski runs (no additional negative impacts)	additional negative impacts can be expected	
	Königssee Ice Rink 	2.86	2.86	-	-	-	-	-	-	-
	Functional areas for the artificial ice rink	3.07	-	0.23	-	2.85	-	-	-	-
F	Parking spaces	4.67	-	3.72	-	0.95	-	-	-	-
C6	Parking spaces	0.23	-	0.23	-	-	-	-	-	-
	Access to start area	0.26	-	0.26	-	-	-	-	-	-
	Access to finish area	0.13	-	-	-	0.13	-	-	-	0.13
	Sports venues	**2.86**	**2.86**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Functional areas	**8.37**	**-**	**4.44**	**-**	**3.94**	**-**	**-**	**-**	**0.13**
	Total	**11.23**	**2.86**	**4.44**	**-**	**3.94**	**-**	**-**	**-**	**0.13**



Map 7: Environmental screening for the Königssee artificial skating rink

4.1.4 SUMMARY - ECOLOGICAL SCREENING

Table 16: Summary illustration of area surveys for sports venues (including Olympic Stadium)

Sports venues	Competitions	Area [ha]	Utilised area [ha]					Biotope pursuant to Art. 13d BayNatSchG [ha]		Permanent new development [ha]
			Infrastructure	Parking space/Road	Existing slope/Sports fields	Other open space	Forest	on existing ski runs (no additional negative impacts)	additional negative impacts can be expected	
Existing infrastructure, no permanent structural adjustments required		50.10	14.90	-	34.95	-	0.25	12.07	-	0.25
Existing infrastructure, structural adjustments required		0.80	0.30	-	0.27	-	0.23	-	-	0.23
Additional planned permanent infrastructure (due to Olympic Games)		2.85	2.85	-	-	-	-	-	-	-
Temporary infrastructure required for Olympic Games		14.55	0.01	0.52	3.25	10.60	0.17	0.07	-	-
Totals		**68.30**	**18.06**	**0.52**	**38.47**	**10.60**	**0.65**	**12.15**	**-**	**0.48**

The total area for the 2018 Olympic and Paralympic Games sports venues is approximately 68 hectares, with 15 hectares attributable to the Munich Ice Park and 54 hectares to the sports venues in the Garmisch-Partenkirchen Snow Park and the Königssee artificial skating rink.

74% of this area relates to ski runs, ski jumping facilities, buildings and the artificial skating rink that are already extensively used for sporting purposes at this time, and which do not require any permanent structural adjustments.

21% of the area will be temporarily used for the Olympic and Paralympic Games, whereby the regeneration and restoration of agricultural open spaces at the Schwaiganger stud farm and sports fields in the Olympic Park can be ensured. Therefore, these areas are not expected to be subject to any permanent interventions.

The Event Arena and Olympic Ice Sport Centre will be replaced by new buildings, and the practice ski jump in the Olympic Ski Stadium will be rebuilt (4% of total area). Since these new buildings replace existing buildings, or fall into the area of the ski jumping infrastructure, there would not be any new developments and additional sealing of open surfaces.

Only a small part of the total area - approx. 1% - must be expressly constructed for the Olympic and Paralympic Games: parts of the Gudiberg ski run will be extended to the side by clearing.

However, the area around the ski run is designated as the 'Mittenwalder Buckelwiesen' FFH area, and parts of the borders for this protected area reach into the area of the downhill slope, so that the majority of these planned clearing areas are located in the area of the FFH zone. The landscape management plan for the double chairlift on the Gudiberg slalom slope (Pröbstl et al. 2009) has designated the forest areas bordering on the slope as relatively young tree stock, which are not allocated to any particular forest type. Based on this mapping, the cleaning measures which were planned for the construction of the lift, and which have now been undertaken (0.6 hectares), did not affect any habitat types in terms of the FFH Directive, meaning that the maintenance goals of the FFH area were not affected and the intervention was approved in view of this aspect. Against this background, and subject to the results of the required approval process, in which the responsible authority is also responsible for clarifying the issue of forest clearing independent of the FFH area, planning appears to be generally eligible for approval considering the respective additional requirements for the prevention and minimisation of negative impacts on ecosystems and landscapes.

Competitions will be held on 12 hectares of existing vegetation that is legally protected pursuant to Article 13d of the Bavarian Nature Conservation Act. These areas solely concern existing ski runs (Kandahar downhill and Horn downhill). Since there are no plans for structural changes, no structurally-related negative impacts are expected for these especially protected biotopes. Since the areas in use concerns a competition ski run that has been used for many years, it is not expected at any additional negative impacts will occur as a result of Olympic and Paralympic Game events.

The regeneration and restoration of temporarily used agricultural land is a special challenge. Even if these areas are not designated as especially protected biotopes, they nevertheless represent important land space for agriculture, which is used at differing intensities over a certain time period. To this end, corresponding methods for the restoration and greening should be developed in advance, e.g. the production of seed on the relevant areas in advance (see lead project for temporary land use).

Table 17 illustrates the functional areas in the area of the sports venues (totalling 86 hectares) and their current use. It can be seen that the majority of functional areas is located in open space used for agriculture as well as existing parking spaces.

In this context, reference is again made to plans for preparing all functional areas for temporary use during the Games, and restoring them to their original condition after the Games. Small exceptions as seen in the overall context are the access road to the finish area of the artificial skating rink as well as the clearing areas for the functional areas on the Gudiberg and the Horn downhill with a total area of 0.8 hectare.

Table 17: Temporary functional areas for sports venues (as at August 2010)

Functional areas for sports venues	Area	
	ha	%
on agricultural open space	37.5	43.7
on park space	31.7	36.9
on sports fields	10.6	12.3
in the area of existing infrastructure	2.9	3.4
on ski runs	2.5	2.9
on wooded areas	0.7	0.8
Total	**85.9**	**100**

Combining all competition sites and Olympic Villages results in a total used area of approximately 211 hectares.

Table 18: Area survey of sports venues, functional areas and Olympic Villages (as at July 2010)

Area category	Area	
	ha	%
Sports areas	68.3	32
Temporary functional areas for sports venues	85.9	41
Olympic Village in the Munich Ice Park	23.1	11
Media Village in the Munich Ice Park	2.6	1
Olympic Village in the Garmisch-Partenkirchen Snow Park	18.4	9
Media Village in the Garmisch-Partenkirchen Snow Park	13.3	6
Total	**211.6**	**100**

Approximately one quarter of used space consists of existing infrastructure which does not require any permanent structural changes. Based on the current status, new construction will only take place in already developed areas, an area totalling approx. 16 hectares. Any additional space will only be temporarily used for the Olympic and Paralympic Games.

Table 19: Area survey of sports venues, functional areas and Olympic Villages, in relation to current land use (as at July 2010)

Area category	Area	
	ha	%
Existing infrastructure, no permanent structural adjustments	55.9	27
New developments only in already developed areas	15.7	7
Temporary land use and infrastructure	140.0	66
Total	**211.6**	**100**

4.2 ARTIFICIAL SNOW FOR THE SNOW PARK

In the application documents, the IOC also inquires about existing and planned facilities for artificial snow production. The ability to guarantee that competitions can be held through the production of artificial snow is one of the basic criteria for holding large winter sporting events.

Since this topic is also relevant in view of ecological aspects, the current facilities for existing ski areas have been summarised below based on information provided by Garmisch-Partenkirchen. With respect to the temporary Schwaiganger Nordic Centre, an artificial snow concept has been developed, and the hydrological and ecological general conditions have been prepared.

A first step assesses the total demand for artificial snow that is required for the Olympic and Paralympic Games. These values have also been included in the Games' climate balance sheet under the energy requirements heading, and will be compensated for with corresponding projects.

The amount of artificial snow required for the Olympic and Paralympic Games is subject to different variables. For one, the amount of artificial snow that is produced will depend to a large degree on natural snow conditions, as well as weather conditions before and during the Games. Another factor which must be taken into account is that approximately 80% of the competition sites (see Table 20) are used for tourism and competitions, and hence will also receive artificial snow regardless of whether the 2018 Games are held.

Against this background, an artificial snow cover of 50 cm, which is required for holding the Olympic and Paralympic competitions, has been assumed. Calculated over an area totalling 50 hectares, this results in snow requirements of approx. 260,000 m^3. The water volume required to produce this amount of snow is approximately 105,000 m^3.

Table 20: Artificial snow production for the competition sites in the Snow Park

	Area of ski runs [ha]	Amount of snow [m]	Required snow [m³]	Required water [m³]
Kandahar Alpine Arena	26.8	0.5	134,200	53,680
Hausberg Snowboarding and Ski Arena (PGS/Ski Cross)	4.8	0.5	23,750	9,500
Hausberg Snowboarding and Ski Arena (SBX)	0.5	3.0*	13,500	5,400
Hausberg Snowboarding and Ski Arena (Halfpipe)	0.4	3.0*	12,000	4,800
Olympic Ski Stadium (Ski run)	3.5	0.5	17,500	7,000
Olympic Ski Stadium (Ski Jump)	2.0	0.5	10,000	4,000
Schwaiganger Nordic Centre	10.5	0.5	52,500	21,000
Totals	**48.5**		**263,450**	**105,380**

(* amount of artificial snow cover: assuming that no structural or other technical facilities will be used to construct these facilities.)

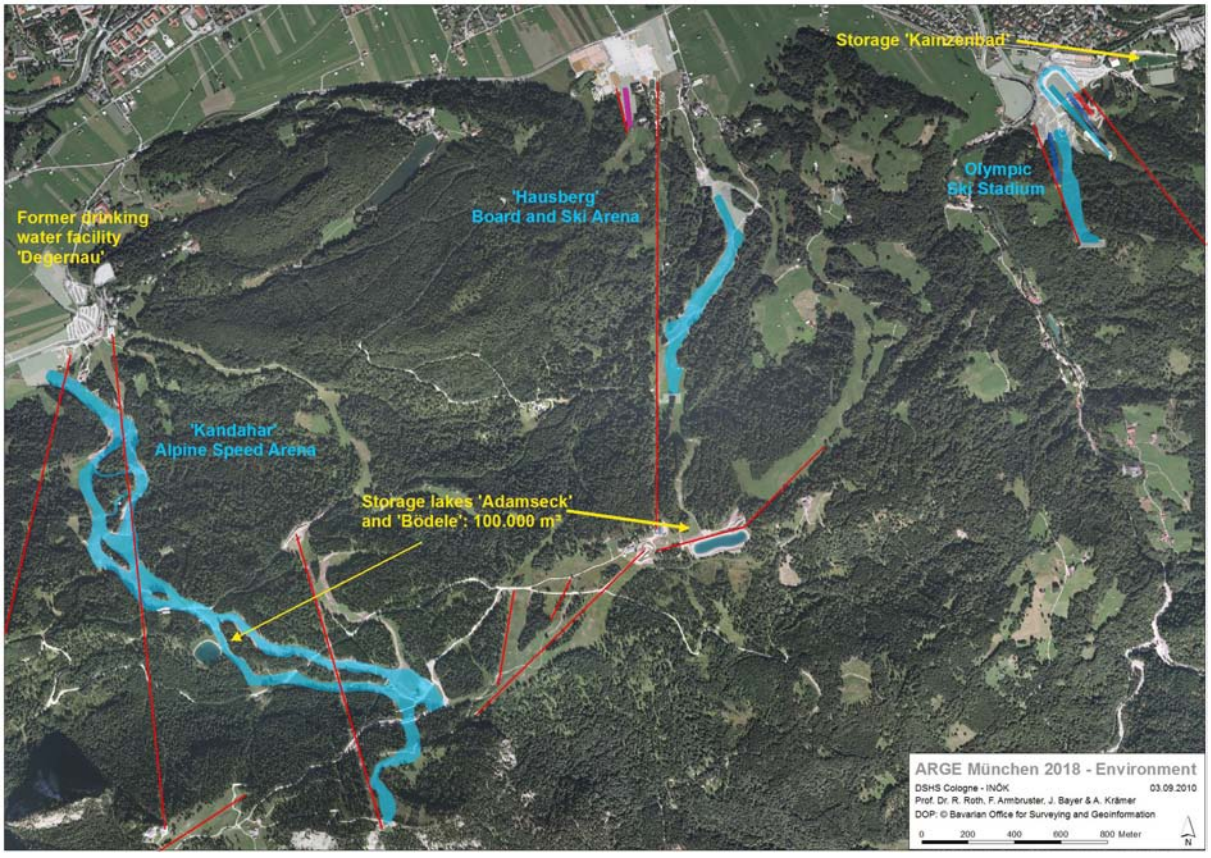
4.2.1 KANDAHAR ALPINE ARENA, HAUSBERG SNOWBOARDING AND SKI ARENA AND OLYMPIC SKI STADIUM

The information below is based on information provided by Garmisch-Partenkirchen regarding the current situation of artificial snow in the existing ski areas.

The Kandahar Alpine Arena and Hausberg Snowboarding and Ski Arena are fully equipped with high-performance snow-making equipment. Water is supplied from the surplus water of the former Degernau drinking water facility. It is located approx. 500 m from the Kandahar Alpine Arena finish area. There are also two storage lakes, 'Bödele' and 'Adamseck' (see Map 8) with a total volume of approx. 100,000 m^3. All ski runs used for competitions are connected to the corresponding supply point for snow production via a pipe network. Not included is the ski run with the planned halfpipe. It currently has a separate facility but may also have to be connected to the main piping if required.

The Olympic Stadium also has a high-performance snow-making facility. Water is taken from the rivers Partnach and Kanker, with a maximum withdrawal volume of 90 l/s (total). Interim storage takes place at Kainzenbad. Ski sport facilities feature supply points through existing piping.

Other than connecting the halfpipe, no additional snow-making facilities or storage options will be required in the area of existing competition sites, even in consideration of additional facilities such as moguls and aerials during the Olympic Games.



Map 8: Site plan for artificial snow production at existing competition sites in the Snow Park

4.2.2 SCHWAIGANGER NORDIC CENTRE

The Schwaiganger Nordic Centre, which has been designated as the site for cross-country and biathlon competitions, is planned as a temporary competition site. To ensure certainty with regard to snow supplies, a plan for the facility has been prepared in co-operation with a leading manufacturer of snow-making facilities.

The plan is based on the following premises:

- Pursuant to Art. 35 (3) of the Bavarian Water Act (BayWG), water used for snow-making purposes may not contain any additives.
- Because of possible microbial pollution of the nearby Loisach River, it may be necessary to subject the water to UV treatment (artificial snow must be of bathwater quality).
- The Garmisch-Partenkirchen administrative district generally requires that a maximum of 20% of the average low water runoff (MNQ) may be withdrawn from surface water. If levels fall below the MNQ, withdrawals must be discontinued.
- Only permanently installed snow-making facilities are technically able to cover the sections with sufficient snow (50 cm) within a specified time of 65 hours.
- Water used for snow-making purposes must be cooled to ensure the efficiency of the snow-making process.
- A variety of water supply possibilities were reviewed during the preparation of the concept. Withdrawing water from the Loisach would certainly be the best solution in view of economic aspects, given the proximity to competition sites and large available volume of water.

4.2.2.1 HYDROLOGICAL ASPECTS - LOISACH

Information related to the Schlehdorf water gauge was used in the description of the hydrological aspects; extensive information for this location is available in the form of hydrological annuals (http://www.hnd.bayern.de/). The gauge is located above where the Loisach River leads into Lake Kochel (Kochelsee), and hence approximately 4 km before the potential withdrawal point. The surface catchment area is 640 km^2. The values used below refer to the time series 1926 to 2005, i.e., a time period of 80 years.

Figure 5 illustrates the run-off conditions in the Loisach. Average run-off (MQ) is approx. 23 m^3/s, with average low water run-off (MNQ) at 8.6 m^3/s. The lowest run-off value ever measured was on 27 January 1963, and was still 5 m^3/s.

The requirements related to water withdrawals by snow-making facilities in the Garmisch-Partenkirchen administrative district limit withdrawal quantities to a maximum value of 20% of the MNQ, i.e., approx. 1.72 m^3/s. Another requirement is that withdrawals be discontinued if actual run-off falls below the MNQ value. Using the flow duration curve for the 80-year time series, this situation can, on average, be expected to occur 20 days per year.

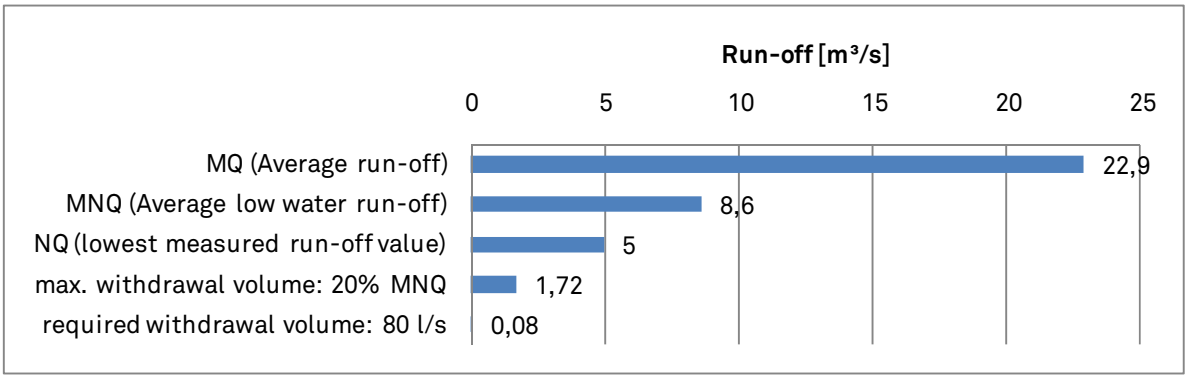


Figure 5: Run-off conditions in the Loisach river (MQ, MNQ and NQ) as compared to requirements for maximum and actual requirement withdrawal volumes

The illustration also shows the required withdrawal volume when the planned facility runs at full capacity. It shows that the planned withdrawal volume of 80 l/s is only a fraction of the run-off values measured during low water. Even assuming the lowest ever measured value of 5.0 m^3/s, a withdrawal of 80 l/s would only make up 1.6% of total run-off.

Against this background, during the required approval process it would also become necessary to verify whether this requirement, namely the discontinuation of withdrawals upon reaching the MNQ, will have to be applied considering the large catchment area. To this end, the ecological conditions of the body of water would also have to be considered. If yes, storage options would have to be included in the planning. If not, snow-making activities could proceed without interim storage.

4.2.2.2 TECHNICAL SNOW-MAKING FACILITY CONCEPT

The criteria for sizing a snow-making facility consist of the area to be covered with snow, and the time period during which the areas must be covered with the required snow depth. To ensure that cold periods lasting a few days can also be used for the production of the required snow, a relatively short snow-in period of 65 hours (for basic snow cover) has been selected, and the capacities of the main pumps and pipe dimensions have been configured accordingly. The depth of the snow cover required for holding the cross-country and biathlon competitions has been set at 50 cm.

Because of the extensively branched cross-country ski run network, artificial snow would have to be distributed over a relatively large area. This requires the existence of a corresponding piping on the grounds to ensure that these areas can be covered with snow fairly quickly. Supply points provide snow production equipment with water and electricity. These requirements can only be met by using permanently installed facilities, even for temporary competition sites. This means that the pump station must be accordingly housed in a building, and the piping must be installed in the ground. The sizing for the snow-making facility is shown in Table 21. Based on the assumed snow area of approx. 10 hectares, water requirements for basic snow cover will be approx. 21,000 m^3.

Table 21: Technical parameters of planned snow-making facility at the Schwaiganger Nordic Centre

Parameter	Cross-Country	Biathlon	Total
Length of ski run [m]	10,000	5,000	15,000
Average width [m]	7.0	7.0	7.0
Area [m²]	70,000	35,000	**105,000**
Snow cover [m]	0.5	0.5	0.5
Snow density [kg/m³]	400	400	400
Snow per m³ of water [m³]	2.5	2.5	2.5
Snow required for snow cover [m³]	35,000	17,500	52,500
Water required for snow cover [m³]	14,000	7,000	21,000
Subsequent snow cover, losses [m]	0.5	0.5	0.5
Snow required for subsequent snow cover [m³]	35,000	17,500	52,500
Water required for subsequent snow cover [m³]	14,000	7,000	21,000
Total water requirement (initial snow cover and subsequent cover)	**28,000**	**14,000**	**42,000**
Number of snow-production machines T60	14	7	21
Snow-in time at -5°C ca.[h] (snow-in period)	65	65	65

In addition, water used for snow-making must be cooled to ensure efficient snow production, particularly if the facility is supplied directly with surface water at correspondingly higher temperatures.

The capacity of the facility (main pumps, snow production equipment, cooling towers, etc.) is approx. 1000 kW. Energy consumption for providing basic snow cover over the 10 hectares, with a technical snow cover of 50 cm, is therefore set at approx. 65,000 kWh.

4.3 MUNICH 2018 TRANSPORTATION CONCEPT

The transportation concept described in this section was prepared by the 'Transportation' expert commission (rather than the 'Environment' expert commission). It addresses the fact that some transportation issues in the Environment and Sustainability Concept - for example, the use, expansion and capacity planning for environmentally-friendly public transport - fall into the responsibility area of the 'Transportation' expert commission. By linking the expertise of both commissions, it is possible to address these important issues in a professional and timely manner, and incorporate them into the Environment and Sustainability Concept.

Munich and Upper Bavaria already feature the optimum conditions for hosting the Olympic and Paralympic Winter Games - both in regard to transportation infrastructure as well as experience with large sporting events:

- Most of the transportation infrastructure used for the 2018 Olympic and Paralympic Games is already in place. On the 'Quality of Living 2009' ranking conducted by the Mercer consulting company, Munich boasts the world's second-best infrastructure of surveyed large urban centres.
- The General German Automobile Association (Allgemeiner Deutscher Automobil-Club e.V., ADAC) has studied public transit in 23 densely populated centres as part of a Europe-wide test. Munich's public transit programme topped both German and European rankings. The city received grades of 'very good' in 3 of 4 categories (travel time, transfers, information).
- Munich's main train station is one of Europe's most frequented railway hubs and the third-largest main station in the world as measured by the number of tracks. As a part of the trans-European high-speed rail network, it has express train connections (ICE/IC/EC) to all important German urban centres and neighbouring European centres such as Paris, Rom, Amsterdam, Budapest, Zurich and Vienna.
- The dense Munich local traffic network includes commuter and regional connections as well as 442 km of rapid transit, 95 km subway, 75 tram and 464 km bus lines, providing perfect access to Munich's metropolitan region of 5.5 million people.
- Garmisch-Partenkirchen is where the main train routes to Munich and Innsbruck (Austria) connect with the branch line section from the Allgaeu tourism region and Tyrolian holiday region of Reutte.
- A high-density local and regional bus system located in the Ice Park as well as the Snow Park and the area of the artificial skating park at Königssee warrant public transport access to the competition sites.
- The bus fleets of Munich and Garmisch-Partenkirchen are environmentally-friendly and protect the climate. Newly acquired vehicles meet the most demanding standards for engines and exhaust cleaning. New buses currently in use meet the demanding EEV European exhaust standard, which by far exceeds statutory requirements pursuant to EURO V. At this time, 64 buses already meet the EEV exhaust standard, and by 2018 the entire public transit fleet in Bavaria will meet the EEV standard. In addition, the Munich transportation company is also testing very promising hybrid technology. And not least, the vehicles are equipped with carbon-particulate filters, which reduce particulate matter (PM) emissions to a minimum.

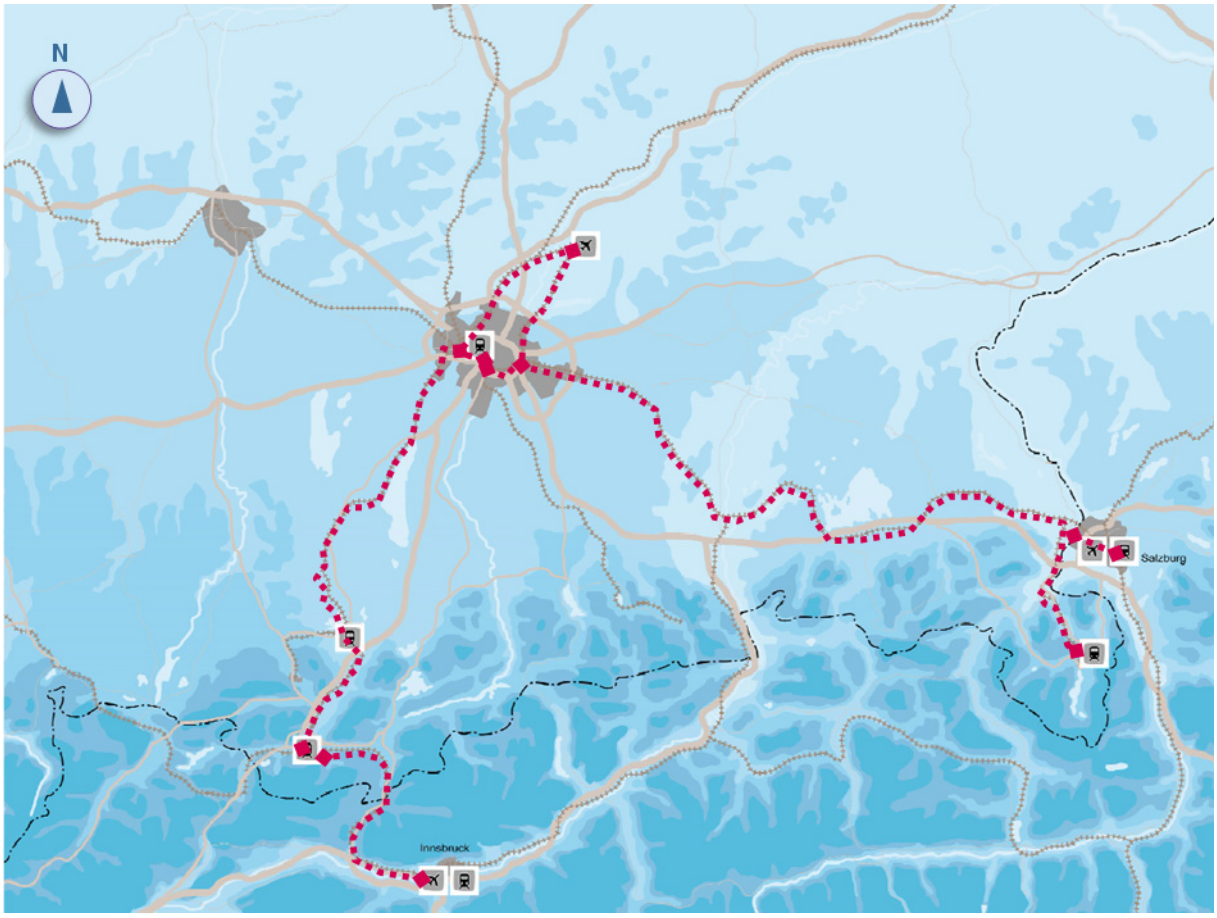


Figure 6: Rail connections with high significance for Olympic Games (Source: ARGE München 2018 – AS&P/ProProjekt)

- At this time, the entire public transit fleet is equipped so as to allow for mostly stair-less and disabled-appropriate access. Munich was one of the first German cities to implement disabled-appropriate low-floor buses in 1988; these buses have been in use on all lines since 2004.
- Good public transit access and a consistently expanded route network for pedestrians and bicycle riders in Munich has already reduced the car portion of the modal split to approx. 36%. Other investments in the 'Umweltverbund' (public transit, bicycle, pedestrian) are planned, meaning that this trend will continue.
- The proportion of bicycle transportation as part of Munich's modal split is 14%. Annual investments for the promotion of bicycle use and further expansion of the bicycle network have been increased to EUR 4.5 million. The routes in Munich's entire bicycle network now total 1,200 km.
- All competition sites can be reached via highways and the main road network. Munich's street system, with its efficient bypasses and main radials, comprises more than 2,300 km and is therefore suited to achieve a balanced distribution of traffic and minimisation of bottlenecks.
- An established system of marked alternate routes is in place for all highway segments. At the same time, guidance and telematic systems, which are already established on important segments and are continuously expanded, improve traffic flow and reduce the risk of traffic jams.

Traffic prevention and reducing the stress on resources

The compact sports venue concept ensure short routes for both athletes and visitors. Sports venues can be reached by foot within the various parks. With regard to athletes, officials and guests arriving from abroad, airports in Munich, Salzburg and Innsbruck are available in close proximity to the sports venues.

The size of the sports venues is based on the expected number of visitors and in part also on the capacity of the transportation systems. Under no condition would the expected Olympic traffic exceed the capacities of the existing and planned infrastructure.

The transportation concept builds on the principle of reducing the stress on the environment and identifies five priorities:

1. Preferential use of existing infrastructure
2. Optimisation and modernisation of existing infrastructure
3. Construction of already planned projects (for which future demand has already been identified)
4. Additional infrastructure (where possible, with additional rail projects that take into account future demand)
5. Temporary expansion measures in consideration of ecological concerns and the avoidance of ecologically sensitive areas

The transportation concept designated for the Olympic and Paralympic Winter Games is mainly based on existing infrastructure, and is only supplemented by a few additional structural measures. Already planned roads and rail tracks will be implemented no later than the end of 2017, and thus increase the efficiency of the 'Munich 2018' transportation system. The extension of the A95 (B2 new) and the two bypasses for Garmisch-Partenkirchen have already been considered in the federal government's requirements plans, and are independent of the Olympic and Paralympic Winter Games.

The only new plan initiated for Munich 2018 is the construction of an additional two-track railway segment between Munich and Garmisch-Partenkirchen, which will contribute towards improving the current rail offering (shorter trip and reduction in travel time to approx. 70 minutes), and thus address a long-standing request on the part of the local population.

The OCOG will plan, finance and implement (in a timely manner) additional measures such as auxiliary train platforms, temporary P+R schemes and Olympic lanes in coordination with the responsible authorities.

All extension measures related to transportation infrastructure promote the attractiveness of Bavaria as a business location and will continue to contribute towards its competitiveness in the future.

Inbound travel by spectators

As a result of complex modelling and simulations, it is expected that approximately 60% of visitors will come from Germany and the Olympic region (within 100 km), as well as 11% from overseas and Asia, and almost 30% from neighbouring European states. As a result, high-speed rail traffic takes on a particularly important role.

There is a large and diverse supply of accommodations in the Olympic region. The majority of visitors can be accommodated within a 50 km radius around the centre of the Games. On the busiest days, up to 81,000 visitors will be expected at the Ice Park, with figures of 72,000 and 12,000 for the Snow Park and Königssee artificial skating rink, respectively. At the beginning and end of the competitions, it is estimated that up to 35,000 (Ice Park) and 20,000 (Snow Park) spectators will be arriving or leaving per hour.

Promotion of public transport

The intent is to have as many visitors as possible arrive and depart by using public transit. To this end, both push as well as pull factors will be utilised.

- All visitors can use public transit to reach the event locations and sports venues directly. Train travel time will continue to be reduced on several segments by 2018.
- Competition sites are connected to the rail network (Munich subway, Deutsche Bahn and/or Bayerische Zugspitzbahn). The only two exceptions are the Königssee artificial skating rink and the Schwaiganger stud farm. However, these two locations can also be conveniently reached with public transit. Shuttle buses run to and from the competition sites at very short time intervals from both the Murnau railway station as well as the Berchtesgaden railway station.
- Reduced travel time and the modernisation of the public fleet increase the attractiveness of public transit.
- Special routes and stops allow for direct connections to sports venues.
- Combination tickets combine entrance to a competition site with a ticket for public transit, and therefore allow visitors to enjoy convenient and environmentally-friendly inbound and outbound travel. The combination ticket can be used across Bavaria including neighbouring Austrian regions (Salzburg, Kufstein, Innsbruck) and the Reutte region, and allows for free travel on the event day and an additional day. Experience has shown that combination tickets significantly increase demand for public short-distance transit. The transit ticket is an obligatory part of all entrance tickets. Public transit can also be used free of charge by volunteers, media representatives and OCOG employees.
- In addition, cycle time for public transport routes will also be reduced.
- Motor coaches are able to park directly near sports venues, which creates a convenience advantage for buses, as opposed to private vehicles. Sufficient numbers of parking spaces for motor coaches of marketing partners and spectators will be offered within walking distance of the competition sites. This is expected to lead to a higher motor coach proportion in the model split - approx. 20%.

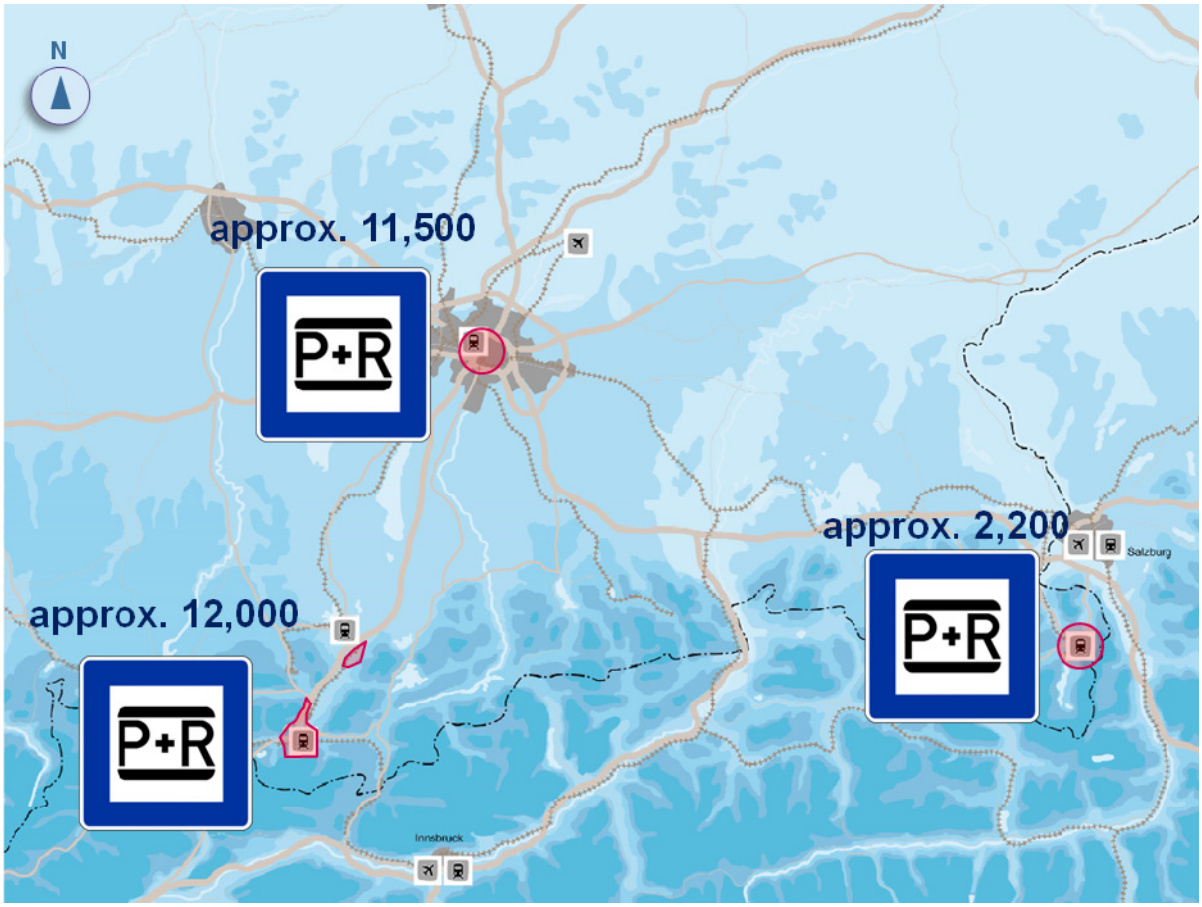


Figure 7: Access restrictions and P+R concept (Source: ARGE München 2018 – AS&P/ProProject)

There will be no provision for private vehicle parking at the sports venues. Spectators will not have vehicle access to the town areas in the Snow Park and around the Königssee artificial skating rink. The intention is to catch passenger cars as part of a large-scale P+R system at the boundaries to populated areas (see Figure 7). A graduated P+R system with attractive public transit and/or shuttle bus connections will be offered.

In the Ice Park, all P+R spaces are located directly near a subway or rapid-transit railway station. In the Snow Park, visitors can reach the sports venue directly from the P+R grounds either by train or shuttle bus. Shuttle buses also connect the P+R locations with the sports venue on the approach to the Königssee artificial skating rink. Drivers will be guided to the P+R spaces via dynamic traffic control and guidance as well as route information systems (on-board navigation)

The Olympic and Paralympic Winter Games will be used to promote the use of electric vehicles. For this reason, visitors travelling to the sites by electric car will be offered parking spaces plus loading station within walking distance of the competition sites (usually less than 2 km). These parking spaces must be booked in advance, and will be subject to charges. Approximately 500 parking spaces each for electric vehicles will be made available near the Olympic Park in Munich and the town area of Garmisch-Partenkirchen.

Accessibility of Munich Olympic Park

- All sports venues in Munich are in the vicinity of the Olympic Park and offer optimum access using subway lines 1 and 3 as well as tram lines 12, 20, 21 and 27.
- The cycle time between trips for the U1 and U3 as well as Tram 20/21 will be reduced.
- There will be no visitor parking at the Olympic Park.
- Motor coaches will park in the Parkharfe and Ackermannbogen area.
- Visitors coming in with their own cars can park on the P+R grounds at Allianz-Arena, Messe München, P+R grounds at Grosshadern, Freiham (urban development area), Langwied, business parking spaces at Siemens (Neuperlach), MAN (Karlsfeld) and BMW (Milbertshofen).

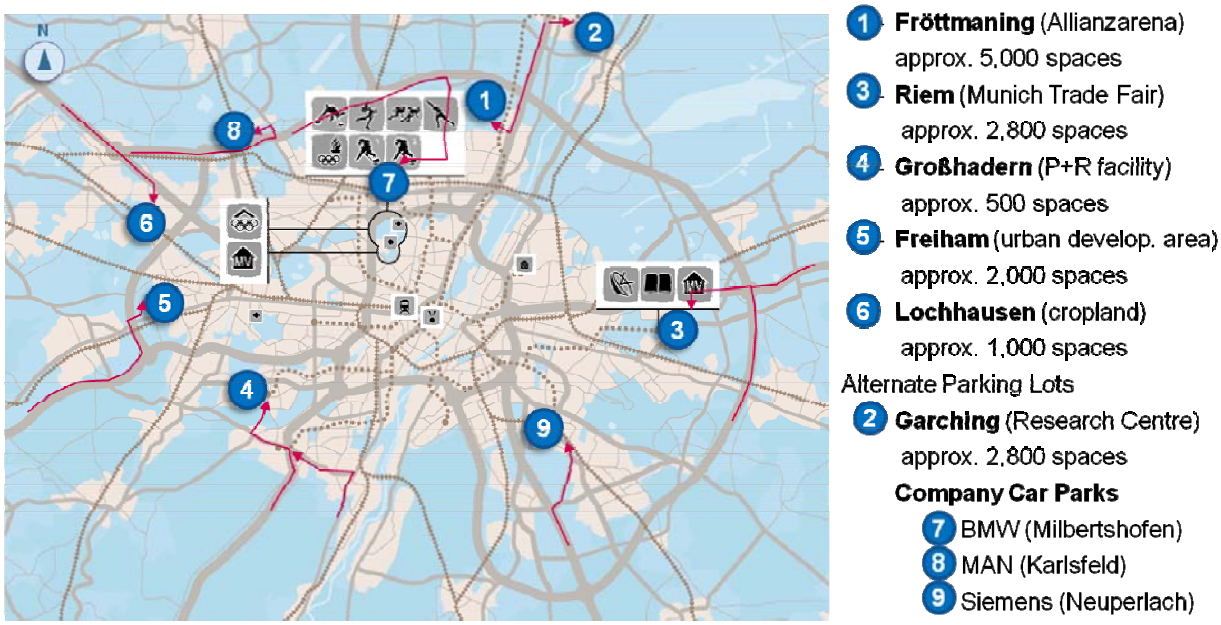


Figure 8: P+R locations for the Ice Park (Source: ARGE München 2018 – AS&P/ProProject)

- BMW AG, which is located in direct vicinity to the Olympic Park, has indicated an interest in providing free parking spaces in underground and above-ground parking garages for electric vehicles as well as vehicles of the Olympic family.
- Parking spaces around the Olympia Park which were previously used by the public and are subsequently reserved for the Games will be hide within the dynamic trip guiding system (pre-trip information, on-trip information), while P+R spaces will be offered on a prioritised basis.

Accessibility of competition sites in Garmisch-Partenkirchen

- All sports venues in Garmisch-Partenkirchen can be reached with DB trains and/or those of the Bayerische Zugspitzbahn. One temporary stop each will be set up at the Kandahar downhill run and the Olympic Ski Stadium in addition to those already in place at this time.
- The current schedule of one train per hour between Munich and Garmisch-Partenkirchen will be increased to four trains per hour and direction, each with a capacity of around 1,000 passengers per train. Travel time will be reduced by approx. 20 minutes by 2018.

- In addition, the cycle time coming from Innsbruck and Reutte will also be doubled (30 min and 1 hour cycles), enabling almost 6,000 visitors per hour to travel directly from key originating areas to the sports venues just by train. This corresponds with almost a third of forecast spectators during peak periods.
- Additional trips will be added to existing public bus lines in a demand-appropriate manner. Moreover, special lines will be set up from tourism centres, hotels and small towns outside of the usual lines in a radius of up to 100 km around Garmisch-Partenkirchen.
- Parking for motor coaches will be made available in direct vicinity to the sports venues.
- Access restrictions which limit access by private vehicles for a limited and previously defined number of persons will be in place for the town areas of Garmisch-Partenkirchen and Schwaiganger as well as the towns in-between. This will free up considerable capacity on the roads for additional bus traffic and traffic related to the Olympic family.
- A total of 14,000 vehicle parking spaces on P+R premises (subject to charges) along the highway and main feeder segments into Garmisch-Partenkirchen and Schwaiganger will be temporarily fortified and connected to the sports venues by approx. 250 shuttle buses. In addition, some P+R sites are located near train stations, allowing for onward travel to the sports venue by train.

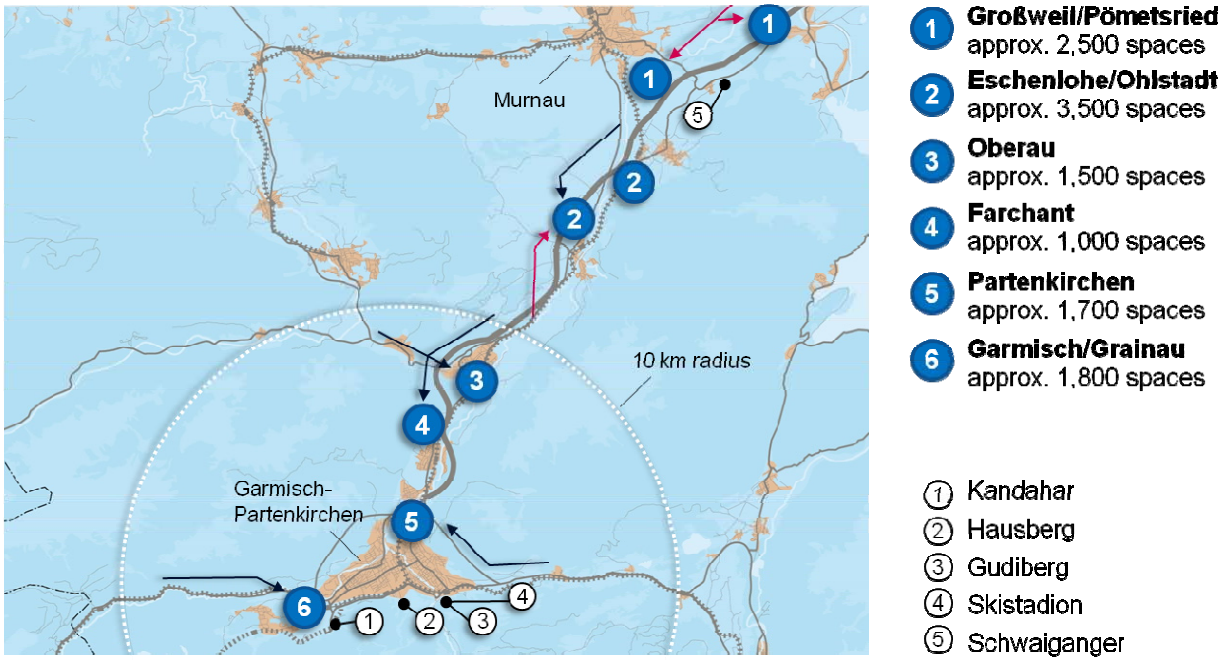


Figure 9: P+R locations at Snow Park (Source: ARGE München 2018 – AS&P/ProProject)

Accessibility of competition sites at the Königssee artificial skating rink

- Trains travelling on the Freilassing-Berchtesgaden route will run at half-hour intervals in 2018.
- Starting at the Berchtesgaden railway station, shuttle buses go up to the Königssee artificial skating rink (4.5 km).
- Motor coaches may park at the Jennerbahn parking site.
- Access roads to the town areas of Berchtesgaden and Schönau am Königssee will be closed for normal and through traffic.
- There is no visitor parking near the sports venue. P+R sites will be set up at the Strub barracks, the Berchtesgaden salt mine and around the Storchenstrasse in Schönau am Königssee.

Accessibility of Schwaiganger competition site

- The route between Munich and Garmisch-Partenkirchen features four trains per hour and direction. All trains on this route stop at Murnau, where a bus shuttle takes visitors 6 km to the competition site at short time intervals (every two minutes during peak periods).
- Motor coaches park in the area of the Schwaiganger stud farm, within walking distance to the competition sites.
- There is no visitor parking near the sports venue. P+R spaces will be available in Großweil, Ohlstadt and Eschenlohe. In addition, visitors may also park at the existing Pömetsried glider air strip, and access the competition sites via a foot path or a shuttle bus.

Olympic family, officials and media representatives

Munich 2018 will provide a total network of approx. 380 km of Olympic lanes, which connects all Olympic Villages (IOC headquarters, Olympic Park, Olympic Village, Medal Plaza, airport, sport parks, training sites, media centres and villages etc.). The Olympic lanes have already been coordinated with the responsible authorities. Their operation will be optimised and warranted using available telematics, with the goal of adhering to a defined maximum travel time. For the purpose of facilitating official Olympic traffic, large areas will be subject to access restrictions, e.g. at the Snow Park and the Königssee artificial skating rink.

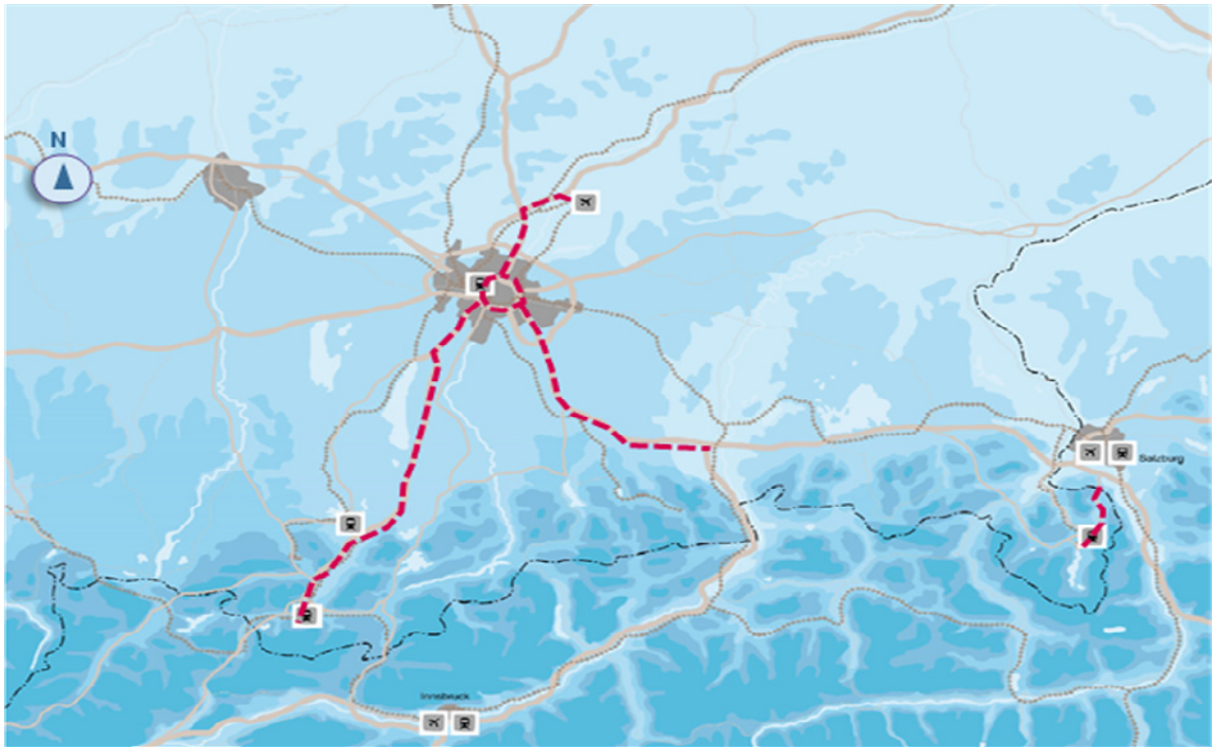


Figure 10: Olympic Lanes (Source: ARGE München 2018 – AS&P/ProProjekt)

A traffic management centre, in which the OCOG and all transportation carriers communicate with each other and exchange information, allows for the identification of problems and quick decisions on countermeasures.

Separate areas designed to facilitate the processing of inbound and outbound travel formalities for athletes, team officials, Olympic family and sports equipment including weapons, along with the corresponding reserved waiting areas, will be made available.

Athletes and team officials

A shuttle programme tailored to the athletes and teams will take into account individual requirements and will guarantee rapid, comfortable, environmentally-friendly, safe and timely transport services around the clock.

A separate fleet will be allocated to athletes and officials, which

- is comprised of bus shuttles, passenger cars, small and medium buses,
- satisfies IOC requirements for athletes and officials,
- draws on state-of-the-art and environmentally-friendly engine technologies,
- uses Olympic lanes between all Olympic sites (IOC headquarters, Olympic Park, Olympic Village, Medal Plaza, airport, sports parks, media centres and villages etc.)
- is also offered within the Olympic Villages and Olympic Park.

In general, accredited athletes and officials will be entitled to the free use of public transport (rapid-transit railway, subway, tram and line buses) in the entire urban area of Munich, including travel to the airport.

Olympic family (IOC, international federations, technical officials etc.)

A separate fleet that corresponds with the respective accreditation level will be allocated to the Olympic family in accordance with IOC statutes and the results of a future requirements survey. It will

- be comprised of bus shuttles, vehicles, small and medium buses,
- also draw on state-of-the-art and environmentally-friendly engine technologies,
- allow the use of Olympic lanes and include access rights to restricted zones,
- include transportation within the Olympic Park.

Accredited members of the Olympic family are entitled to the free use of public transport (rapid-transit railway, subway, tram and line buses) in the entire urban area of Munich, including airport transports.

Media representatives

With respect to media representatives, all Olympic destinations in Munich are connected by public rail transport systems (subway, tram) and can be reached very quickly. Inside the Snow Park, regular intra-park shuttles supplement the transportation offering to connect individual competition sites and other sites with transportation hubs and the train station. The cycle sequence will vary during the day, and transportation will be provided around the clock, seven days a week. The programme at Schönau am Königssee and the Snow Park will be supplemented by demand-driven bus shuttles to the nearest airports at Salzburg or Innsbruck. In addition, free shuttle buses for media representatives will run between the respective parks.

The accommodation of media representatives in the Media Villages requires an efficient and comfortable shuttle system with only a few lines. Central transport hubs are located at the Olympic Park and near by the Garmisch-Partenkirchen train station, not far from the Snow Park Media Centre. The main Munich train station as well as the train stations in Garmisch-Partenkirchen and Berchtesgaden form a part of the media shuttle network and linkages to the public transit system.

Free media shuttles will be running between the Königssee artificial skating rink and the Ice Park and Snow Park in accordance with demand. In addition, accredited media representatives will also be entitled to the free use of public transit within the event locations and airport transfers.

Marketing partners/Sponsors

In general, marketing partners will receive preferential treatment. Parking spaces located directly at the competition sites have been reserved for the motor coach fleets of marketing partners. In association with an entrance ticket, marketing partners and sponsors will also receive a combination ticket for the full use of the public transport system. In addition, accredited individuals are entitled to use public transit in the urban area of Munich free of charge for the duration of their accreditation.

Personnel

Personnel such as volunteers and employees will be able to use the public transit system for free for the duration of their activities/accreditation. In addition, they are also entitled to the free use of additional shuttle buses for spectators. Public transport buses and the shuttle will take into account early arrival times at the workplace and late departure following the closure of the sports venues, so that homeward travel can be guaranteed even during late hours.

4.4 MUNICH 2018 CLIMATE ANALYSIS

4.4.1 OBJECTIVE

The 2018 Olympic and Paralympic Winter Games will be climate-neutral Games. To this end, a three-level strategy will be pursued - a harmonious combination of energy-efficient technologies, use of renewable energy resources and the compensation of unavoidable greenhouse gas emissions (see Figure 11).

Energy-efficient transportation or Plus-Energy standard buildings directly prevent the occurrence of carbon dioxide emissions. The use of renewable energies ensures that the Games are supplied with energy that has been produced in an environmentally-friendly and climate-compatible manner. All CO_2 emissions that cannot be directly avoided are offset with climate protection projects that meet the highest international standards.

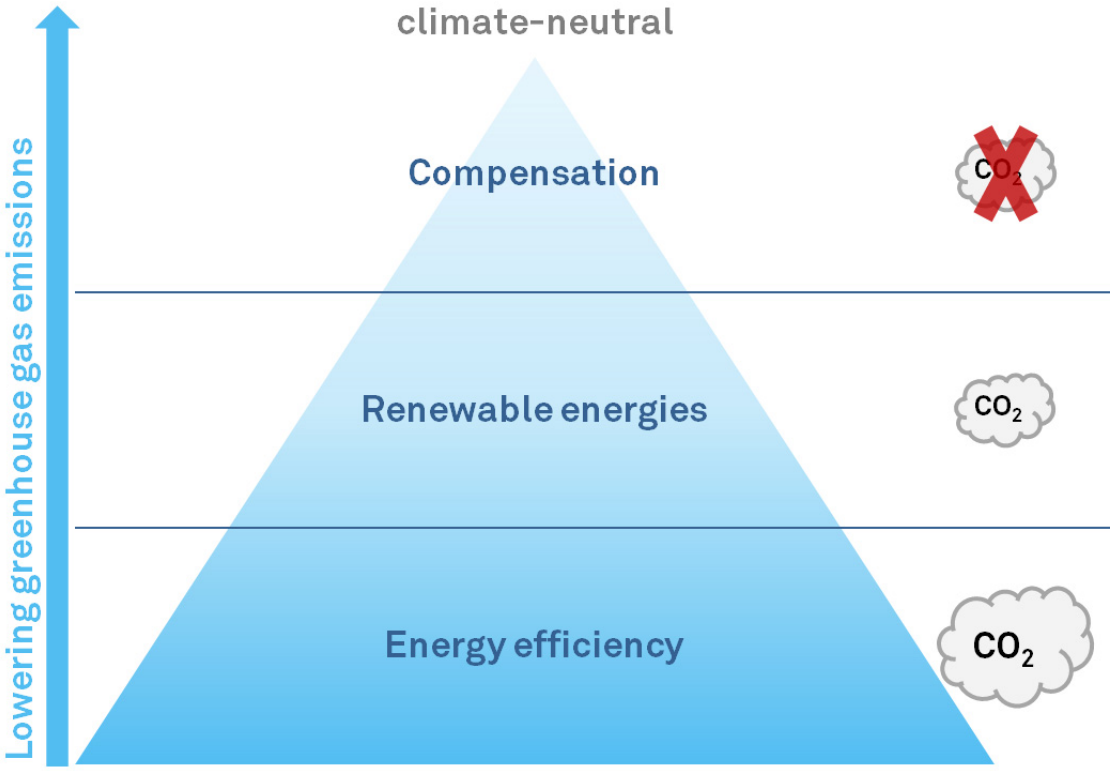


Figure 11: Climate strategy for Munich 2018

The use of low-emission and emission-reducing technologies, such as efficient transportation methods or the construction of Olympic Villages that meet the Plus-Energy standard form the strategic basis on the way to climate-neutral Games. This strategy ensures that carbon dioxide emissions can be avoided as much as possible. In this context, a series of important lead projects are developed as part of the Munich 2018 Environment and Sustainability Concept: 'Plus-Energy Villages 2018', 'Sustainable Olympic Park 2018' etc. (see Section 5.1).

The increased use of renewable energies (2nd level) ensures that non-avoidable and energy-related emissions caused by Munich 2018 leave a smaller CO_2 footprint. Finally, all non directly avoidable CO_2 emissions are offset by climate protection projects at the third and final level. The greenhouse gas emissions generated at the national level due to Munich 2018 will be expressly offset by regionally or nationally oriented environmental lead projects ('100 sports clubs reduce 2018 t CO_2/a' as well as 'Positive national climate balance sheet 2018') rather than being shifted around through the trade of certificates. On the other hand, the very relevant greenhouse gas emissions caused by the inbound and outbound air travel of international guests will be addressed and offset by a separate environmental lead project 'Compensation of international air travel'.

The combination of all levels ensures that Munich 2018 will in fact be designed and held as the first climate-neutral large sporting event that comprises all modules. Many of the measures under the umbrella of the environmental lead projects (e.g. renovation of sports venues) will continue to reduce the stress on the environment for many years after the Games, and effect further reductions in greenhouse gas emissions.

Estimated greenhouse gas emissions are based on information provided by the planning committee (ProProjekt; AS & Partner), primary data of sports venue operators (for existing facilities and the Munich Olympic Park) and data available from technical literature. Accounting activities are carried out using the process chain model and the GEMIS (Global Emission Model for Integrated Systems) software tool, as well as the leading database for eco balance sheet calculations - Ecoinvent V2.1. All greenhouse gases (Kyoto-Gases) are considered and expressed as CO_2 equivalents (CO_2 eq.). The balance sheet comprises the entire production and value chain, e.g. also greenhouse gas emissions generated during the production of PV modules etc.

Seven core modules have been defined for the representation of climate balance sheet results:

1. Transportation
   - includes emissions for traffic flows related to inbound and outbound travel, as well as onsite traffic.
2. Accommodations for spectators and IOC representatives
   - includes energy costs for electricity and heat that are required for hotel accommodation purposes.
3. Existing competition sites
   - records consumption of electricity and heat for existing competition sites.
   - takes into account the climate effect of building materials used.

4. New competition sites
- calculates the energy consumption of facilities that are similar on an energetic level.
- takes into account climate effect of mass materials concrete and steel.

5. Olympic Villages (including Ice Park Media Village)[2]
- calculates their energy requirements and climate effect of building materials.

6. Other infrastructure
- calculates, among others, the energy requirements of the Munich Media Village, TV broadcasting, International Broadcast Center and Main Media Centre.

7. Catering and merchandising
- records the climate effect of meals for athletes and spectators and the production of selected merchandising articles.

The time period in which the Olympic and Paralympic Winter Games are held forms the time reference for all modules. A time period of 21 days will be used for the Olympic Winter Games. The selected time period, which is slightly above the actual number of event days (16) is designed to take into account inbound and outbound travel of athletes and officials, as well as possible advance training days. A time period of ten days is assumed for the Paralympic Winter Games.

4.4.2 MUNICH 2018 CLIMATE BALANCE SHEET

Figure 12 displays the result of the climate balance sheet for Munich 2018. The first calculation shows the expected climate gas emissions without taking into account the emissions savings developed in the Environment and Sustainability Concept (left bar). A second calculation takes into account the climate protection measures described in the Munich 2018 Environment and Sustainability Concept.

The figure illustrates that Munich 2018 without the Environment and Sustainability Concept generates greenhouse gas emissions of approx. 420,000 tonnes CO_2 eq. - with the majority attributable to international inbound and outbound air travel by guests (284,000 tonnes CO_2 eq.). Based on the Environment and Sustainability Concept, savings of 34,100 tonnes of CO_2 eq. will be achieved at the Munich Ice Park, Garmisch-Partenkirchen Snow Park, the Königssee artificial skating rink and the region. This leaves greenhouse gas emissions of approx. 385,000 tonnes of CO_2 equivalents, which are fully offset.

[2] This is based on the assumption that the Olympic Villages in the Ice Park in Munich and the Snow Park in Garmisch-Partenkirchen are built at the Plus-Energy standard (see lead project 5.1.1.), that the Ice Park Media Village is planned at a minimum passive house standard but allows for subsequent construction at the Plus-Energy level.

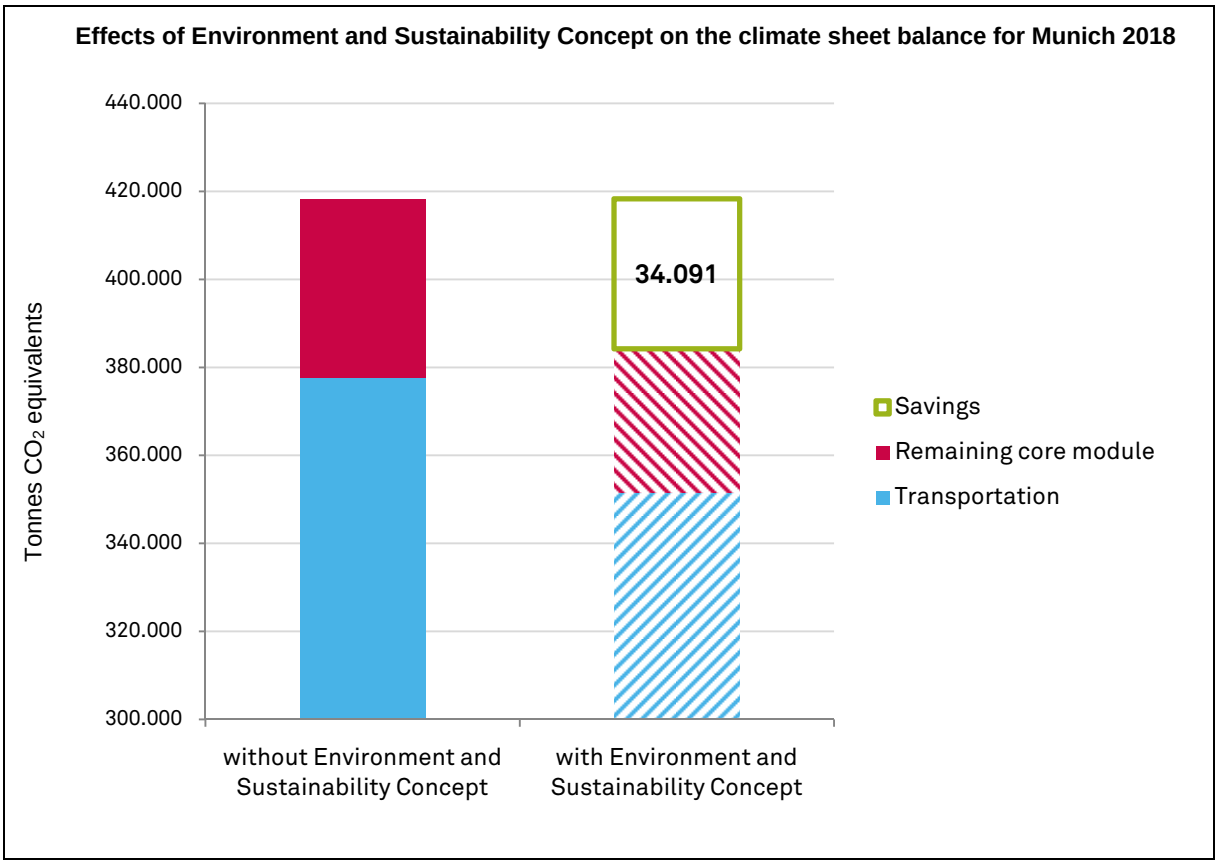


Figure 12: Munich 2018 climate balance sheet with and without Environment and Sustainability Concept

4.4.3 TRANSPORTATION-RELATED GREENHOUSE GAS EMISSIONS FOR MUNICH 2018

Methodological procedure

Greenhouse gas emissions are calculated on the basis of traffic output measured in person kilometres (Pkm), which in turn are the result of the number of transported persons and amount of distance covered. With respect to visitors, officials and athletes - the number of persons, the means of transportation used and the region of origin are calculated using the traffic models of the planning committee (divided into region (up to 100 km), rest of Germany, Austria, Switzerland, Italy, rest of Europe, North America, Asia, rest of the world)[3]. The traffic model assumes a more or less free choice of transportation for inbound travel; special measures for the targeted use of environmentally-friendly transportation methods are only assumed for onsite mobility. In addition, ProProjekt has calculated average capacity utilisation figures for the different means of transportation.

In a first step, the average travel distance is calculated on the basis of this data, by using the origin of the persons, while a second step calculates transportation output per means of transportation,

[3] Traffic modelling does not take into account transportation of the workforce, i.e. volunteers, volunteer security staff etc. The transportation-related emissions of this group will be integrated into the calculation on the basis of assumptions and comparative values

distinguished by inbound and outbound travel and onsite mobility. This transportation output is in a third step linked with the (for each mode of transport)-specific CO_2 equivalent emission factors (g/Pkm) for 2018. These factors are obtained from the transportation emissions database TREMOD (Transport Emission Estimation Model, Version 4.17) of the German Federal Environmental Agency (Umweltsbundesamt) and adjusted to the specific capacity utilisation figures (e.g. for cars, 2.8 Persons/Car). With respect to air travel, emission factors have been obtained from the atmosfair emission calculator[4]; it takes into account the higher effect on the climate caused by air travel.

With respect to the Paralympic Games, transportation output and greenhouse gas emissions will be derived in a differentiated manner based on transportation methods in accordance with existing traffic data and general framework data.

Results

In total, inbound and outbound travel as well as onsite mobility in connection with the 2018 Olympic and Paralympic Winter Games will generate approx. 2.8 billion person kilometres, resulting an 378,000 tonnes of CO_2 equivalents in greenhouse gas emissions. 93% of transportation capacity and 94% of greenhouse gas emissions are attributable to the Olympic Winter Games, with a small remainder to the Paralympic Winter Games (see Figure 13). In total, spectator traffic (private persons including sponsors) make up the largest share in transportation output (79%) and hence also greenhouse gas emissions (88%). Approximately 20% of transportation output and 1% of greenhouse gas emissions are attributable to the transport of officials (athletes and their coaches, representatives and delegations of the International Olympic Committee, National Olympic Committee and sports associations and media representatives).

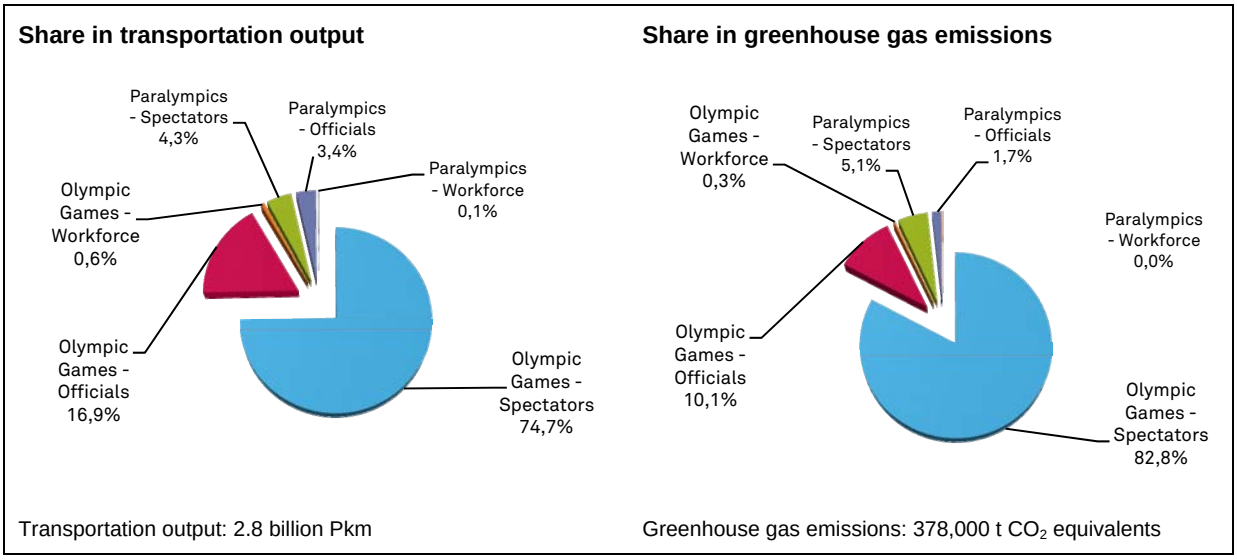


Figure 13: Share of different participant groups in total transportation output and transportation-related greenhouse gas emissions for Munich 2018 (Sources: ProProjekt, own calculations by Öko-Institut)

[4] See www.atmosfair.de

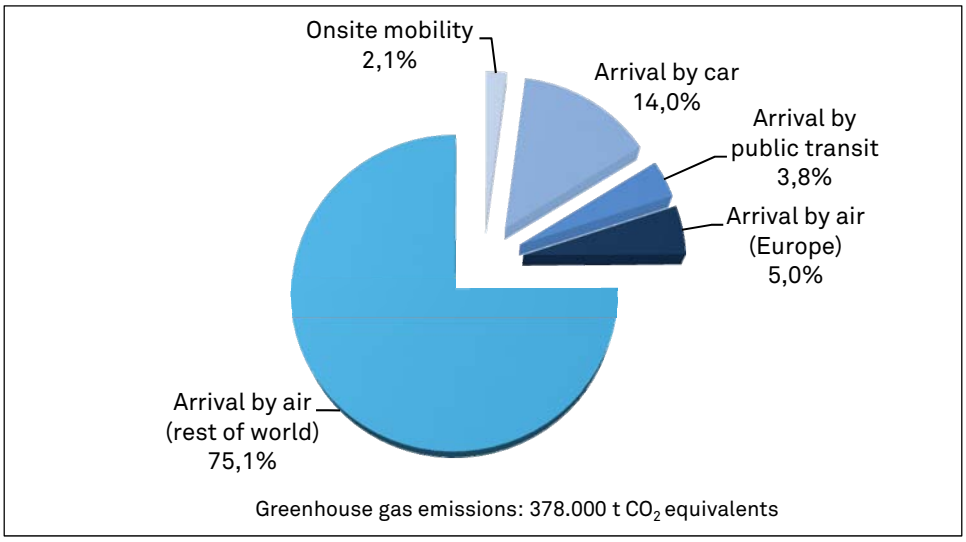


Figure 14: Share of different transportation methods in transportation-related greenhouse gas emissions for Munich 2018 (Sources: ProProjekt, own calculations by Öko-Institut)

Approximately three quarters of transportation-related greenhouse gas emissions for Munich 2018 are generated by air travel of guests from outside of Europe (see Figure 14). This corresponds with a volume of 284,000 tonnes of CO_2 equivalents. This portion cannot be reduced, since these visitors do not have access to more environmentally-compatible alternatives besides airplanes. Approximately 14% of greenhouse gas emissions for Munich 2018 will be attributed to the inbound and outbound travel by car to and from Munich, Garmisch-Partenkirchen or Schönau am Königssee. This corresponds with a volume of 54,000 tonnes CO_2 equivalents. The third most important segment is inbound air travel by European guests. This transportation segment still makes up 5% of total emissions (approx. 19,000 tonnes). Total onsite mobility only makes up 2% of total emissions, regardless of the transportation methods used, which corresponds with approx. 8,000 tonnes (CO_2 eq.).

4.4.4 IMPACT OF ALL OTHER MODULES ON THE MUNICH 2018 CLIMATE BALANCE SHEET

Transportation emissions clearly dominate the entire climate sheet for Munich 2018. At the same time, the remaining six modules also affect the climate. Figure 15 shows the greenhouse emission balance sheets for the 'transportation-free' modules, each with and without the implementation of the Environment and Sustainability Concept and attainable emission reductions.

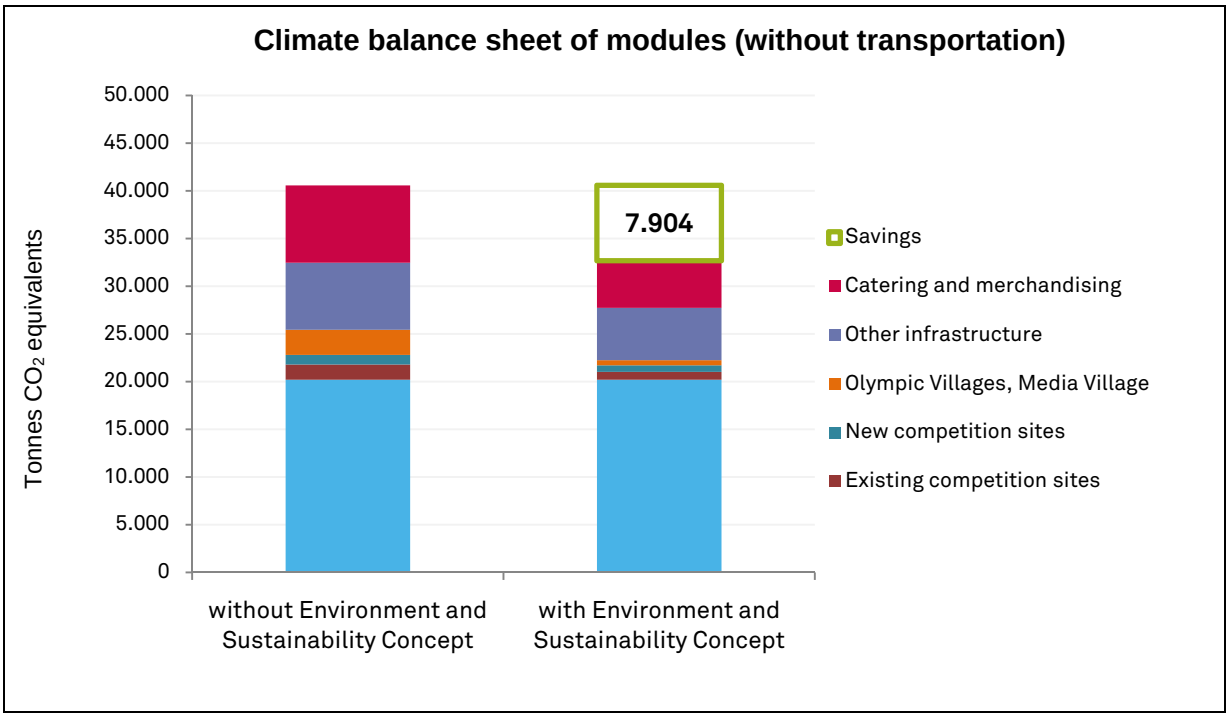


Figure 15: Munich 2018 climate balance sheet with and without climate and sustainability concept (without transportation)

Accommodations for spectators/IOC officials

Spectator volumes calculated by the planning committee are used to derive the number of overnight guests during the 2018 Munich Olympic and Paralympic Winter Games (see Table 22).

Table 22: Munich 2018, overnight figures

Total spectators	Number of spectator overnight stays	Overnight stays by IOC officials[5]
2,238,100	841,100	316,800

All overnight stays included in the calculation are based on average energy consumption values per overnight stay during the winter season (electricity 5.7 kWh, heat 45 kWh)[6]. These assumptions result in emissions of approx. 21,000 t CO_2 equivalents.

[5] Without media representatives in the Ice Park Media Village

Existing competition sites

The impact of existing competition sites on the climate balance sheet is calculated from their actual energy consumption values which are linked with data from literature. They are limited to the time period of the Olympic and Paralympic Winter Games and adjusted to diverging forms of use (Olympic Pool) if required. The energy consumption of the snow-making facility for Garmisch-Partenkirchen is determined based on scenarios for different snow covers. In total, the green house gas emissions result from this category are approx. 1,600 t CO_2 equivalents - without taking into account the measures from the environment concept.

The Environment and Sustainability Concept provides for the consistent supply of electricity from renewable resources for existing sports venues during the Games. In addition, the energy consumption of the facilities will be reduced by at least 30% as part of the 'Sustainable Olympic Park 2018' project, using structural measures. Due to the long lifetime, they will full develop their saving potential particularly also after the Games. Especially with regard to sports venues which are used intensively and use a lot of energy, e.g. the Olympic Pool, energetic renovation activities contribute to a long-term sustainable Olympic legacy.

In total, greenhouse gas emissions of 835 t CO_2 equivalents remain for the 'Existing competition sites' module, taking into account the mitigating measures from the Environment and Sustainability Concept.

New competition sites

Based on the good existing sports infrastructure in Munich, Garmisch-Partenkirchen and Schönau am Königssee, only three new sports venues must be accounted for. These include the two ice hockey arenas 1 + 2 at the Munich Ice Park - they replace existing buildings at the same site - as well as the Munich Speed Skating Oval. The calculation is based on the expected energy consumption for ice production, heating, lighting etc. The proportionate impact of building materials (especially reinforced concrete) on the climate balance sheet will also be incorporated into the calculation. These result in greenhouse gas emissions of approx. 1,000 t CO_2 equivalents, without taking into account the Environment and Sustainability Concept. With respect to this module, the Environment and Sustainability Concept provides for the use of electricity made of renewable energy sources as well as the use of cement produced under low-CO_2 conditions. The resulting savings lead to greenhouse gas emissions of 690 t CO_2 equivalents.

Olympic Villages

The Olympic Villages, which are planned for athlete accommodations, will be accounted for in this module. Both Villages are planned as especially energy-saving 'Plus-Energy Villages 2018'. There is also the Ice Park Media Village for approx. 1,500 media representatives, which is planned at the passive house standard. It will be planned in a way that also allows for construction at the Plus-Energy standard[7]. The comparison calculation accounts for greenhouse gas emissions in case the Olympic Villages and the Ice Park Media Village are constructed and operated using standard construction methods and not according to the highest energetic standards. Emissions for this reference case are approx. 2,600 t CO_2 equivalents during the Games. The implementation of the lead project 'Plus-

[6] Hamele, H. & Eckardt, S.: Umweltleistungen europäischer Tourismusbetriebe Instrumente, Kennzahlen und Praxisbeispiele. Ein Beitrag zur nachhaltigen Tourismusentwicklung in Europa. Hrsg. ECOTRANS 2006.

[7] However, any final decisions in this regard can only be made at a later time following the determination of detailed conditions (e.g. energy supplies) and verification of overall feasibility.

Energy Villages 2018' and the energy-saving construction method provided for in this project, as well as the passive construction method for the Ice Park Media Village, leave merely 530 t CO_2 equivalents in emissions. Modern energy-saving construction methods which will be used in particular for the Olympic Villages will create significant savings of (heating) energy and hence greenhouse gas emissions particularly as a result of long-term subsequent use.

Other infrastructure

Other infrastructure comprises the energy requirements needed to supply media and TV facilities. These include electric generators for TV broadcasting at the sports venues, energy requirements of the International Broadcast Centre and Main Press Centre (IBC/MPC) at Messe München and the accommodation of media representatives at the Messe Media Village and Snow Park Media Village (modular mobile homes) both in Munich as well as Garmisch-Partenkirchen. The reference case is based on a supply of conventionally produced electricity, resulting in emissions of almost 7,000 t CO_2 equivalents. On the other hand, if electricity is obtained from renewable sources of energy, emissions will be reduced to approx. 5,500 t CO_2 equivalents.

Catering and merchandising

With respect to catering, electricity and gas consumption used in preparing meals at the canteens of the Olympic Villages and at the sports venues for spectators will be calculated, whereby consumption at the sports venues (snacks and small meals) will be significantly lower. In addition, assumptions regarding required foods and food volumes will also be established[8]. With regard to merchandising, resulting greenhouse gas emissions will be calculated from the production of three sample products - Olympic shirt, jacket made of artificial fibres and a fan scarf. An examination of resulting emissions reveals approx. 8,100 t CO_2 equivalents, without considering environmental measures. The use of textiles made of organic cotton and recycled artificial fibres, eco-electricity for kitchens, and the use of organically produced food products has a significant effect on greenhouse gas emissions, which drop to only 5,000 t CO_2 equivalents.

Other variables

Greenhouse gas emissions created by the organisation of the Olympic and Paralympic Winter Games and the Torch Run have not been considered to date. These emissions will also be subsequently incorporated into the climate balance sheet along with increasing planning activities and detailing of plans, and will be compensated according to the highest international standards.

[8] National Consumption Study 2008.

LEAD PROJECTS FOR ENVIRONMENT AND SUSTAINABILITY

5

LEAD PROJECTS FOR THE ENVIRONMENT AND SUSTAINABILITY

The 2018 Olympic and Paralympic Winter Games will be green and sustainable Games. To this end, Munich 2018 is implementing projects, processes, systems and working groups which guarantee the realisation of this objective in all planning areas. At the centre of this process are 18 innovative lead projects which address the entire spectrum of sustainable development topics. In the context of international competition, they represent a special feature of the application for Munich 2018 and will secure a positive ecological balance far beyond 2018.

Sustainability refers to a holistic process that spans across issues, and in which ecological, economic and social aspects overlap. Therefore the issues in the projects generally relate to different main themes.

Table 23 highlights the lead projects which show the cross-commission work done by Bewerbungsgesellschaft München 2018, and where cross references can be found with respect to existing environmental and sustainability activities undertaken by the federal government, Bavaria and the Olympic region. While some projects seamlessly tie into existing activities, others are new, innovative and being implemented for the first time.

Table 24 shows how individual activities can be allocated to central main themes and their intended time horizon with regard to impacts.

Table 23: Overview of lead projects for Munich 2018 with cross references

No.	Lead project	Cross references to other Munich 2018 expert commissions	Cross references to ongoing environmental and sustainability activities (by way of example)
1	Plus-Energy Villages 2018	▪ Accommodations ▪ Sports venues and Olympic legacy ▪ Paralympics	▪ Klimaprogramm Bayern 2020 ▪ Bavarian Climate Adaptation Strategy ▪ Klimaschutzbündnis “Covenant of Mayors”
2	Sustainable Olympic Park 2018	▪ Sports venues and Olympic legacy	▪ Klimaprogramm Bayern 2020 ▪ Perspektive München: Ökologie & Klimaschutz
3	Green building materials 2018	▪ Sports venues and Olympic legacy	
4	100 sports clubs reduce 2018 t CO_2/a		▪ Klima-Check des BLSV
5	Positive national climate balance sheet 2018	▪ Transport and traffic ▪ Accommodations	▪ Klimaprogramm Bayern 2020 ▪ Perspektive München: Ökologie & Klimaschutz
6	Climate compensation for international air travel	▪ Transport and traffic	
7	Onsite mobility: - Green fleet 2018: Efficient and renewable - Visitor mobility: Right of way for public transport	▪ Transport and traffic ▪ Paralympics	▪ Klimaprogramm Bayern 2020 ▪ Elektromobilität München
8	Sustainable Garmisch-Partenkirchen	▪ Transport and traffic ▪ Sports venues and Olympic legacy	▪ Bavaria 2020 Climate Programme ▪ Bavarian sustainability strategy ▪ Education for sustainable development in Bavaria ▪ Bavarian Climate Adaptation Strategy
9	Nature, cultural legacy and education - Working together in the Olympic region		▪ Aktionsprogramm Bayerns ländlicher Raum ▪ Bayerische Biodiversitätsstrategie ▪ Bildung für nachhaltige Entwicklung in Bayern
10	360° Olympic and Paralympic Managers		▪ UN Dekade Bildung für nachhaltige Entwicklung ▪ Bayerische Biodiversitätsstrategie
11	BergTour 2018		▪ Aktionsprogramm Bayerns ländlicher Raum ▪ Bayerische Biodiversitätsstrategie
12	Improving the biotope quality of Alpine sports venues	▪ Sports venues and Olympic legacy	▪ Bayerische Biodiversitätsstrategie
13	Olympic Green: Green moves		▪ Perspektive München: Ökologie & Klimaschutz
14	Temporary land use - Landscape-compatible methods and resource-saving building materials	▪ Sports venues and Olympic legacy	▪ Bayerische Biodiversitätsstrategie
15	Recycling economy 2018		▪ Perspektive München: Ökologie & Klimaschutz
16	Healthy nutrition 2018	▪ Safety & Medicine	▪ Green Cop
17	Fair procurement and merchandising 2018		▪ Green Cop
18	Centre for Sustainability	▪ Sports venues and Olympic legacy	▪ Aktionsprogramm Bayerns ländlicher Raum

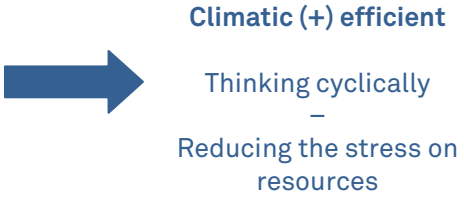
Table 24: Lead projects for Munich 2018 with priority allocation of main themes, localisation and time horizon as regards impacts

Lead project	relevant main themes				Location	Impact horizon
	Protection of climate	Protection of natural resources	Sport and regional development	Education for sustainable development		
Plus-Energy Villages 2018					Munich, GaPa	long-term
Sustainable Olympic Park 2018					Munich	long-term
100 sports clubs reduce 2018 t CO2/a					Germany	long-term
Positive national climate balance sheet 2018					Germany	Munich 2018
Climate compensation for international air travel					global	Munich 2018
Onsite mobility: Green fleet 2018 & Visitor mobility					Munich, GaPa, Schönau	Munich 2018 & long-term
Sustainable Garmisch-Partenkirchen					GaPa	long-term
360° Olympic und Paralympic Managers					Germany	long-term
BergTour 2018					GaPa, Schönau	long-term
Nature, cultural legacy and education					GaPa & region	long-term
Improving the biotope quality of Alpine sports venues					GaPa	long-term
Olympic Green: Green moves					Munich	long-term
Temporary land use					Munich, GaPa, Schönau	long-term
Green building materials 2018					Munich, GaPa, Schönau	long-term
Recycling economy 2018					Munich, GaPa, Schönau	Munich 2018
Healthy nutrition 2018					Munich, GaPa, Schönau	Munich 2018 & long-term
Fair procurement and merchandising 2018					global	Munich 2018
Centre for Sustainability					GaPa	long-term

The lead projects are presented in detail below. For a better overview, they will be divided into four groups in accordance with their priority impacts on the central main themes of the Environment and Sustainability Concept (see also Table 24).

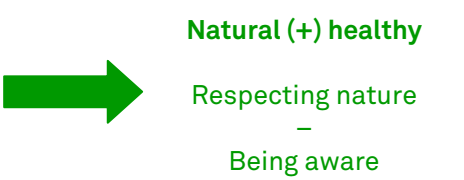
A. Lead projects for the protection of the climate

- Plus-Energy Villages 2018
- Sustainable Olympic Park 2018
- Green building materials 2018
- 100 sports clubs reduce 2018 t CO_2/a
- Positive national climate balance sheet 2018
- Climate compensation for international air travel
- Green fleet 2018: Efficient and renewable
- Visitor mobility: Right of way for public transport



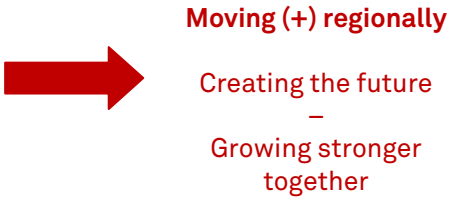
B. Lead projects for the protection of natural resources

- Improving the biotope quality of Alpine sports venues
- Temporary land use
- Recycling economy 2018
- Healthy nutrition 2018
- Fair procurement and merchandising 2018



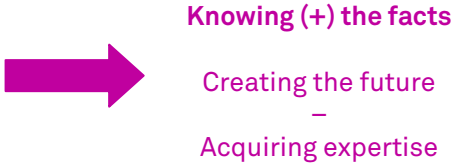
C. Lead projects for sustainable sport and regional development

- Nature, cultural legacy and education
- Sustainable Garmisch-Partenkirchen
- BergTour 2018
- Olympic Green: Green moves



D. Lead projects for education for sustainable development

- Centre for Sustainability
- 360° Olympic und Paralympic Managers



In addition to the joint effects with regard to the central themes, there are also content-related connections between individual lead projects which allow for clustering and which are summarised prior to the detailed project description (see Table 25):

Table 25: Connections between individual lead projects, including explanations

Connections between lead projects	Explanation
▪ Plus-Energy Villages 2018 ▪ Sustainable Olympic Park 2018 ▪ Green building materials 2018 ▪ 100 sports clubs reduce 2018 t CO_2/a ▪ Temporary land use	Structural measures for buildings and their accompanying infrastructure (renovation and new construction) in terms of energy-efficient and environmentally-friendly building methods and building materials
▪ Centre for Sustainability ▪ Nature, cultural legacy and education ▪ Sustainable Garmisch-Partenkirchen ▪ BergTour 2018 ▪ Improving the biotope quality of Alpine sports venues	Sustainable development of the Olympic Alpine region
▪ 100 sports clubs reduce 2018 t CO_2/a ▪ Positive national climate balance sheet 2018	Climate protection measures across Germany
▪ 100 sports clubs reduce 2018 t CO_2/a ▪ Positive national climate balance sheet 2018 ▪ Climate compensation for international air travel	Co-ordination by the 'München 2018 klimagerecht' association
▪ Nature, cultural legacy and education ▪ Improving the biotope quality of Alpine sports venues	Includes the monitoring of natural conditions and measures so as to maintain and developt species and habitats
▪ Nature, cultural legacy and education ▪ BergTour 2018	'Nature, cultural legacy and education' includes the monitoring of natural conditions in the Alpine region, which forms the ecological basis for sustainable mountain sport and tourism development as part of 'BergTour 2018'
▪ Recycling economy 2018 ▪ Healthy nutrition 2018	Integration of hotels in waste-prevention measures (e.g., abolishment of disposable packaging) and healthy nutrition with regional food (e.g., 'Bavarian Specialty Cuisine' cooking contest), thus providing evidence of the high environmental expertise of domestic hotel operations

Projects can only be successfully implemented in practice if financing can be secured. The Environment and Sustainability Concept for Munich 2018 also provides specific information on this aspect. Financing for individual lead projects and respective project sponsors are shown in detail in Section 5.5.

LEAD PROJECTS FOR CLIMATE PROTECTION

5.1 LEAD PROJECTS FOR THE PROTECTION OF THE CLIMATE

5.1.1 PLUS-ENERGY VILLAGES 2018

Project title:	Plus-Energy Villages 2018
Main theme:	Protection of the climate
Implementation:	State capital Munich

Background

Much progress has been made during the last 20 years with regard to the construction, planning and implementation of new buildings as related to energy efficiency for heating purposes. The first passive house residential buildings were constructed 18 years ago in Darmstadt; at very low heating requirements of < 15 kWh per square meter of living space and year, they require 90% less energy than today's average buildings. Since the beginning of the 1990's, several amendments to the Heat Insulation Regulation (1995), which became the Energy-Saving Regulation (most recently amended October 2009: EnEV 2009), have further strengthened the legal standards for new buildings with regard to energy consumption. At the same time, a passive house will still require 60 - 70% less energy for heating than prescribed by the standards. In the meantime, several thousand building projects using passive house construction have been successfully implemented in Central Europe: from simple residential buildings to school buildings. Architects, planners, structural engineers and building material companies have gathered a lot of experience, meaning that passive house construction is still classified as an ambitious but also mature construction method.[9]

At the same time, dramatic progress in the area of renewable energies has made it possible to design and build structures that feature a positive energy balance sheet; they are described as Plus-Energy buildings[10]. In line with the application process for 2018, the Environment expert commission agrees unanimously that the Olympic Villages in the Munich Ice Park and the permanent structures in the Garmisch-Partenkirchen Snow Park which are planned for Munich 2018 must be designed and implemented as Plus-Energy villages. This vision and requirement is pursued with the environmental lead project 'Plus-Energy Villages 2018' as part of the Munich 2018 Environment and Sustainability Concept.

Objectives

The permanent structures of the Olympic Villages in Munich and Garmisch-Partenkirchen will be fully constructed in such a way as to create Plus-Energy villages[11]. Energy consumption for household electricity, heating energy and hot water is mostly reduced using the newest technical possibilities: i.e. passive house construction, flow limiters for washing basins etc. to reduce hot water requirements and the highest efficiency standards for household appliances. The remaining emery requirements for heat and electricity are covered directly onsite with the surplus electricity produced by renewable energy

[9] Extensive information regarding the passive houses complex can be found on the website of the Passive House INstitute at www.passiv.de.

[10] The office of the Öko-Institut in Freiburg is located in the 'Sonnenschiff' complex of renowned solar archictect Rolf Disch, which has been constructed as a Plus-Energy building: www.sonnenschiff.de.

[11] The Ice Park Media Village is planned as a passive house complex, but will be planned in a way that also allows for implementation at the Plus-Energy standard.

resources (> as the demand of the Olympic Villages) through photovoltaic, solar heat etc. The lead project will underline Germany's leading competence standard in the area of 'Green Buildings'. The highest requirements of the LEED certification system[12] and of the Deutsche Gesellschaft für Nachhaltiges Bauen e.V.[13] would not only be met but clearly exceeded. The 'Plus-Energy Villages 2018' lead project makes a significant contribution to main theme 1 'Protection of the climate' as part of the 2018 Munich Environment and Sustainability Concept.

Project description

The project has been designed to enable Bavaria and Germany to set the trend in the area of Green Building. The special challenge for this project is the size of the Olympic Villages, as they consists of not one individual building but rather two new settlements (Olympic Village at the Munich Ice Park and the Olympic Village at the Garmisch-Partenkirchen Snow Park) which will be permanently built at the Plus-Energy standard. The key figures below highlight the dimension and responsibility regarding 'Plus-Energy Villages 2018':

- 3,500 athletes in Munich, 2,500 in Garmisch-Partenkirchen,
- Residential space in Munich (total): approx. 62,000 m^2, and 9,700 m^2 office space,
- Residential space in Garmisch-Partenkirchen (total): approx. 51,000 m^2, plus 16,300 m^2 office space,
- 44,000 m^2 photovoltaic modules (Munich + Garmisch-Partenkirchen),
- 3,000 m^2 solar heat (Munich + Garmisch-Partenkirchen).

Figure 16: Olympic Village

[12] LEED-NC, Green Building Rating System For New Construction & Major Renovations, Version 2.2, US Green Building Council, October 2005.

[13] Das Deutsche Gütesiegel Nachhaltiges Bauen (The German Quality Seal for Sustainable Construction), DGNB, Deutsche Gesellschaft für Nachhaltiges Bauen e.V., 2nd edition 03/2009.

The above figures for photovoltaic and solar heat modules may only be used as an orientation figure. Contingent on the respectively concrete strategy for the production of renewable energy in the area of the Olympic Villages (other options: contribution by geothermal heat, local heat supplies using biomass, wood pellet heating, geothermal heat), the exact design and size will be determined during subsequent detailed planning (see also Implementation). In addition to the highest level of energy efficiency with regard to heating, ventilation, hot water and household electricity, the use of renewable raw building materials (see also lead project 'Green building materials 2018'), measures for saving water and many other ecological aspects must also be considered (see criteria of the Deutsche Gesellschaft für Nachhaltiges Bauen e.V.). The Plus-Energy villages are trendsetters not only with respect to climate protection, but also incorporate other ecological aspects (healthy building materials etc.) and aspects related to sustainable development (e.g. children- and disabled-friendly living) into the concept and implementation.

Implementation

For the purpose of achieving successful planning and implementation of the Olympic Villages, it is recommended that an architecture competition is tendered as early as 2010. In this context, the OCOG would be advised by a jury of selected experts. It is a way of developing tangible and convincing concepts for the architectural, structural and energy-related possibilities that exist.

As part of the non-OCOG budget, the environmental lead project 'Plus-Energy Villages 2018' has targeted a total sum of EUR 24 - 36 million for additional structural expenses as compared to statutory requirements. This budget secures the implementation of the passive house standard and the inclusion of photovoltaic modules as well as other renewable energy resources into the architecture of the Olympic Villages. The Plus-Energy Villages are considered 'beacons' as part of Munich 2018, and will leave behind a truly green legacy.

5.1.2 SUSTAINABLE OLYMPIC PARK 2018

Project title:	Sustainable Olympic Park 2018
Main theme:	Protection of the climate
Implementation:	State capital Munich

Background

The Olympic Park from 1972 plays a key role as the location of the Ice Park for the 2018 Olympic and Paralympic Games. The selection of a former Summer Olympics location for holding Olympic Winter Games is a first, whereby provision has been made for a comprehensive use of the historic 1972 infrastructure, which includes the 1972 Olympic Building (ice arena), the 1972 Olympic Pool (curling arena) and the 1972 Olympic Stadium (opening and closing ceremonies). The existing properties will require extensive energetic renovations, which are the main focus of the environmental lead project 'Sustainable Olympic Park 2018'.

Objectives

The objective of this lead project is the renovation of the 1972 Olympic sports venues while maintaining and strengthening the unique character of the Olympic Park. The existing Olympic Stadium, Olympic Pool and Olympic Building will feature at least 30% lower greenhouse gas emissions by 2018 following extensive energetic renovations. The lead project also contributes to the objectives of the 2020 Climate Programme of the Bavarian government.

Its focus areas and measures include the optimisation of ventilation technology (lower electricity consumption and heat recapture), modern and efficient lighting systems as well as heat insulation. The planned new buildings in the Olympic Park will satisfy the highest technical requirements with regard to energy efficiency. At the same time, all redevelopment and renovation activities must be coordinated with the green space concept for the outside areas of the Olympic Park in order to retain this important local recreational area as a sustainable legacy. In this way, 'Sustainable Olympia Park 2018' represents a generational bridge between the 1972 Summer Games and the 2018 Winter Games, and will leave a sustainable legacy for active use and recreation for the city and its inhabitants.

Project description

Notwithstanding some renovations that have been undertaken since 1972, many parts of the Olympic Stadium, Olympic Building and Pool still correspond with the standards of the early 1970's. The current annual energy consumption values for these three properties are listed in Table 26 below. These are average values, since consumption is not consistent but rather depends on the respective annual events.

Table 26: Energy consumption (current) for Olympic Building, Olympic Pool, Olympic Stadium

Building	District heat usage (MWh/a)	Electricity consumption (MWh/a)
Olympic Building	2,454	3,074
Olympic Pool	7,063	3,434
Olympic Stadium	3,481	1,983
Total	**12,998**	**8,491**

The table demonstrates that the three buildings combined require almost 13,000 MWh in district heating per year, whereby the Olympic Pool is the largest individual user at almost 7,000 MWh. Electricity consumption totals approximately 8,500 MWh per year. Interviews, research and preliminary planning have resulted in the following key focus areas for energetic renovation activities:

Olympic Building

- Reducing electricity consumption by modernising the ventilation system (speed control etc.),
- Reducing district heat usage through insulation of false ceiling, replacement of old window panes,
- Reducing district heat usage by modernising the ventilation system (flexible controls, heat recapture).

Olympic Pool

- Reduce district heat requirements by replacing old glass module (U value of 1.1 instead of 3.0)
- Saving on electricity and district heat with new ventilation system in the large building area with heat recapture,
- Reducing electricity requirements with new lighting systems (movement sensors etc.).

Olympic Stadium

- Modernisation of floodlights (approx. 40% electricity savings as compared to current situation)
- Saving on electricity and district heat through modern building control technology, conversion of heating systems to static heating units, modern ventilation systems with heat recapture, modern lighting (movement sensors etc.), partial insulation of walls on the inside of the Olympic Stadium.

The measures outlined above can reduce energy consumption and related greenhouse gas emissions by at least 30% as compared to current values. This corresponds with a reduction of more than 4 MWh in district heat and approx. 3 MWh electricity per year. These measures will leave another green legacy as a result of Munich 2018.

Figure 17 Olympic Park Munich

Implementation

The establishment of a joint working group with the application company (later OCOG), Olympiapark München GmbH, Stadtwerke München GmbH and participating planning and engineering firms is recommended. This working group would coordinate and reconcile the planned energy-saving measures in the Olympic Park. For example, individual measures must be reviewed to see if they can be implemented more cost-effectively as part of an overall renovation strategy. The goal is the comprehensive energetic renovation of the Olympic Stadium, Olympic Building and Pool, and hence the creation of modern, energy-efficient and exemplary competition sites for Munich 2018.

The financing of a 'Sustainable Olympic Park 2018' will require extensive investments towards the renovation of the Olympic Stadium, Olympic Building and Olympic Pool in Munich. A total of EUR 7-11 million will be reserved in the non-OCOG budget for additional costs. Besides making an excellent contribution to the protection of the climate and resources, a sustainable Olympic Park also promises a lasting green legacy.

5.1.3 GREEN BUILDING MATERIALS 2018

Project title:	Green building materials 2018
Main theme:	Protection of the climate
Implementation:	Organising Committee for the Olympic Games (OCOG)

Background

Large building projects are often associated with a high degree of relevancy as regards environmental impacts due to their sheer size. This applies even more if the entire process chain of building materials that are used (raw material production, production processes, transport) is considered as part of a life cycle approach. The production of building materials is frequently associated with considerable burdens on the environment: e.g. through the destruction of landscape by mining mineral resources or the harmful emissions associated with high-temperature processes and truck transports. For this reason, 'Green building materials 2018' aims to use as many environmentally-compatible construction methods and building materials as possible.

Objectives

Ecologically advantageous building materials such as wood and low-CO_2 cement will be used for all building projects associated with Munich 2018. In addition, all tenders will emphasise the use of as much recycling steel (electric steel) as possible, as the production of this steel generates significantly lower greenhouse gas emissions as compared to furnace steel, and also reduces the stress on iron ore resources. In general, recycled materials will be given preference with regard to all materials where possible.

The use of renewable resources such as wood from certified and regional stock is a guideline that applies to all Munich 2018 building projects. As an additional contribution to climate and resource protection, only low-CO_2 cement[14] (blast furnace cement, at minimum CEM III/A) will be used for all suitable concrete structures. This approach is associated with extensive reductions of CO_2 emissions, e.g. 40% for cement (approx. 380 t CO_2 savings per 1000 tonnes of cement). The state of Bavaria will be able to provide clear evidence of its extensive competence related to sustainable construction (timber construction etc.) at an international level.

Project description

The environmental lead project 'Green building materials 2018' represents a cross-sectional task that equally affects all building projects connected with Munich 2018 (new construction, redevelopment, renovation) for the areas underground construction and structural design, as well as civil engineering (e.g. bridges, train infrastructure etc.). Important examples of ecologically beneficial building materials and substances are described below:

Timber construction: Wood is a building material with excellent technical and ecological properties. In contrast to building materials from non-renewable resources, timber materials have an alleviating effect on resources across their entire application period. Therefore wood is not only the raw material of choice for the construction of the Olympic Villages but also presents a meaningful option for the construction of sports venues overall.

[14] CEM II- and CEM-III/A cement for concrete construction "Sustainable solutions for building with concrete", Verein Deutscher Zementwerke e.V. (Publ.), Düsseldorf 2008.

For example, the production of glued-laminated timber girders already consumes less energy than is bound in the product. More than half of the sun energy stored in the wood is thus carried along on its subsequent journey and can be recaptured as heat or electricity without losses once its usage period has come to an end. In addition to the carbon storage effect achieved with timber construction, wood also features excellent heat insulating properties due to its low heat conductivity. Wood as a building material and the use of wood-based insulation materials can make an important contribution to the construction of the planned 'Plus-Energy Villages 2018'. The use of wood as a building material can therefore be considered climate protection in practice. In addition, using constructive wood preservation, wood is also able to retain its permanency without the use of chemicals, as evidenced by many modern timber houses and historic timber frame buildings. As well, with its ability to regulate moisture, wood creates healthy living spaces with a positive interior climate. Another advantage of wood is that this renewable resource is available in large quantities in Bavarian forests, which are managed in a manner that is both sustainable and close to nature. However, Bavaria is home not only to the raw material but also numerous medium-sized timber construction firms that are ranked among the top firms in the world with regard to product development as well as the implementation of innovative timber construction solutions. Building with wood has had a great and successful tradition particularly in the Alpine region. Hence there are a number of reasons why an emphasis on a high proportion of wood construction is a meaningful option for Munich 2018. Timber construction will also be considered with respect to sports venues, wherever possible and meaningful. An important factor in terms of sustainable building is the ability to ensure that only certified wood and, where possible, Bavarian operations are used.

Low-CO_2 cement: The production of cement contributes approximately 8% to global CO_2 emissions and is therefore one of the most relevant causative factors. The global production of an average tonne of cement produces .89 tonnes of carbon dioxide[15]. Carbon dioxide emissions are mainly caused by the burning of the cement clinker - the main component of conventional Portland cement.[16] The burning of cement clinker generates fuel-related CO_2 emissions and (approx. 60%) material-related CO_2 emissions due to the limestone content in the raw material. As a result, the use of cement types with much lower proportions of cement clinker per tonne of cement can achieve significant savings of carbon dioxide emissions. Because of the high relevance of this topic, the cement industry is placing great emphasis on the identification and use of other suitable additional supplements which significantly reduce the use of cement clinker and hence CO_2 emissions. A relevant example for Germany is blast furnace cement (CEM III/A). The addition of slag sand (a by-product of blast furnace slag) at a rate of 36 to 65% of cement makes it possible to reduce CO_2 emissions from cement production (as opposed to CEM 1) by a significant amount (40%). Cement is mainly used in a variety of concrete components (the cement portion in concrete is 15 - 20 % in weight). According to VDZ, domestic shipments of cement produced in Germany in 2006 already contained 17.9% of low-CO_2 CEM III cement; it has also been used in many larger projects (floor slabs, walls, stair towers, road slabs, bridges etc.). Large cement manufacturers in Germany and abroad continue to search for additional suitable supplements (preferably residual substance flows) and the development of new low-CO_2 cement varieties. In line with the goals of protecting the climate and resources, the use of low-CO_2 cement for all building projects related to Munich 2018 is a very important aspect with regard to sustainable construction, in consideration of the relevant DIN norms and regulatory approvals.

[15] Harnisch, J.; Müller, N.: A Blueprint for a Climate Friendly Cement Industry - How to Turn Around the Trend of Cement Related Emissions in the Developing World; Ecofys Germany GmbH on behalf of WWF International, 2007.

[16] In the EU, the so-called "clinker" factor - i.e. the ratio between cement clinker and cement - is 0.78.

Recycling steel: Along with concrete, steel is the most common building material found at large building projects. Similar to cement, its entire production chain also generates extensive amounts of greenhouse gas emissions. At the same time, there are considerable differences between blast furnace steel (approx. 1.8 t CO_2 equivalents/tonne steel: raw material basis consists almost exclusively of iron ore) and electric steel (approx. 0.6 t CO_2 equivalents: steel scrap raw material basis), which generates significantly lower greenhouse gas emissions. The portion of electric steel in steel production is growing slowly but consistently at a global level; in Germany, its share is nearly one third. Particularly the construction sector is an important and common consumer for recycling materials (steel mats for reinforced concrete etc.). For this reason, the Munich 2018 Environment and Sustainability Concept insists on the exclusive use of recycling steel as part of all tenders connected to Munich 2018. Exceptions may only be approved in the case of justified technical problems for specific applications.

The main steps required for implementing the environmental lead project 'Green building materials 2018' are described in the following sections.

Implementation

With regard to the successful implementation of the 'Green building materials 2018' environmental lead project, it is of vital importance that the OCOG establishes an independent advisory board of experts in architecture, construction and building materials well in advance of the actual tenders for detailed planning and construction services. The responsibility of this board is to advise the OCOG regarding the use of ecologically beneficial building materials. Based on experience, there is considerable time pressure associated with the tender and selection procedures for construction lots, often at the expense of alternative building materials. In addition, large construction companies have holdings e.g. in quarries and gravel pits, which sometimes results in a limited openness to and willingness to use alternative building materials. The independent advisory board of the OCOG will be responsible for preparing positive lists for ecologically beneficial construction methods and materials and their dedicated areas of use early on, whereby such lists would then be included in the tenders as binding specifications. Not least, experts from Bavarian universities will also be included in the board.

A non-OCOG budget of EUR 800,000 to 1.2 million has been provided for securing the extensive use of excellent building materials with the lowest possible resource consumption and reduced greenhouse gas emissions. These funds can only be used for guaranteeing the use of ecological building materials, and only for the case that evidence of actual additional costs as compared to conventional building materials can be provided.

5.1.4 100 SPORTS CLUBS REDUCE 2018 T CO_2/A

Project title:	100 sports clubs reduce 2018 t CO_2/a
Main theme:	Protection of the climate
Implementation:	Deutscher Olympischer Sportbund (DOSB)

Background

DOSB estimates that the renovations that are required for German sports venues will total at least EUR 42 billion. A relatively large portion of this amount can be attributed to energetic measures. Due to their frequently outdated energetic standards, many individual properties (sports buildings, pools, sports fields etc.) of the more than 90,000 sports clubs in Germany do not only consume a lot of energy and hence create a lot of greenhouse gas emissions, but the high consumption of operating materials also creates a considerable burden on the budgets of the associations that play an important role in German popular sports, the promotion of children and youth and the integration of migrants, and hence also make an important contribution to the social dimension of sustainable development. As a result, the DOSB and its 97 member organisations have been committed to the issue of climate protection for many years, and assist associations in developing savings potentials. In this context, a number of different activities, e.g. the 'Climate protection project' of the DOSB or the Eco-Check initiatives (e.g. National Sports Association of Hessen) have already led to a large number of identified measures at many associations, which need to be implemented.

Objectives

The '100 sports clubs reduce 2018 t CO_2/a' environmental lead project is used to implement the strategy for the Environment and Sustainability Concept for Munich 2018 across the region and the entire country, and will make a significant contribution to reducing national CO_2 emissions. The operating objective of this lead project is to compensate a portion of remaining greenhouse gas emissions[17] that remain even after the implementation of direct emission savings by the Munich 2018 Environment and Sustainability Concept through meaningful renovation measures in the area of German popular sports. In this way, the lead project contributes to main theme 1 of the Munich 2018 Environment and Sustainability Concept 'Protection of the climate - the first climate-neutral Olympic and Paralympic Winter Games' and stimulates the club system for contemporary climate protection under the umbrella of the DOSB.

The DOSB will select the sports clubs according to a national application process. Energy-saving measures (replacement of outdated lighting systems, modernisation of heating and ventilation systems, heat insulation of club houses etc.) will be implemented before 2018 and evaluated by that year, in order to document the success of the measures.

[17] This does not affect the compensation of greenhouse gas emissions generated by the inbound and outbound air travel of international guests (see "Climate compensation for international air travel") and the measures undertaken by the "Positive national climate balance sheet 2018" lead project.

Project description

The spectrum of technical possibilities for the renovation of existing sports club infrastructure as a contribution to climate protection is very diverse, both with regard to the scope as well as type of available measures. A very small selection of important examples is listed below:

- Reduction of energy consumption with lighting systems that use movement sensors,
- Replacement of outdated floodlight facilities,
- Replacement of outdated windows against modern heat protection windows, insulation of outside skin (e.g. for sports buildings, club houses etc.),
- Modernisation of heating technology (e.g. condensing boiler, pellet or wood chip heating),
- Modernisation of outdated and inefficient refrigeration generators (ice rinks etc.),
- Solar heat, heat recapture (from basin water or ventilation facilities) at pools,
- etc.

The suggested process for this environmental lead project is outlined below. As mentioned previously, this environmental lead project is able to build on many renovation requirement calculations that have been conducted at many sports clubs, and also on the DOSB's technical competence and its member associations across Germany. Savings potentials that have already been identified but have not been developed due to a lack of funds will be addressed with robust renovation measures. Participating clubs from the area of popular sports can therefore expect significant savings in operating costs over the long term.

Implementation

For the purpose of implementing the environmental lead project, it is recommended that in the event that Munich 2018 is awarded the Games by the IOC, the DOSB immediately publicizes the opportunity for sports clubs to participate in the '100 sports clubs reduce 2018 t CO_2/a' on its Internet page and other information channels across Germany, in coordination with the organisation committee for Munich 2018. Before that time, the DOSB and application company will define the criteria for participation or the possible selection of measures undertaken by the clubs.

To provide sports clubs with a fair opportunity to apply for this environmental lead project, the application period will be approx. 6 months, i.e. applications are received no later than the end of 2011/beginning of 2012 and can then be evaluated by the DOSB. Without pre-empting the detailed selection criteria to be developed, the following aspects will be considered:

- Preference will be given to medium-sized and large projects.
- No grants will be provided for measures that are already required by law.
- The expected annual energy-saving potential must have been accounted for in a transparent and comprehensive manner in advance, using suitable and recognised methods, and form a part of the grant application to the DOSB/OCOG.
- Preference will be given to coordinated and integrated concepts whose implementation leads to a significant reduction in energy consumption and hence greenhouse gas emissions.

The selection of clubs or projects by the DOSB is followed by the implementation phase for the measures until the end of 2017 (immediately before the start of the 2018 Games). For the purpose of including these figures as part of the overall balance sheet for Munich 2018, it is recommended that the savings achieved by the beginning of the Games in 2018 are considered on a cumulative level (see information in section 'Climate balance sheet Munich 2018'). That means, in the case of a successful implementation of a reduction measure with a saving of 20 tonnes CO_2 equivalents/year and completion of the measure 5 years before the 2018 Games, 100 tonnes of CO_2 equivalent would be 'deducted' from the Munich 2018 climate balance sheet.

One important aspect is that independent evaluations are conducted for each measure that has been implemented, which confirms the successful realisation of the energy savings and reduction in greenhouse gas emissions, in order to secure the success of the environmental lead project.

The non-OCOG budget provides EUR 4.8 to 7.2 million for the implementation of this environmental lead project. It is expected that two-thirds of required investment costs for the measure (packages) will be provided to the 100 selected clubs as additional funding from the non-OCOG budget. The remaining third of the respective investment sum must be raised by the relevant club. The range of available funding for the clubs from the non-OCOG budget may be set between EUR 20,000 to 200,000 per club, i.e. a typical measure would involve an investment sum of EUR 30,000 to EUR 300,000 per club. This ensures that robust medium-sized to large renovation measures can be initiated and implemented. Investment measures which exceed this scope would require a higher in-house portion to be provided by the club, or additional funds from other sources.

Invested funds for renovation measures are balanced with four- and sometimes five-digit annual savings in operating costs (in EUR) for the clubs. They also provide a lasting contribution to the future of popular sports clubs and a green legacy of Munich 2018 in all federal states.

5.1.5 POSITIVE NATIONAL CLIMATE BALANCE SHEET 2018

Project title:	Positive national climate balance sheet 2018
Main theme:	Protection of the climate
Implementation:	Organising Committee for the Olympic Games (OCOG)

Background

The Munich 2018 climate balance sheet (see also 4.4.2) shows that approx. 385,000 tonnes of greenhouse gases generated by the 2018 Olympic and Paralympic Winter Games will remain notwithstanding the reduction in greenhouse gas emissions by direct reduction measures in line with the Munich 2018 Environment and Sustainability Concept. Of these, around 284,000 tonnes will be caused by inbound and outbound international air travel (guests from outside of Europe). These amounts will be compensated by measures contained in the 'Climate compensation for international air travel' environmental lead project. This will still leave 101,000 tonnes of greenhouse gases as a result of traffic emissions (onsite transportation, inbound and outbound transportation within Germany and land- and air-based inbound and outbound travel between Germany and the rest of Europe[18]) as well as energy-related emissions through the competition sites, Olympic Villages and other infrastructure, accommodations for spectators and officials, and catering/merchandising (see also section on 'Climate balance sheet for Munich 2018'). These 101,000 tonnes of greenhouse gases will be mainly addressed and compensated by the 'Positive national climate balance sheet 2018' lead project described in this section.

Objectives

With the objective of financing measures for the compensation of unavoidable CO_2 emissions as part of the 'Positive national climate balance sheet 2018', the association 'München 2018 klimagerecht' will be established for the purpose promoting suitable additional climate protection measures at the regional and national level (see also additional lead project 'Climate compensation for international air travel'). These measures will compensate those greenhouse gas emissions caused by Munich 2018 that cannot be directly avoided during the Games through efficiency measures or the use of renewable energy resources. All compensatory measures as part of this lead project will be carried out at the regional or national level based on physical measures. The underlying idea is to compensate emissions caused by onsite traffic, accommodations and the operation of the competition sites within the region and Germany, while emissions caused 'outside of Europe' are compensated through measures in emerging and developing countries (see also lead project 'Climate compensation for international air travel'). The projects to be funded must result in clearly additional emission reductions and satisfy the strict criteria of the 'München 2018 klimagerecht' association. More specifically, it means that the aforementioned 101,000 tonnes of remaining greenhouse gas emissions would not only be compensated but over-compensated. Since it can be assumed that several thousand tonnes are already being compensated by the lead project '100 sports clubs reduce 2018 t CO_2/a' along with the aim of over-compensating for national greenhouse gas emissions, the objective in this respect will be to use the lead project 'Positive national climate balance sheet 2018' to save at least 110,000 tonnes of greenhouse gas emissions through suitable measures and projects in the region and across

[18] Also contains traffic-related emissions of the workforce.

the country. The largest portion of savings will be achieved before the start of the 2018 Olympic and Paralympic Winter Games.

Based on effective publicity measures undertaken by the 'München 2018 klimagerecht' association - which mean that the lead project is particularly suited to raise donations - and the planning and implementation of national measures, the lead project is particularly suited to create a positive atmosphere and positive expectations for Munich 2018 in the years before the Games. The lead project 'Positive national climate balance sheet 2018' is an important building block in main theme 1 'Protection of the climate' of the Munich 2018 Environment and Sustainability Concept.

Project description

Following the establishment of the ''München 2018 klimagerecht' association (see Implementation), the association will conduct effective publicity activities to raise funds from citizens and companies for the promotion of measures which supplement state measures for climate protection. Examples of regionally adapted projects may include the replacement of heating units based on fossil-based energy with biomass or geothermal heat, biogas production from agricultural residue, the renovation of public buildings at low-energy or even passive house standard, the energetic renovation of club-owned and community sports venues etc. The projects are selected by an independent technical advisory board to the club based on a recommendation; the association 'München 2018 klimagerecht' will continue to raise funds for projects until the greenhouse gas emissions generated by Munich 2018 at the national level are overcompensated (> 10% over-compensation), i.e. at least 110,000 tonnes of CO_2 equivalents. This underlines the large task associated with the implementation of the 'Positive national climate balance sheet 2018' environmental lead project, which will also require a series of multi-year fundraising campaigns (see Implementation).

All of the projects will be implemented in Germany, without the purchase of certificates or participation in emission trading systems. The 'Positive national climate balance sheet 2018' lead project only provides for physical measures in Germany for the purpose of achieving a direct reduction in greenhouse gases.

Implementation

The first step of this environmental lead project is the establishment of an incorporated association 'München 2018 klimagerecht e.V.'. It is recommended that the application company, with the support of participating partners and other entities (associations, government organisations, sponsors etc.), establishes the association in 2010, between the two application phases for Munich 2018. This association focuses on climate protection, and more specifically aims to make a significant contribution to climate-neutral 2018 Olympic and Paralympic Winter Games. The first publicity campaigns will already be started in 2011, and possibly prior to the final awarding date for the 2018 Games by the IOC.[19] Each of the individual campaigns will involve several weeks of focus activities. In particular, obtaining well-known personalities from public life as patrons along with the active participation of prominent figures (athletes, actors, musicians etc.) for special fundraising activities will be a key factor for raising considerable funds. Sponsors will have the option of making donations to the 'München 2018 klimagerecht' association when selling their products (depending on the product price, for example 18 EUR per sold unit). There is no limit to the imagination with respect to intelligent

[19] In the case Munich is not considered, already raised funds should in any case be used for climate protection projects in terms of the purpose of the club.

and successful activities. The responsibility of the expert advisory committee for the association is to set strict and transparent criteria for the climate protection projects in Germany, and to select the projects. A key criterion is the independent nature of the measures i.e. 'tag-along effects' of already approved projects or otherwise funded projects (e.g. through EEG) must be excluded. The measures must result in climate protection projects which are associated with a real reduction of greenhouse gas emissions once implemented.

The Internet page of 'München 2018 klimagerecht' will continuously publish the current status of donations received as part of a 'Euro Ticker'. The other page provides current and illustrative information on funded projects and communicates already achieved reductions in greenhouse gases: 'CO_2 Ticker'.

In contrast to other environmental lead projects, no funds from the non-OCOG budget will be reserved for financing this lead project. Rather, it is intended that 'München 2018 klimagerecht' will be established by the different sponsors and partners of the application company. The association will be raising funds for projects until at least 110,000 tonnes of CO_2 equivalents have been over-compensated (> 10% over-compensation). It can be assumed that a million Euro figure will have to be raised for compensation efforts - although this figure is distributed over the years 2011 to 2018. This will require a series of multi-year donation campaigns.

5.1.6 CLIMATE COMPENSATION FOR INTERNATIONAL AIR TRAVEL

Project title:	Climate compensation for international air travel
Main theme:	Protection of the climate
Implementation:	Organising Committee for the Olympic Games (OCOG)

Background

In total, inbound and outbound travel as well as onsite mobility during the Games will generate approx. 2.8 billion person kilometres, resulting an 378,000 tonnes of CO_2 equivalents in greenhouse gas emissions, of which three quarters will be attributable to air travel by non-European guests. The high proportion of greenhouse gas emissions caused by international inbound and outbound travel confirms already noted patterns for other international sporting events such as the 2006 FIFA Football World Championships in Germany.

Objectives

The objective of the 'Climate compensation for international air travel' environmental lead project is to compensate non-avoidable greenhouse gas emissions (approx. 284,000 tonnes) associated with the international inbound and outbound travel of athletes, officials and private spectators on a global level with investments in additional climate protection projects. In addition, the project will set the standard for future large sporting events, which will have to be met by other organisers and application organisations. This way, the lead project also supports the long-term 'green legacy' of Munich 2018.

The compensation of non-avoidable greenhouse gas emissions associated with the planning and hosting of large sporting events has become a goal since the 2006 Olympic and Paralympic Winter Games in Turin and the 2006 FIFA Football Championships in Germany. At the same time, air-related international inbound and outbound traffic, which makes up the largest proportion of the entire emissions balance sheet, has not been consistently addressed to date. Greenhouse gas emissions related to international air travel was only estimated and integrated into the emission balance sheet for the 2008 Olympic Summer Games in Beijing. However, there are great uncertainties with regard to the additionality of prevented emissions for compensation purposes.

Project description

The basic idea behind compensating greenhouse gas emissions associated with international air travel in the context of planning and hosting Munich 2018 is to create additional savings for non-avoidable emissions via investments in climate protection projects elsewhere (in the same amount), so that additional emissions caused by transportation can be virtually over-compensated.

Such compensatory mechanisms and recognised rules exist both under the international climate regime and as a result of the Kyoto Protocol. In addition, there are a number of voluntary standards and markets for climate compensation, with qualitatively different requirements for the corresponding compensation projects. At this time, the so-called 'Gold Standard', which is coordinated by international environmental associations and which was prepared by WWF International, is likely the highest global standard (in view of ecological and social aspects) for high-quality climate protection and compensation projects, and can also be described as 'best practice'. As part of the Munich 2018

Environment and Sustainability Concept, the aim is to implement the compensation of international air travel via the 'Gold Standard', or the projects which correspond with this standard.

Due to the uncertainty regarding the design of the flexible mechanisms for compensation projects after 2012 as a result of the still ongoing international negotiations at the UN level regarding a successor treaty for the Kyoto Protocol for climate protection, it is not possible to provide more detailed statements regarding future quality requirements for international climate protection projects.

With regard to the Olympic movement however, the intent is to implement at least one project on each of the continents which are represented via the five Olympic rings. Where possible, these projects will be developed in the area of renewable energy resource utilisation (e.g. use of biomass, wind power). Projects will be oriented to regional strategies for the development of renewable energy resources with adapted technologies and satisfy the then applicable highest requirements of the World Climate Council, the further developed 'Gold Standard' and if applicable, additional sponsor criteria. An important factor in terms of the Munich 2018 Environment and Sustainability Concept is to ensure that these projects also create positive effects for the economic and social development of people and participating companies, e.g. saving fuel costs through decentralised biogas use, reduction of accident risks to children by replacing open fire locations with petroleum etc.

The Environment expert commission has suggested the implementation of the projects in partner cities or regions of the hosting cities and administrative districts involved in Munich 2018. This objective will also be reviewed for feasibility and implemented where possible. It may be necessary to develop and implement own projects with international partners. The general objective is to develop the projects as soon as possible following the possible awarding to host the 2018 Olympic and Paralympic Winter Games by the IOC, and to compensate greenhouse emissions as much as possible prior to 2018.

Implementation

The first emission balance sheet of international air travel which is now available must be regularly updated in future years - up to the ex-post evaluation following the 2018 Olympic Winter Games. This activity is required and also useful in order to provide credible guarantees for the actual compensation of all emissions that have been generated.

The expert advisory board of the 'München 2018 klimagerecht' association will be managing the definition of quality and selection criteria for global compensation projects and the initiation or selection and evaluation of existing projects; the association will also be managing the 'Positive national climate balance sheet 2018' lead project.

The expert advisory board of the association will also sensitise other actors to participate in this lead project. They may include participating international and national associations and national Olympic committees, but also companies and private persons (e.g. spectators and guests). This is useful since the generation of greenhouse gas emissions by international air travel in the context of the 2018 Olympic and Paralympic Winter Games is not solely within the responsibility of the host but represents a shared responsibility by all those involved. At this time, the required funds can only be calculated in the form of an orientation value. The starting premise - that up to EUR 20 must be invested via credible compensation projects in emerging and developing countries according to the 'Gold Standard' for the prevention or compensation of one tonne of CO_2 equivalents. Given a volume of 284,000 tonnes of greenhouse gases associated with air travel, this results in financial requirements of

between EUR 4-6 million, which has been reserved for this purpose as part of the non-OCOG budget. Responsibility for financing must not necessarily be carried by the organisation committee alone, but may also be assumed through a corresponding fund financed by participating partners, associations, state organisations and sponsors, in addition to the organisation committee. However, financing should be secured through the organisation committee, in case no other funds can be raised from participating partners.

With the corresponding implementation and design, this lead project that can also be used to sensitise large parts of the public, which will further increase the project's 'green legacy'. In addition, the advantage of this type of implementation is the possibility of reducing the financial burden for the host. The association's expert advisory board will be responsible for raising the required funds from the participating partners.

5.1.7 ONSITE MOBILITY

5.1.7.1 GREEN FLEET 2018: EFFICIENT AND RENEWABLE

Project title:	Green fleet 2018: Efficient and renewable
Main theme:	Protection of the climate
Implementation:	Organising Committee for the Olympic Games (OCOG)

Background

Only 1.2% of entire traffic-related greenhouse gas emissions for Munich 2018 are attributable to the transport of athletes and their coaches and delegations of the International Olympic Committee, National Olympic Committee and sports associations and media representatives. At the same time, this type of transportation is a particular focus of public discussions, since it is carried out by the local organisation committee itself or on the direct order of the organisation committee. This way, the organisation committee for the Olympic Winter Games (OCOG) has the ability to exert direct influence on the environmentally- and climate-friendly design of these transportation methods.

For this reason, several previous hosts of Olympic Winter and Summer Games and other large sporting events have already relied on passenger vehicles and buses with alternative engines or renewable fuels. For example, planning for Vancouver 2010 set out a target of 30% hybrid vehicles or vehicles with sophisticated environmental technologies with respect to the vehicles used by the organisers and volunteers. At the 12th IAAF Track and Field World Championships 2009 in Berlin, for example, 50% of the 200 passenger vehicles for the organisation committee consisted of hybrid vehicles.

While some of the passenger vehicles used in recent years included and continue to include hybrid vehicles, alternative engines and fuels do not play a big role for the bus and shuttle traffic conducted on the order of the organisation committee. Twenty fuel cell buses were used in Vancouver. During the Football World Championships in Germany, six hydrogen-operated shuttle buses were used in Berlin and Hamburg.

These examples show that to date, organisers have only used small volumes of passenger vehicles and buses with alternative engines. Renewable fuels for fuelling the fleet were also only used in part. Another conspicuous feature is that with regard to measures undertaken, current organisers have predominantly focused on the passenger vehicle fleet. While it is true that the number of passenger vehicles - see Table 27 for Salt Lake 2002 and Turin 2006 - is much larger than the number of buses in use, the number of vehicle kilometres covered by buses is much higher than for passenger vehicles. For example, with regard to the transport of officials for Munich 2018, it is expected that 97% of vehicle kilometres and 88% of greenhouse gas emissions will be attributed to bus and shuttle traffic, with a small remainder to the passenger vehicle and minibus fleets. It means that it is not sufficient to only include passenger vehicles as part of a sophisticated Environment and Sustainability Concept.

Table 27: Passenger vehicle and bus fleets for the 2002 Olympic Winter Games in Salt Lake City and Turin 2006 (Source: IOC 2007)

	Passenger vehicles	Minibuses	Buses
	Number	*Number*	*Number*
Salt Lake 2002	**4,160**	**545**	**568**
Olympic Family	430		
NOC	350		
OCOG	1,700		
Rate Card Vehicles	1,400		
Athletes/Coaches		455	50
Technical Officials	50		
Media		90	350
IOC	230		25
Marketing Partners			143
Turin 2006	**2,900**	**172**	**745**
Olympic Family	401		
NOC	399		
OCOG	749		
Rate Card Vehicles	1,065		
Athletes/Coaches		172	80
Technical Officials	36		14
Media			488
IOC	250		20
Marketing Partners			143

Objectives

The objective of the 'Green fleet 2018' lead project is to ensure that vehicles and buses used to transport athletes, coaches, IOC, NOC and IF delegations and media representatives, which are used on the order of the organisation committee, are exclusively equipped with alternative engine concepts and fully supplied with renewable energy. The buses used for visitors in the form of P+R shuttle transportation in Garmisch-Partenkirchen, Schwaiganger and Schönau am Königssee will also meet these requirements.

Therefore the lead project addresses the main theme 'Protection of the climate'. The 'Green fleet 2018' will contribute towards reducing traffic-related greenhouse gas emissions generated by Munich 2018 to a minimum (on location). In addition, this project also allows the OCOG to meet its own responsibility for climate protection and will thus contribute to reducing greenhouse gas emissions. In addition, the project will set the standard for future large sporting events, which will have to be met by other organisers. In this way, the lead project will also create a long-term green legacy.

Project description

It is expected that increasing numbers of electrically-operated passenger cars and minibuses will be in use in Germany by 2018. The federal government has established large funding programmes in order to drive the further development of electric vehicles towards a target of 1 million electric vehicles on German roads by 2020. This trend is supported by the fact that both the state capital Munich and Garmisch-Partenkirchen are considered model regions for testing electro-mobility. As shown by the Figure below, however, it is the use of renewably produced and certified eco-electricity that produces a noticeable reduction in greenhouse gas emissions as compared to a conventional new vehicle in 2018.

More specifically, this lead project aims to ensure that all 3,000 passenger vehicles and minibuses of the OCOG will be electric vehicles, which are also operated with renewably produced and certified eco-electricity. This electricity must fully originate from new facilities that are not older than six years. For the event that an insufficient number of these vehicle types is available by 2018, alternative vehicle variants are also reviewed, such as vehicles with biogas engines (90% CO_2 reduction). It is the only way to ensure strong reductions in emissions. At around 5 g greenhouse gases (calculated as CO_2 equivalents), these vehicles will feature 96% fewer emissions per vehicle kilometre than a typical new 2018 vehicle (see Figure 18).

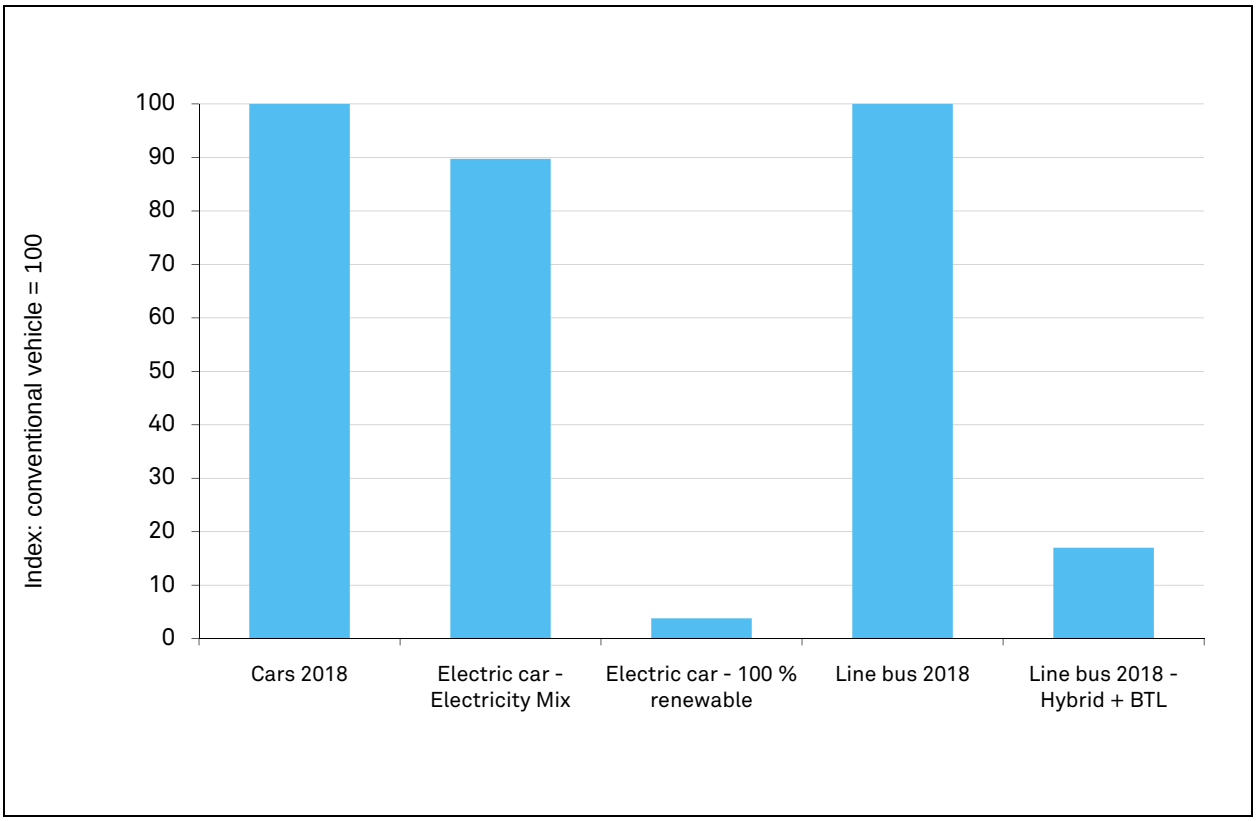


Figure 18: Greenhouse gas emissions of different passenger car and bus engine concepts in comparison

With respect to buses, electric drives will still be more the exception than the norm by 2018. While it is conceivable that some electric buses will be used, this will not be the case for the entire number of 800 - 1,200 required buses[20]. Hybrid buses will feature technical maturity by 2018. In this context, the federal environment ministry has issued a EUR 20 million grant for hybrid buses in December 2009, which is directed at local public transport companies. At the same time, hybrid buses only create greenhouse gas emission savings of 15-20% as compared to conventional buses (up to 25% within some urban areas). Further emission reductions will only be achieved through the additional use of biogas[21] or - if available by 2018 - second generation bio fuels which are produced from residual matter (e.g. biomass to liquid - BTL) and therefore do not pose competition to food. BTL reduces greenhouse gas emissions by 80% as compared to conventional diesel fuels. In combination with hybrid drives and biogas or second generation bio fuels, buses will therefore feature 83% lower values than those for a typical 2018 line bus at 130 g CO_2 equivalents per vehicle kilometre (see Figure 19).

In total, the 'Green fleet 2018' will save more than 4,500 tonnes of greenhouse gases (calculated as CO_2 equivalents). Of these, 3,700 tonnes will be avoided during the Olympic Winter Games and 800 tonnes during the Paralympic Games. In total, the fleet (including P+R bus shuttle) will only emit 800 tonnes CO_2 equivalents instead of 5,300 tonnes. There are also plans to conduct a fuel-savings training programme with all drivers, so that real emissions can be held below specified levels.

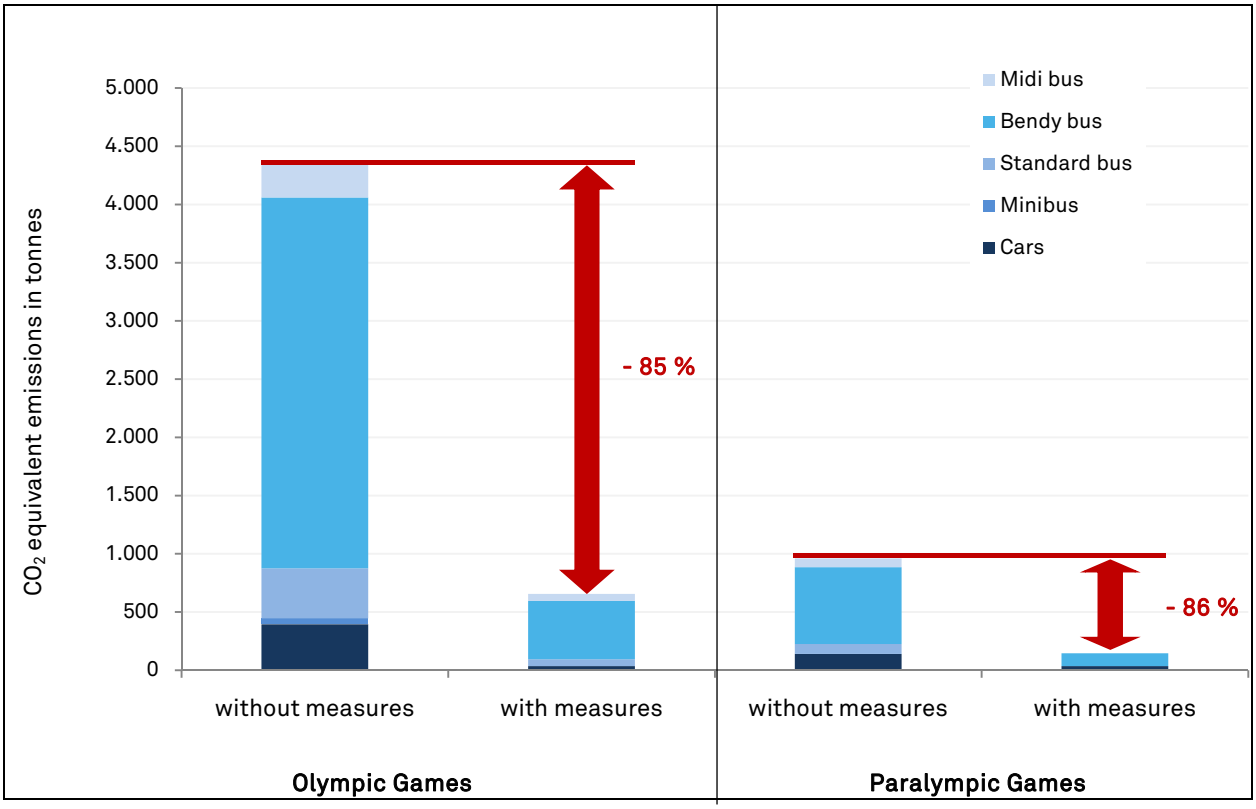


Figure 19: Greenhouse gas emissions of the OCOG passenger car and bus fleet before and after the implementation of the 'Green fleet 2018' lead project

[20] Including buses for P+R shuttle transportation

[21] In München-Pliening, biogas has already been fed into the natural gas network for two years, and can also be used for fuelling purposes using the corresponding infrastructure.

Implementation

In the past, vehicles for the in-house passenger car and bus fleet were frequently provided by international or national sponsors. Therefore the aforementioned environmental requirements will have to be incorporated into the preparation of sponsor contracts. Since the procurement of electric passenger vehicles and hybrid buses in 2018 will be associated with additional costs (see Financing), this aspect must be taken into account during negotiations with sponsors. Ideally, sponsors from the vehicle area will be participating in these possible additional costs. One benefit for sponsors would be the ability to position themselves as an environmentally-friendly producer of vehicles, thus enabling them to utilise their environmental commitment to Munich 2018 for advertising purposes.

The OCOG already requires its own vehicles in advance of the Olympic Winter Games. As an example, the Turin OCOG already used 200 passenger cars in the years leading up to the 2006 Olympic Winter Games. In the event that electric vehicles are not yet available for this purpose, concepts that allow for greenhouse gas emission reductions of at least 80% must be used.

Subcontractors will be commissioned for the majority of bus transportation; the OCOG will only be operating very few buses on its own, if at all. During the tender and awarding of these transport services, the above requirements (hybrid engine plus second generation bio fuels or biogas) must be taken into account. This will also result in a situation where a demanding environmental standard will be reflected in additional costs for the transport services to be awarded (see Financing).

Based on the current state of development, it is estimated that additional costs of EUR 1,000 will apply to the procurement of each passenger car with electric drive, with the sponsor responsible for about half of that figure. Considering a total of 3,000 vehicles, this leads to additional costs of approximately EUR 1.5 million (non-OCOG budget). At the same time, clarification must also be sought with the sponsor as to what extent subsequent sales proceeds may reduce this amount.

With respect to the 1,000 buses with hybrid drives, additional costs of approx. EUR 2.5 million are expected (approx. EUR 2,500 per bus), which must be fully covered by the non-OCOG budget. The use of renewably produced and certified electricity as well as the use of biogas or second generation bio fuels will likely also lead to additional costs of around EUR 1 million.

In total, the OCOG and non-OCOG budgets provide respectively EUR 1.6 to EUR 2.4 million and EUR 2.4 to EUR 3.6 million for implementing this lead project.

5.1.7.2 VISITOR MOBILITY: RIGHT OF WAY FOR PUBLIC TRANSPORT

Project title:	Visitor mobility: Right of way for public transport
Main theme:	Protection of the climate
Implementation:	Organising Committee for the Olympic Games (OCOG)

Background

Inbound and outbound travel to and from Munich, Garmisch-Partenkirchen and Schönau am Königssee, as well as onsite mobility for all spectator groups at the sports venues (including officials and workforce) as part of Munich 2018 will generate a total of 378,000 tonnes of greenhouse gases (calculated as CO_2 equivalents, without including the measures of the Environment and Sustainability Concept). Of these total emissions, only 2% are attributable to onsite mobility, while 98% of traffic-related greenhouse gas emissions by spectator groups are attributed to (sometimes) longer inbound and outbound travel to Munich, Garmisch-Partenkirchen or Schönau am Königssee (see also section on the climate balance sheet for Munich 2018).

Therefore it is even more surprising that current host cities and organisers of large sporting events have generally only focused their efforts on onsite traffic, while inbound and outbound travel by spectators has hardly received any attention. For example, the explicit goal for the 2006 FIFA World Championships in Germany was that at least 50% of spectators should travel to the stadiums using public transport; on the other hand, there were no concrete targets regarding the inbound and outbound travel of fans, athletes and delegations to the host cities from around the world. London 2012 is even aiming towards having all spectators travel to sports venues using public transport; however, concrete targets for inbound and outbound travel have not been formulated.

Organisers of Olympic Winter Games have placed most of their focus on public transport for onsite mobility (e.g. Vancouver 2010). '100% Public Transport' such as for London 2012 is not possible for the Olympic Winter Games however, since the sports venues for snow sports are generally located in rural areas, which go beyond the capacity of most public transit systems. A massive expansion of the public transport infrastructure would also not be very sustainable, since required capacities would drop again after the Games are over. Therefore, while organisers of Olympic Winter Games are also relying on public transport for onsite mobility, no targets have been formulated for inbound and outbound traffic.

Objectives

For this reason, public transport (buses and trains) will be consistently given preference for Munich 2018. This applies not only to the mobility for spectators on site, but in particular travel by all spectator and participant groups to sports venues (including athletes, coaches, sport delegations, sponsors, and media). The objective of the lead project 'Visitor mobility: Right of way for public transport' is to ensure that more than 50% of spectators will be travelling to Munich, Garmisch-Partenkirchen and Schönau am Königssee on public transport. It forms an important contribution to main theme 1 'Protection of the climate' in the Munich 2018 Environment and Sustainability Concept.

A comparison with current traffic calculations for the 2018 Olympic Winter Games in Munich (not including Paralympic Winter Games) highlights the challenges associated with this objective. Without the implementation of special measures, it is expected that 55% of global spectators (with officials,

without workforce) will arrive by car and 8% will arrive by airplane. The proportion of public transit is therefore at 37%.

In order to attain the indicated target of 50% public transit, a large portion of European spectators - whether travelling in a private or official capacity - would have to travel to the Olympic Winter Games by means other than an airplane. Of course this is mainly targeted at spectators from surrounding countries, such as Austria and Switzerland etc., and less at spectators from European countries that are further away (e.g. Spain). Athletes and guests from other continents will continue to travel solely by plane. With the successful implementation of this lead project, it will be possible to lower the proportion of air travellers from 8% to 4%. To achieve a public transport share of 50%, however, the proportion of passenger car travellers must be reduced by 9 percentage points from 55% to 46%. The proportion of train and bus travellers would be increased from 17% to 23%, while the proportion of travellers using local public transit (rapid-transit railway, subway, tram and line buses) would increase from 3% to 4% (see Figure 21).

Figure 20: Hybrid-Bus of the Munich City Utility

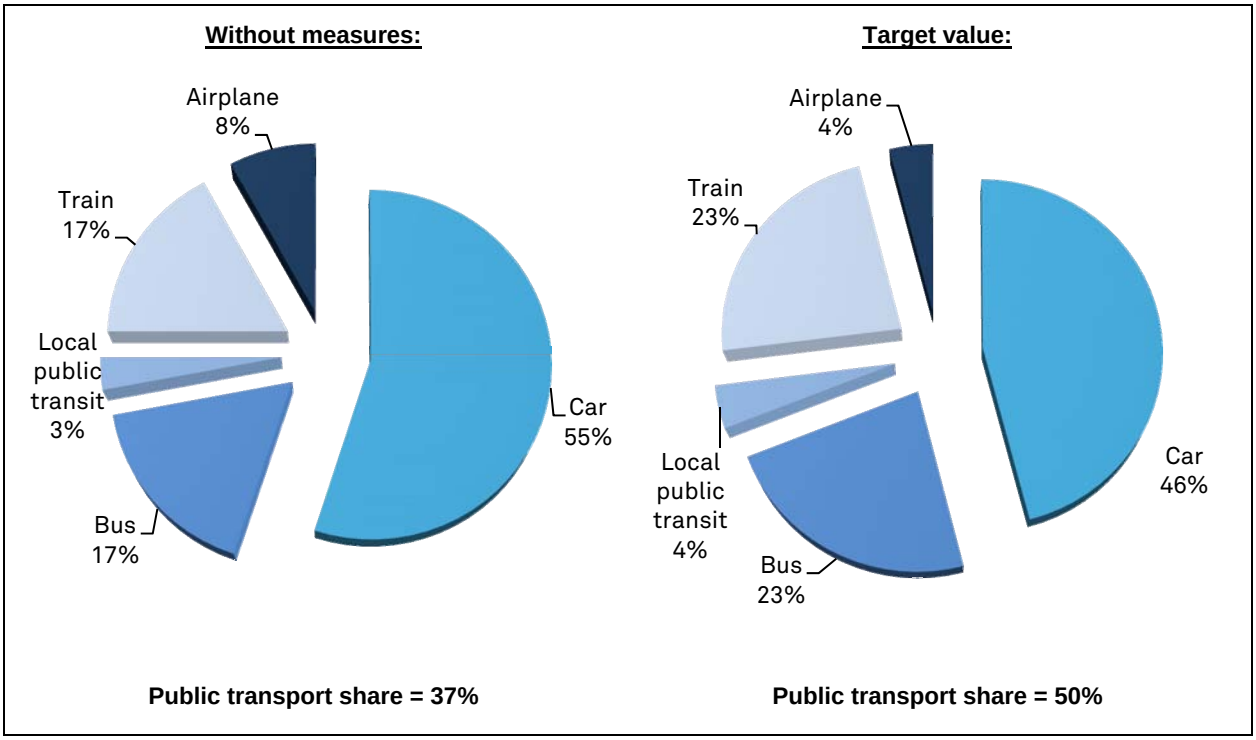


Figure 21: Proportion of modes of transportation for inbound and outbound travel (total global spectators, relating to persons) for the 2018 Olympic Winter Games (without Paralympic Winter Games) (Sources: ARGE München 2018 – AS&P/ProProjekt, own calculations of Öko-Institut)

With respect to the Paralympic Winter Games, a larger proportion of spectators will come from Germany and neighbouring countries as compared to the Olympic Winter Games. For this reason, the public transport proportion is already at 52%, even without any measures. However, additional measures (see below) will increase this share to 54%. For the sake of completeness, the following is also noted: Onsite mobility will also be mainly provided through public transport methods. 65% of visitors - according to the objective - will be mobile on location using regional public transport.

Overall, the lead project 'Visitor mobility: Right of way for public transport' will contribute towards reducing traffic-related greenhouse gas emissions related to the Munich 2018 Olympic and Paralympic Winter Games with more than 25,000 tonnes CO_2 equivalents (-7%). The total greenhouse gas emissions generated by all traffic at Munich 2018 (all visitors, officials including workforce) will hence be reduced to 350,000 tonnes CO_2 equivalents.

In this context, it must be noted that the 4% of non-European guests travelling by airplane will generate a total 284,000 tonnes of greenhouse gases. This portion cannot be reduced and must therefore be compensated (see 'Climate compensation for international air travel' lead project). Looking solely at the greenhouse gas emissions caused by European transportation, the lead project 'Spectator mobility: Right of way for public transit' will reduce these emissions from 94,000 tonnes to 68,000 tonnes CO_2 equivalents - which represents a reduction of 28% (see Figure 22).

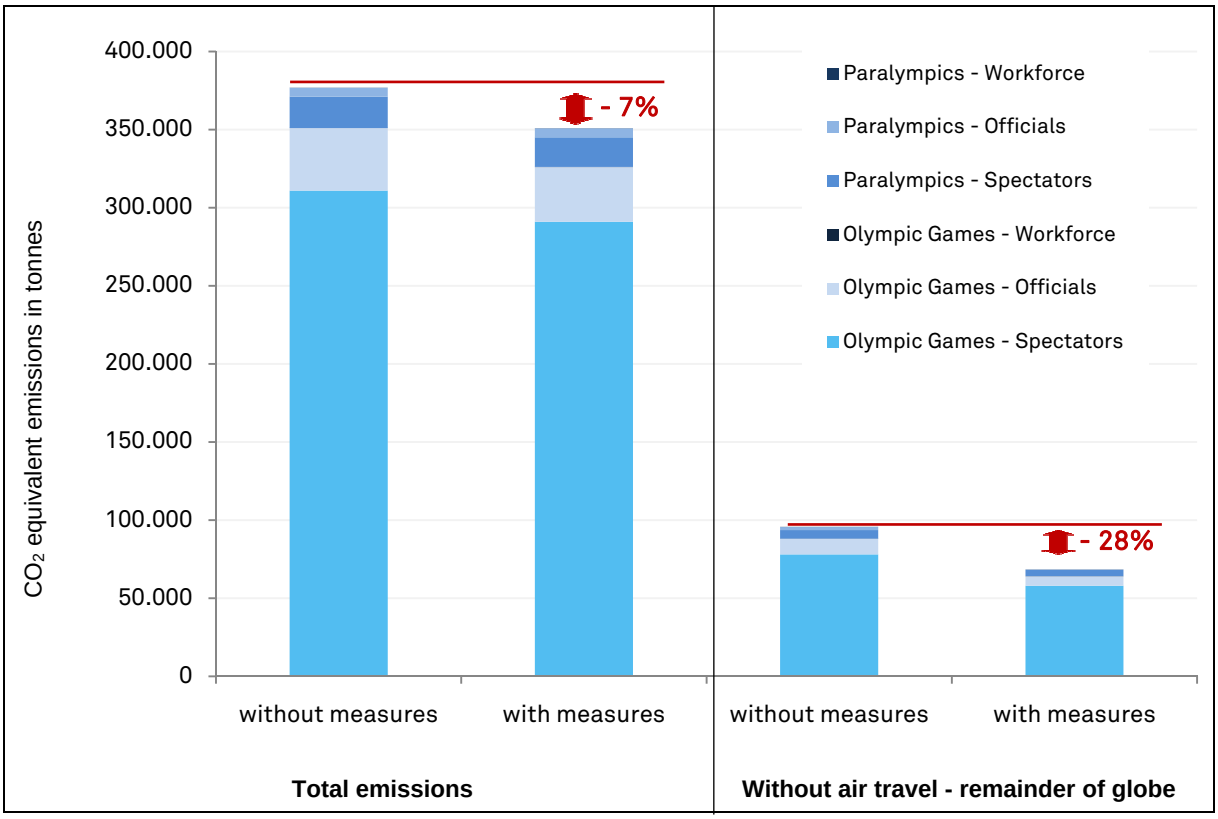


Figure 22: Traffic-related greenhouse gas emissions for Munich 2018 (Olympic and Paralympic Winter Games) before and after implementation of lead project 'Spectator mobility: Right of way for public transit' (Sources: ARGE München 2018 – AS&P/ProProjekt, own calculations by Öko-Institut)

Therefore the lead project addresses the main theme 'Protection of the climate'. It contributes to a strong reduction in European traffic emissions. A key component consists of shifting traffic from airplane and cars to more environmentally-friendly means of transportation such as buses and trains. At the same time, any further reduction in greenhouse gas emissions would reach the limits of what is physically possible, since buses and trains still produce emissions. Therefore any travel by spectators will always be associated with some level of emissions. Another reduction in emissions by 7,000 CO_2 equivalents could be achieved by the use of renewably produced and certified eco-electricity from 100% new facilities (not older than 6 years) for trains. This option has not been considered to date, but will be reviewed during the further course of the implementation process.

Project description

To ensure that at least half of all visitors to Munich 2018 are able to use buses and trains, numerous measures will be required, which must be coordinated:

- Adaptation of public transit infrastructure

  Expansion of train lines between Munich and Garmisch-Partenkirchen and associated shorter travel time, shorter cycle times and lower susceptibility to failure.

- Provision of additional public transport capacities

  Use of special and charter trains for long-distance train services and increased number of trips for local public transport; co-operation with bus tour operators to develop targeted offerings for Munich 2018.

- Development of competitively priced travel offers

  Offer of special Olympic train tickets for Germany and other European countries; development of flat rates for Munich 2018 with environmentally-friendly train and bus tours; development of combination ticket which combines entrance ticket and use of local public transport (ideally including transportation between Munich, Garmisch-Partenkirchen and Schönau am Königssee).

- Information on Europe-wide inbound travel options using public transport

  Information regarding inbound travel options using public transport are already being distributed and prominently displayed; also included is the integration of this aspect in the Munich 2018 web presence.

These measures are flanked by environmentally-oriented parking space management (e.g. no passenger car parking directly at sports venues; preferred spaces for buses directly at sports venues) as well as measures to increase the capacity utilisation of passenger cars (e.g. car pooling centre on the Munich 2018 Internet page). It is assumed that measures that restrict passenger cars will lead to a reduced numbers of passenger cars and increase car occupancy rates from an average of 2.8 persons to 3.0 per car.

In general, the measures that have been suggested as part of the lead project take into account that public transport infrastructure will only be expanded in areas that will require the corresponding capacities following the end of the 2018 Olympic Winter Games in Munich (e.g. expansion of train route between Munich and Garmisch-Partenkirchen). All other areas would merely be expanded on a temporary basis in order to meet increased demand, to avoid any negative subsequent ecological effects. The 2006 FIFA Football World Championships in Germany have also demonstrated the advantage of increasing the capacities of available vehicle inventories by continuing to keep older vehicles, which would have otherwise been decommissioned following the purchase of new vehicles, on the road during the championships. The implementation of this type of measure must also be reviewed as part of Munich 2018.

With the expansion of the train route between Munich and Garmisch-Partenkirchen, the lead project will also create an important green legacy for the region in the long term.

Implementation

The implementation of the aforementioned measures generally presumes close co-operation between the OCOG and train and bus companies and their interest associations (e.g. Verband Deutscher Verkehrsunternehmen, Internationaler Eisenbahnverband UIC). If these companies are not sponsors of Munich 2018, however, they do not have a contract with the OCOG. For this reason, regular steering meetings for the transportation areas must be conducted at the start of planning for Munich 2018, with the involvement of all relevant players from the transportation industry. Meetings such as

these, which were also conducted as part of the 2006 FIFA Football World Championships, yielded very positive results. Experience has also shown that the timely inclusion of bus companies is of the utmost importance. Responsibility for organising the meetings must rest with the OCOG.

At the same time, a portion of the measures outlined above may also be directly planned and implemented by the OCOG. These include measures for parking space management, information on public transport travel options as well as Internet-based offerings (inbound travel information, car pooling centre). The implementation of these measures along with the marketing of environmentally-friendly travel options will require additional funding resources, which must be taken into account as part of overall budget planning.

Environmentally-friendly train and bus travel offerings must be developed so as to ensure that sale prices cover costs. Based on the experience gained from the 2006 Football World Championships in Germany and many other large sporting events, this will be mainly achieved with so-called combination tickets, which include the additional costs for public transport into the total ticket price for all visitors. Possible costs related to the addition of trains in order to increase the number of trips, or costs for special trains and the costs required for expanding the train section between Munich and Garmisch-Partenkirchen, have already been considered as part of the transportation budget. As a result, planned marketing measures (including integration on Internet site) and possible technical implementation (e.g. Internet Car Pooling Centre) would result in additional costs for the non-OCOG budget with respect to the lead project, which are not covered by other budgets.

The planned combination tickets will also result in additional costs. At the 2006 FIFA Football World Championships, the cost for a combination ticket, which was valid for the entire event day (until 3 am of next morning) and the entire transportation network for the host city, was EUR 2.30 per spectator. Based on 2 million spectators for the 2018 Olympic Winter Games (not including Paralympic Winter Games), this would result in additional costs of more than EUR 4.5 million. However, these costs must be considered in the calculation of the prices for combination tickets, so that the non-OCOG budget does not incur any additional costs. Overall, the combination ticket was a very successful instrument at the 2006 World Championships, and would also be introduced at Munich 2018.

LEAD PROJECTS FOR THE PROTECTION OF NATURAL RESOURCES

5.2 LEAD PROJECTS FOR THE PROTECTION OF NATURAL RESOURCES

5.2.1 IMPROVING THE BIOTOPE QUALITY OF ALPINE SPORTS VENUES

Project title:	Improving the biotope quality of Alpine sports venues
Main theme:	Protection of natural resources
Implementation:	Landesbund für Vogelschutz in Bayern (LBV)

Background

Many sports-related areas at the Snow Park in Garmisch-Partenkirchen and Schönau am Königssee are located in areas of intensively used ski runs, ski jumping sites and the bobsled and luge track, so that there will not be a need for extensive new developments for Munich 2018. At the same time, the Winter Games will nevertheless result in interventions in the ecosystem and scenery. Legislation prescribes that significant negative impacts that cannot be avoided or minimised must be compensated for with suitable balancing and substitution measures.

In terms of this Munich 2018 Environment and Sustainability Concept, it is a matter of course that during subsequent planning phases, these statutory requirements will be implemented at an exemplary level with respect to the construction of infrastructure.

This also applies to the consistent implementation of compensation measures for already completed expansion measures, e.g., at the Kandahar downhill ski run or the Gudiberg, since it is precisely these efforts that have created the conditions for an Olympic application that is able to abstain from the further use of, or negative impacts on, ecologically significant areas.

The lead project entitled 'Improving the biotope quality of Alpine sports venues' integrates these responsibilities and thus warrants their implementation. In addition, it exceeds statutory minimum standards by one important step.

The main study area is the 'classic ski area' of Garmisch-Partenkirchen, since this is where most of the intervention into the countryside takes place, and also because this is the area that is most permanently utilised. However, the intention is to record and assess biotopes and species for all Alpine and Nordic competition sites. These insights, along with existing activities, will be used to develop an overall concept for the improvement of habitats in this area, which will be implemented through targeted landscape management measures.

Objectives

The primary focus of this lead project is on ensuring that the biotopes and species which are prevalent in the regions are maintained and safeguarded. However, it will also be able to provide answers to specific issues that are important to subsequent planning for Munich 2018 - e.g., the question of the regeneration and restoration of temporarily used agricultural areas. A cross-regional and cross-species approach will identify suitable compensation and substitution measures and take into account existing biotopes. This project serves as a concrete contribution towards maintaining the Alpine convention and supports the common goals of nature conservation and sports associations. The comprehensive safeguarding and development of natural resources beyond the statutory minimum will

allow for the establishment of a green legacy for the 2018 Winter Games, which not least will also secure the attractiveness of tourism in the region.

Project description

The project consists of the following steps, among others:

- Analysis of current studies and expert opinions on the expansion of ski sport facilities and current biotope and species protective measures (e.g. by the LBV),
- Monitoring and implementation of the success of current compensation measures,
- If required, supplementary mapping and assessment of vegetation, bird types and existing damage to vegetation and surface soils,
- If required, supplementary mapping and assessment of bird types and other affected species,
- Gathering information concerning conflicts of use,
- Monitoring other large sporting events under the aspect of biotope and species protection, particularly the 2011 FIS Alpine Ski World Championships, conclusion of recommended actions for the Olympic and Paralympic Winter Games,
- Formulation of goals and conclusion of measures for the maintenance and development of biotopes, habitats and species,
- Development of suggested solutions for special issues associated with the planning of the Olympic and Paralympic Winter Games, e.g., regeneration and restoration of agricultural land,
- Model-type long-term and binding development plan for the classic ski area to ensure that compensation areas and implementation measures are not destroyed by further development activities or use,
- Technical supervision of planning and building measures in preparation for the 2018 Winter Games.

Implementation

The ecological ski run audit method, which is required and promoted in accordance with FIS, lends itself to the successful implementation of this project; it involves the implementation of a corresponding process for ski areas based on the Eco Audit (EMAS or ISO 14001 ff), in consideration of nature and landscape[22]. Possible players in this process include: OCOG, ski area operators and organisers, Landesbund für Vogelschutz in Bayern, representatives of government offices related to nature conservation (nature conservation authority and LfU), the town of Garmisch-Partenkirchen, sports organisations (Deutscher Skiverband), representatives of the agricultural and forestry industry. Pre-existing documents, maps and monitoring processes must be collected, reviewed and analysed. Information thus gained will form the starting point for any subsequently required information gathering and the promotion of existing compensatory measures and approaches from current mapping results. The majority of the costs for the overall concept will result from the auditing process and accompanying moderation components. In addition, funding must be closely co-ordinated with the

[22] Stiftung pro natura – pro ski (2003): Auditing in Skigebieten – Leitfaden zur ökologischen Aufwertung (Auditing in ski areas - Guideline for ecological improvement). Liechtenstein. 108 pages

'Nature, cultural legacy and education - Working together in the Olympic region' project, so that both projects can benefit from synergy potentials on a cost-based level.

5.2.2 TEMPORARY LAND USE - LANDSCAPE-COMPATIBLE METHODS AND RESOURCE-SAVING BUILDING MATERIALS

Project title:	Temporary land use - Landscape-compatible methods and resource-saving building materials
Project title:	Protection of natural resources
Implementation:	Organising Committee for the Olympic Games (OCOG)

Background

The Munich 2018 sports venue concept aims to make use of as many existing sports venues as possible, and cover any additional requirements via temporary sports venues and temporary infrastructure. According to the current planning standard, this applies particularly to sports venues related to Nordic disciplines at the Schwaiganger stud farm, but also to a large number of functional areas near other competition sites. It is a planning challenge: Temporary facilities must not pose an undue burden on agricultural use or cause permanent damage to valuable green space.

The following temporary facilities will be required: cross-country runs and shooting range, spectator areas and paths, parking spaces and access roads, buildings for the media, organisation, athletes and logistics. The temporary infrastructure expansion for the Schwaiganger Nordic Centre is expected to use an area of approx. 30 hectares, and the use of additional agricultural land at the sports venues in the Garmisch-Partenkirchen Snow Park. Potential negative effects must be reduced by building methods and materials that are recyclable and pose no ecological or health concerns. The regeneration and restoration of temporarily used agricultural land is another challenge. In this case, corresponding restoration and greening measures should be developed in advance.

Objectives

Based on expert supervision and integration of affected farmers, the lead project develops tests and applies processes and materials which meet the following criteria:

- The use of resource-friendly building materials and other materials that pose no ecological or health concerns, and use of renewable raw materials for building materials where possible.
- The use of systems that reduce soil compaction in the case of unsealed subsoil.
- Methods for the rapid restoration and regeneration of surface soils and previous vegetation.

The results of these action fields can then be used as models for other (winter sport) events.

Project description

With respect to the aforementioned three action fields, processes and materials which allow for the best landscape-compatible and resource-friendly construction and operation of temporary facilities will be developed and tested:

The use of resource-friendly building materials and other materials which do not pose ecological or health concerns, and as much use of renewable raw materials for building material as possible: Parts of the 'Temporary land use' project must be viewed in close connection with the 'Green building materials 2018' lead project (see Section 5.1.3). That project highlights the great importance of wood as a building material, and also the fact that the Alpine region has a long successful tradition of timber

construction. In addition to wood, the project also evaluates building materials such as clay, natural stone or geotextiles.

The use of systems to reduce soil compaction for unsealed subsoil: snow, temperature fluctuations and resulting ice formation or thawing soil pose the greatest challenges. In addition to the required combination of methods, which is co-ordinated to the expected stability and condition of the subsoil, there is also the issue of timing the installation of corresponding soil protection systems. The use of geotextiles and wood chips as resource-friendly and cost-effective process technology must be explicitly investigated.

Methods for the rapid restoration and regeneration of surfaces and previous vegetation: the objective is the rapid restoration of previously characteristic site conditions in the area of the utilised areas. Depending on the duration and intensity of loading, measures such as the partial (professional) removal, storage and subsequent re-application of surface soils following the loosening of possibly compacted subsoil may be considered in addition to reducing soil compaction.

Areas may be subsequently re-greened using seed from regional origins. The application of mowing material or threshings after the event is also conceivable. If the material is mowed on nearby surrogate areas, this method meets the highest requirement for local origin and allows for the restoration with regional-typical combinations of species.

Implementation

This project will be co-ordinated by a working group headed up by the German Sport University in Cologne. It will consist of regional players and experts from the areas of sport, technical agencies, science and business, who will accompany both the product development and implementation of Munich 2018 in a practice-oriented and scientific manner. Insights gained as part of the working group will in particular benefit the needs of the Olympic and Paralympic Games and also the Schwaiganger site, but are also designed to be applied in the region after the Games.

For the purpose of securing the optimum restoration of characteristic site conditions at temporarily used areas, investments in soil protection systems (that pose no ecological or health concerns) for cross-country runs, parking spaces and access roads, along with spectator areas and paths, will be required. The calculation must also include costs for re-greening measures following the Games. Expenses for the construction of structures, such as grandstands etc., will not be affected.

5.2.3 RECYCLING ECONOMY 2018

Project title:	Recycling economy 2018
Main theme:	Protection of natural resources
Implementation:	Organising Committee for the Olympic Games (OCOG)

Background

The Olympic and Paralympic Games attract large crowds. Based on current information, approx. 2.2 million spectators are expected at the 2018 Winter Games venues. Added to this figure are the members of the national and international Olympic committees, media representative and numerous coaches and support staff. They all produce waste, therefore an ambitious waste management programme is of the utmost priority.

The Recycling and Waste Act of 1996 governs the handling of waste in Germany. Long-standing experience in this area, which is also recognised abroad, therefore creates a particular obligation as it relates to a German Olympic application. On the international stage, measures designed to reduce the amount of waste at large sporting events have only been included in planning for several years. Frequently this only consists of the formulation of ambitious goals, the attainment of which is not subsequently reviewed.

Objectives

The 2018 Olympic and Paralympic Winter Games are expected to generate waste volumes of approximately 3,000 tonnes. This figure does not include construction waste due to the dismantling, renovation and new construction of sports venues, the Olympic Villages and other infrastructure. The ability to restrict the generation of waste and associated resource consumption to a minimum is the declared objective of the 'Recycling economy 2018' lead project. The first challenge and basis for the lead project consists of combining all areas involved in the Olympic Games (sports venues, accommodations, transport etc.) into an integrated concept. To this end, a hierarchy and priorities sequence for waste that applies to all areas will be defined; it will follow the specifications of the European Waste Framework Directive (see Figure 23).

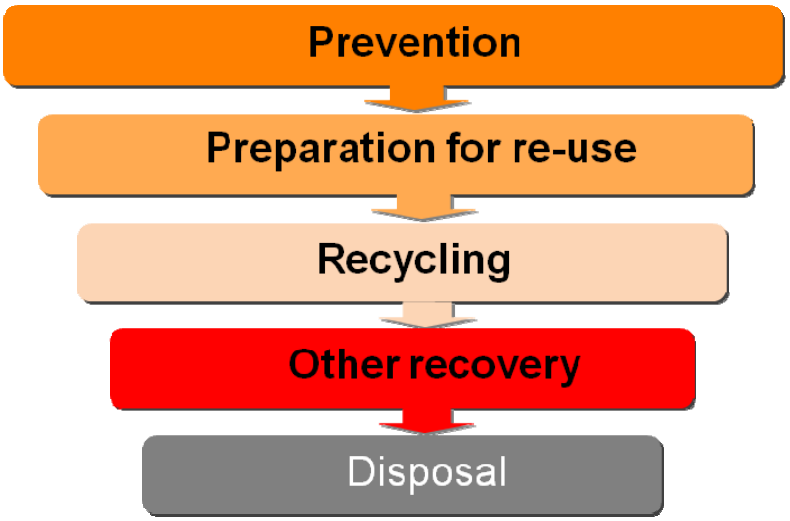


Figure 23: Hierarchy for handling waste according to the European Waste Framework Directive

Project description

The 'Recycling economy 2018' lead project involves a consistent effort to minimise the waste volumes that are generated - in strict adherence to the above hierarchy. This includes measures that will take effect during the 2018 Games as well as measures for building activities which already take place in the years before the 2018 Winter Games. Overall, the presence of visible and successful measures to prevent waste at sports venues has great symbolic value for international guests. The optics of clean rows during and after events is an impressive sign, leaving spectators with the impression that they have done their part to achieve this successful outcome.

Implementation

One requirement is the timely and diligent coordination of a joint waste concept by the responsible agencies of the host cities (Munich, Garmisch-Partenkirchen, Schönau am Königssee) in co-operation with the OCOG. It is also an area where Munich waste management companies can contribute their experience with large events, for example. The following elements are of importance in this regard:

In terms of the prevention of waste, priority will be given to the use of return systems during the Olympic and Paralympic Winter Games. Where possible, the concept of returns should take precedence over one-way systems. This applies particularly to the catering areas associated with the sports venues, the Olympic Village in the Munich Ice Park as well as the Olympic Village in the Snow Park at Garmisch-Partenkirchen. It can be assumed that catering companies will already be using a large amount of washable cutlery and dishes for use in athletes' canteens. Measures must be taken to ensure that the strict use of return systems - also in the area of beverage packaging - is mentioned in the tenders for the relevant contracts. The same applies to locations that provide meals and snack bars at the sport venues. In the event that reusable cups have not been introduced in these areas, work towards the binding use of such systems must be undertaken. Many visitors would consider a reusable cup with 'Olympic lettering' a competitively priced souvenir, which reduces littering at the sports venues. On the other hand, reusable dishes at snack bars are not as practical and relatively cumbersome. The abandonment of one-way packaging should also include participating hotels. In this area, waste can be avoided by replacing one-way packaging (e.g. breakfast buffet) with big bags or portions in reusable packaging.

Figure 24: Fans with reusable cups at the 2006 FIFA World Championships

One important building block of waste prevention is the clear reduction of give-aways, flyers and brochures. This requires early communication with key international sponsors and national supporters. One contribution to prevention, particularly with regard to paper, is the so-called 'think before print' principle. A corresponding notification can be included in the electronic signature of all e-mails with are sent out as part of the application process.

In preparation for re-use, planning for sports venues may also place great emphasis on the use of temporary, i.e. rentable and re-usable building components and modules, such as the plans to accommodate 1,500 media representatives in rented mobile homes at the Messe Media Village.

The extensive recycling routes which already exist in the region will be used for the recycling and recovery of separately collected waste fractions. An important contribution to the minimisation of waste consists of the selective dismantling of old infrastructure and buildings as part of new construction measures for Munich 2018, i.e. the diligent separation of the reusable material fractions wood, metals, concrete, glass, plastics, as a prerequisite for subsequent high-quality recycling. In addition, it is recommended that suitable building components from the dismantling process are added to building component lists, which are offered as part of a building component exchange. It is recommended that scientists at universities provide technical assistance with larger dismantling measures. The inclusion of universities may also result in detailed material balance sheets, which are highly relevant for the subsequent documentation of the implemented Munich 2018 Environment and Sustainability Concept.

During the Games, waste will be consistently separated and collected in the backstage area. Previous experience has also shown that the separate collection of various waste and valuable fractions is virtually impossible to achieve in the spectator area - therefore measures designed to prevent the occurrence of waste in this area become all the more important

With respect to waste that must be disposed of despite the aforementioned measures, Munich has access to a waste incineration facility (in association with Heizkraftwerk Nord) which is at a very high environmental standard, and which produces both electricity as well as district heat. This type of combined heat and power generation has a high efficiency factor of more than 63%[23]. Any district heat produced in this manner could also benefit hot water systems in the Olympic Village and the Ice Park Media Village which will subsequently used as residential locations.

Many of the measures outlined above do not require large investments, but instead depend on good detailed planning and coordination between participating players. Nevertheless, EUR 0.8 to 1.2 million has been allocated as part of the non-OCOG budget for securing the 'Recycling economy 2018' environmental lead project.

[23] Munich 2018 waste management operations

5.2.4 HEALTHY NUTRITION 2018

Project title:	Healthy nutrition 2018
Main theme:	Protection of natural resources
Implementation:	Organising Committee for the Olympic Games (OCOG)

Background

Healthy and balanced nutrition forms the basis and an integral part of peak performance in sports. While top athletes have known this for a long time, the concept is also gaining in importance with a large portion of the population. Even if the term 'healthy nutrition' is interpreted in different ways, everyone would nevertheless agree that fresh food, lots of fruits and vegetables along with a variety of foods are important components.

Objectives

The application for hosting the 2018 Olympic and Paralympic Winter Games in Munich takes peoples' need for healthy nutrition seriously and therefore aims to provide both athletes and spectators with regional and organically grown food products during the Games: for athletes, at the canteen of the Olympic Villages in the Munich Ice Park and the Snow Park in Garmisch-Partenkirchen, as well as catering offerings in and around the sports venues for spectators. The objective of the 'Healthy nutrition 2018' environmental lead project is to procure 100% of basic food products from regional origin. Of these, at least 50% would be produced according to organic cultivation methods.

The simultaneous focus on regional and organically grown food products combines the aspect of promoting individual health with a consideration for the maintenance of natural resources in the entire region. In this way, the two main themes 'Protection of natural resources' and 'Sustainable sport and regional development' can be addressed equally.

Project description

Regional food products consist of goods and products that ideally come from the European metro region of Munich (EMM) or its direct environs.

Map 9: European metro region Munich (EMM) (modified according to Europäische Metropolregion München e.V. 2009)

In the event some food products are not available from this region, they should ideally be obtained from other regions in Bavaria, whereby the shortest route principle must be observed.

The use of regional products is supported by the following arguments:

- Short routes between production, processing and consumers keep the CO_2 footprints associated with the goods as well as transport-related environmental and health burdens on the region and its population to a minimum.
- The use of regional products results in closed regional value chains, achieves fair prices for producers and thus makes a significant contribution to strengthening the regional economy.
- A sustainable and regional supply sets positive accents for the region in front of an audience of millions and results in an improved image for the entire Munich metro region and all of Bavaria.

Despite the fact that the availability of fresh food products is generally limited during the Winter Games, a maximum level of freshness and hence high contents of nutrients and vitamins can nevertheless be assumed for some regional vegetable varieties such as salad and cabbage. The Munich region is equipped to act as a regional supplier of food for the Olympic and Paralympic Games. For example, agriculture, retailers and consumers have come together in the UNSER LAND network. An initial discussion with the coordinating umbrella association has shown that the availability of 100% of basic foodstuff for the Olympic Winter Games can be warranted.

Organic products consist of food and food products (made of the former), which are produced and manufactured according to specific requirements. The terms 'bio' (organic) or 'öko' (eco) are legally

protected by the EC Eco Regulation. In addition, the aim is to make reference to the labels 'Geprüfte Qualität – Bayern' (Tested quality - Bavaria) as well as 'Qualitäts- und Herkunftssicherungsprogramm: Öko-Qualität garantiert' (Quality and origin programme: Eco quality guaranteed) and 'Öko-Qualität garantiert Bayern (ÖQB)' (Eco quality guaranteed Bavaria), in order to strengthen the location for food production and processing and highlight it for marketing purposes.[24]

Organic products have a number of positive effects on people and nature, as the abandonment of pesticides and synthetic fertilizers. This provides active protection for soil and groundwater. The consistent refusal to use genetically modified organisms (GMO) promotes the maintenance of species diversity and respects the wishes of a majority of the population.

The Munich region also has a long tradition and much know-how with regard to organic agriculture. The headquarters of one of Germany's largest organic agriculture associations - Naturland –Verband für ökologischen Landbau e.V. - is located in this region. As a result of an initial discussion with the association, it has been estimated that at least 50% of food supplies for the Winter Games could consist of organic food.

Not all required food is cultivated and produced in the region. The intent is to procure all coffee, tea, chocolate, exotic fruits etc. as fair traded products, thus supporting producers in developing countries and improving their living conditions. Compliance with this requirement is warranted by the 'Fairtrade' seal of the non-profit TransFair association. This aspect also addresses the economic and social dimension of sustainability, and therefore forms a central building block for sustainable Games.

The fair procurement of food also lends itself to processes that include the various communities. For example, a process of working towards having Munich, Garmisch-Partenkirchen and Schönau am Königssee accepted as 'Fairtrade Towns' [25] could be started in these communities. Fairtrade Towns is a voluntary association of cities and communities with the objective of anchoring fair trade products as part of the municipal procurement structure.

Implementation

A successful implementation of this lead project presumes the early integration of all participating players, as co-operation between sports venue operators and catering companies is generally governed by long-term agreements. The use of regional, ecological and fair trade products should be clearly set out when these agreements are extended or prepared.

As experience has shown, companies from the food industry are also found among the official sponsors for the Olympic Winter Games. Since these companies, in their role as main sponsors, generally conclude agreements directly with the IOC, it will be more difficult to influence these agreements. Even so, international companies in this industry are also cognizant of the increased interest on the part of consumers in regionally produced and healthy food, and they are responding with the corresponding offerings. This also opens up the possibility of voluntary co-operation.

Another aim is the initiation of a chef's competition early in advance of the Winter Games, with the aim of further developing the well-known Bavarian specialty cuisine including gastronomic culture for today's living and working environment (time factor!), in a manner that is appropriate to both the

[24] See also http://www.stmelf.bayern.de/markt/qualitaet_herkunftssicherung

[25] See: www.fairtrade-towns.de

environment and the climate. Excellent award-winning examples would be visibly positioned as part of the Environment and Sustainability Concept, and would receive appropriate consideration in the hotel kitchens' catering products for guests of Munich 2018, for example. The idea is to start the chef's competition during the application phase and subsequently turn it into an established event (e.g. annual event to be held alternately at the different host sites for Munich 2018). Special cookbooks or training (e.g. Adult Education Centres) present other options of bringing the objectives and ideas of the 'Healthy nutrition 2018' lead project to a broader public.

Potential additional costs for sustainable nutrition with respect to the OCOG budget are difficult to estimate. Organically grown food can now be found in supermarkets and discount stores, which has lowered the price level for these products. At the same time, it is difficult to forecast the subsequent development of general food prices. The same applies to the international flow of goods, hence to fair-trade products as compared to conventional goods. However, it can be expected that additional costs for regional, ecological and fair-trade products will be limited. At the same time, the OCOG contains an item of EUR 1 to 3 million to secure funding for this project.

5.2.5 FAIR PROCUREMENT AND MERCHANDISING 2018

Project title:	Fair procurement and merchandising 2018
Main theme:	Protection of natural resources
Implementation:	Organising Committee for the Olympic Games (OCOG)

Background

Bewerbungsgesellschaft München 2018 GmbH stands for the motto of 'fair games', and is convinced that the concept of fair play should not only be limited to the sports aspect. This lead project also intends to transport fair play into areas that are not always directly visible to athletes and spectators: social fairness refers to the working conditions of employees who are involved in the manufacture of fan articles. Ecological fairness refers to the environmental friendliness of materials used for production purposes.

Objectives

All fan and merchandising products that are especially produced for Munich 2018 and feature the Olympic logo will be produced in compliance with humane working conditions, and with a high proportion of recycled materials (lead projects 'Fair procurement and merchandising 2018'). The aim of this lead project is to support the development of an awareness for social and environmental aspects during the production of consumer goods in general and fan articles in particular, both on the producer as well as the consumer side. By adding this project into the overall Environment and Sustainability Concept for the 2018 Olympic Winter Games, the application company makes an important contribution to the anchoring of basic principles of social responsibility (Corporate Social Responsibility, CSR). Against the background of the main theme for the Olympic movement, which centres on the unifying effect of the movement for all countries in the world, this aspect forms an important building block in the entire application concept for Munich 2018.

Project description

Social fairness: Questionable working conditions at supplier firms for the sporting goods industry continue to make headlines which highlight the degrading conditions of workers, such as forced overtime, low wages and precarious job security[26]. With respect to the procurement of fan articles and merchandising products, the lead project aims to address this problem by requiring all supplier firms involved in the production process to comply with the internationally recognised core working standards of the International Labor Organisation (ILO). These include the freedom of association, the removal of forced and child labour, as well as a prohibition on discrimination in the workplace.

Ecological fairness: The production and processing of fan articles and merchandising products must utilise as much organically cultivated or recycled material as possible. These include in particular organically grown cotton and textile fibres from recycled synthetic materials.

Similar to the positive environmental effects related to the use of organic foods, the cultivation of organic cotton also results in a series of sustained environmental effects. For example, organic agriculture prohibits the use of toxic and persistent chemical-synthetic pesticides and fertilisers, as well

[26] see Maquila Solidarity Network 2008

as the use of genetically modified organisms. In this way, the lead project supports ecological cultivation methods for cotton as well as the related protection of soils, groundwater and field workers.

In the area of synthetic textile fibres, there also exists an opportunity to reduce the negative environmental impacts caused by production processes. These efforts centre on the use of recycled starting materials. A suitable material in this regard is polyethylene terephthalate (PET). PET is a commonly used plastic in the packaging industry, and is used for the production of beverage bottles, for example. Once the life cycle of the packaging ends, the material can be melted and reprocessed into granulate. This process does not achieve the same level of purity, which is why this product can no longer be used in the food industry. Instead, the recycled material can be used in the production of synthetic fabrics. In addition to the prevention of waste, the recycling of this material also offers an ecological benefit, namely that the production of granulate from recycled PET only uses about half of the energy required for primary granulate.

The use of ecological materials is mainly intended for the clothing goods area. Based on experience, these items tend to be the most popular and sought after fan items. Added to these is the Olympic Mascot made of ecological materials. Such a 'green' mascot has great symbolic character, since it can communicate the entire sustainability aspect of the Munich 2018 Olympic application.

Implementation

The successful implementation of this lead project requires the participation of national and international Olympic committees as the licence holders of the Olympic emblem, in addition to the inclusion of manufacturers and their suppliers[27]. Compliance with a Code of Conduct, which contains the above ILO core working condition standards, must already be included during the tender phase. In addition, the project will strive to ensure that the contracted companies provide binding assurance of their participation in a multi-stakeholder initiative. The purpose of this initiative is to provide a meeting place for representatives of various interest groups in order to review and secure compliance with the agreements and standards.

Fairtrade products and products made of ecologically beneficial materials must not necessarily be more expensive than conventional products - this applies particularly to high volume items or the special image associated with an order. Therefore it is difficult to estimate potential additional costs at this time. To secure implementation of this project, the OCOG budget has set aside EUR 0.4 to 0.6 million for the 'Fair procurement and merchandising 2018' lead project. However, it is also intended that additional sponsors will be obtained to assist in the funding of this lead project.

[27] OlympSchG 2004: Law for the Protection of the Olympic Emblem and the Olympic Name dated 31 March 2004 (Federal Gazette I p. 479)

LEAD PROJECTS FOR SUSTAINABLE SPORT AND REGIONAL DEVELOPMENT

5.3 LEAD PROJECTS FOR SUSTAINABLE SPORT AND REGIONAL DEVELOPMENT

5.3.1 NATURE, CULTURAL LEGACY AND EDUCATION - WORKING TOGETHER IN THE OLYMPIC REGION

Project title:	Nature, cultural legacy and education - Working together in the Olympic region
Main theme:	Sustainable sport and regional development
Implementation:	Garmisch-Partenkirchen Administrative District

Preliminary remark: Acceptance at the local/regional level (administrative districts, municipalities, population) is a prerequisite for the implementation and success of this project. The integration of the local community into the development, further development and specification of goals and measures must be a top priority.

Background

The Garmisch-Partenkirchen administrative district is characterised by a great diversity of habitats and species. Natural processes and centuries of management have resulted in an ecologically important cultural landscape that determines the quality of life of the people who live there. Agricultural values were also responsible for the development of this region into one of Germany's most important tourism areas and an international centre for winter sports based on the infrastructure that has been established. The biological functionality of this region is expected to decline as a result of climate change, the presence of contaminants, the fragmentation of land through settlements and transportation infrastructure as well as changes in land use due to economic and political pressures – a decline that is associated with noticeable economic and wealth losses. To counteract these developments, it is necessary for measures to be developed by all those involved as part of an integrated approach, and to be implemented as part of a long-term programme. This lead project therefore picks up on an important social task in this region, one which may also serve as a model for other mountain regions due to its general importance. In a second step, the scope of this project may also be expanded to include other administrative districts and regions based on the wishes of the population and municipalities.

Objectives

The project will strengthen the ecological and cultural value of the region even as it secures the sustainable use of an historically developed cultural landscape. This creates a need to remove the tension between nature conservation and experiencing nature on the one hand, and the requirements of sports, tourism, transportation and sustainable land use on the other hand, while creating harmony with respect to this issue in a manner that is compatible with both nature and society. In addition to securing sustainable land management, the linking of already protected areas is also an important goal. This project presents real added ecological value if it is able, for the purpose of maintaining and promoting biodiversity, to establish a land network system that allows for a diverse exchange of animals and plants. To reach this goal, studies will be conducted to assess the potential for trans-sectoral improvements to current conditions. These studies and measures apply to landscape units which are linked in terms of ecological, economic, social and aesthetic sustainability aspects.

A functioning agriculture and forestry industry and its related traditions play a key role in this integrated approach. They form the basis for financial wealth and the aesthetic attractiveness of the region, hence playing a key role in supporting biodiversity objectives. Therefore this lead project is concerned with securing these functions on a voluntary basis, strengthening them and providing them with sufficient force far beyond the time of the Olympic Games. Sport and tourism depend on a sound and attractive natural and agricultural environment, but also require large areas to be utilised for that purpose. Through the use of selected sports and recreational facilities, studies will be undertaken to determine how free areas must be designed so as to underline their importance for the ecosystem and biodiversity. The results will be transferred to other sports venues.

The implementation of educational measures on sustainable development informs citizens, members of sports clubs and political decision-makers of the value of nature and landscapes; it emphasises their ecological interaction in a local and global context, thus strengthening the sensitivity of all affected parties with regard to the need for sustainable action.

With this integrated approach, the lead project contributes to the maintenance of biologic diversity and thus achieves real ecological added value in the Olympic region. To address the long-term and sustainable approach of this lead project, subsequent activities will also review whether the project could be permanently secured by establishing a foundation organised at the administrative district level.

Project description

The project focuses on three thematic blocks, which are closely linked: 'Securing through adaptation', 'Protecting by using' and 'Maintaining through education':

- **Securing through adaptation**
  - *Recording, assessing and linking of biotopes to secure biodiversity*

  Since the full value of ecologically important locations can only unfold when these areas are linked, as opposed to standing alone, efforts will be undertaken to establish 'stepping stones' between existing protected areas. This sub-project will define the functional suitability of the landscape as part of an integrated approach, using national and international protection requirements which are available from a wealth of data. The sub-project will then build on this definition to derive measures for linking pre-existing protected areas in different categories (e.g., nature conservation areas, landscape protection areas, FFH areas, natural heritage sites, etc.), hence maintaining and promoting natural ecological diversity, and implement these measures in close co-operation with the voluntary involvement of the affected parties, as well as in consideration of other societal requirements (e.g., prevention of Alpine natural hazards). Nature conservation approaches are oriented towards the risks and potentials of the existing biotopes. They consist mainly of moors, mountain meadows at different elevations, as well as forest and river plains. Noticeable knowledge gaps will be closed regarding assessments from an ecological disruption point of view or in the case of missing geographic knowledge regarding biotope distribution and its linkages, with this knowledge being specifically used to optimise the management of the protected area. These assessments do not require new and legally protected regions, but rather highlight important regions from an ecological disruption point of view, and measures which can be undertaken to strengthen the importance of these regions or create better linkages between them. Possible

measures to meet these objectives are varied, and may consist of individual free-standing trees, edging at flowing waters or paths, as well as the removal of barriers for fish in rivers.

- *Forest management and climate change*

Forest management is an important component of efforts to maintain healthy environments for generations to come. In addition to providing an environmentally-friendly and renewable resource − namely wood − forests also play an important societal role. A first step involves the analysis of existing data and information, which will be updated or supplemented as needed. It is from this analysis that the sustainable use potential and measures to improve protective functions and nature conservation concerns will be derived. The focus of this project will be on the implementation of derived measures. Together with the active participants of this area (public and private), adaptation measures for climate change, which clearly present a significant contribution to the sustainable development of the region, will be defined and implemented.

The Garmisch-Partenkirchen region features test areas that have been operated upon for more than a century; they cover the most important tree types, are located along an altitude gradient and are therefore ideally suited to quantify the effects of climate change on forest ecosystems and prepare scenarios for the further development of forest ecosystems over several decades together with climate calculations. In this region, the Bayerische Forstverwaltung and research institutions are already actively involved in assessing the suitability of tree types for mountain forests under the aspect of climate protection. Additional studies are designed to supplement existing activities if required. In this regard, mountain forests, which also perform a protective function with regard to mudslides, rock slides or avalanches in addition to providing wood products, play a special role. Building on the scenarios for forest development, analyses of the forest structure will be conducted in order to derive indicators of stability and diversity and identify suitable measures for long-term improvements to protective functions. Under the aspect of climate change, the suitability of tree types which are not currently found in mountain forests, and which are less vulnerable to drought stress during the vegetation period and are adapted to higher temperatures, would also be tested on an experimental level. Privately-owned forest areas would be included on a voluntary basis in the considerations and implementations and as part of a close working relationship.

- **Protecting by using**

  - *'Alpine farming' nature conservation plan*

The cultivation activities of humans have characterised the mountain nature of the Werdenfelser Land for many centuries. To this day, original forms of farming have been maintained, which are in harmony with nature. In the Bavarian Alps, this type of landscape is unique − where else can one find such a wealth of healthy mountain meadows, natural pastures upon which regional farm animals are contentedly grazing, along with butterfly-covered meadows, and all this in the smallest of spaces?

However, this cultural landscape is also threatened by the loss of farming activities. Traditional forms of farming no longer seem relevant in a globalised world. Here, the objective is to maintain this natural legacy. The farming of the small-parcel cultural landscape in the Werdenfelser Land in view of Bavaria's highest mountain tops has characterised its population for centuries − and continues to do so. Many committed mountain farmers wish to continue what the hard work of their ancestors has achieved in order to secure the survival of future generations. The labour-intensive mowing of 'hummocky meadows' (Buckelwiese) is as much a part of the culture and tradition of this region as the fall cultivation of bedding meadows in the Murnauer Moos. This is how mountain

farming characterises regional identity and culture. It represents a unique positioning feature with enormous value in a globalised world.

Funds are to be used to cover measures for which funding is not currently available.

- Flexible use of funds for landscape management measures
- Promotion of regional marketing
- Promotion of joint initiatives by mountain farmers
- Support for the breeding of regional farm animals threatened by extinction (brown mountain sheep, Murnau-Werdenfelser cattle). Another initiative, aimed at strengthening biodiversity, includes the development of a closed breeding area for the Murnau-Werdenfelser cattle with regional marketing.
- Start-up financing, e.g., for the purchase of special machines (small operations do not have access to government investment assistance)
- Options are to be developed for cuttings that are generated by maintenance clearing or the maintenance of ski runs, but are frequently no longer used for agriculture, ranging from thermal recovery to certified wellness hay.

- *Ecology and sustainability at sports venues*

Selected sports clubs of the Bavarian State Sports Association and operators of ski runs will receive support with efforts to improve outside facilities for sports venues in consideration of ecological and sustainability aspects, and also receive assistance with the implementation of the suitable measures. Measures would be considered innovative if they contributed to improving biotopes in the area of ski runs and other sports types with infrastructure requirements that require extensive space and which improve habitats for plants and animals affected by ski operations.

- *Harmony between nature conservation, sport, tourism and land use*

An interdisciplinary project will be conducted in the 'Wank' mountain region with the help of a team consisting of experts, practitioners and affected owners and users from the areas of areal development, ecology, agricultural and forestry as well as sports, reconciling nature conservation, tourism, sport and land use in practice. Due to its location, topography, landscape, biodiversity and use for tourism, the Wank is particularly suited for this purpose. In line with a specific concept, measures for the medium-term sustainable use of the 'Wank' based on tourism, sport, agriculture and forestry will be derived and implemented in close co-operation and co-ordination with land users.

- **Maintaining through education**

This thematic block focuses on education for sustainable development, which represents a linking element within the project and hence plays a central role. To this end, a number of diverse and action-oriented education measures will be carried out; they are designed to promote public awareness of the maintenance of biological diversity and to expand the development of culture and landscape development in the region. The intention is to set up an educational centre for sustainable development which offers continuing education and professional development courses, among others, for the areas of child and youth education, adult education, as well as university and

career-related education in the entire administrative district. Existing competencies in Bavaria will be drawn upon to implement this educational programme.

Implementation

To achieve the highest possible acceptance of this project in the region, from early on in the conceptualisation phase the population, users (farmers), nature conservation associations, political decision-makers and players in environmental education will be included, and will also be involved in the development and implementation of measures. Important multipliers include the Rural District Office as well as the municipalities, environmental associations (incl. LBV, DAV, BN), the Bavarian state forests and other property owners, agricultural and forestry agencies, agriculture and pasture associations, tourism associations and heritage societies. The study will be scientifically accompanied by institutes of selected universities and research institutions.

Coordination activities will be carried out by the Garmisch-Partenkirchen administrative district, which is supported by a steering committee and consists of representatives of all stakeholders. The principle of voluntariness is of the highest priority with regard to the required implementation measures.

Financial requirements will be based on the type and scope of measures planned as part of the project. The measures have not been finalised to date, so that quantitative information is not available at this time. Based on similar projects, the financing volumes are estimated at EUR 4-7 million. Other considerations include a review of whether the project may be secured for the long term through a newly established foundation. The intention is to acquire additional funding through European subsidy programmes.

5.3.2 SUSTAINABLE GARMISCH-PARTENKIRCHEN

Project title:	Sustainable Garmisch-Partenkirchen
Main theme:	Sustainable sport and regional development
Implementation:	Market Town of Garmisch-Partenkirchen

Background

Climate change, demographic developments, scarce resources and rising energy prices pose great challenges to communities which depend on tourism. To address these challenges and secure the future of this region, extensive sustainable measures related to climate protection and adaptation to the consequences of climate, demographic and energetic change are required, which must take into account the subsequent balance between economy, ecology and social aspects.

As the site for the 2018 Winter Games, Garmisch-Partenkirchen is particularly affected by these problems due to its orographic location at the northern edge of the Alps, its population structure and high dependence on tourism and large sporting events. This calls for a long-term strategy for the sustainable development of the community, on the basis of which concrete measures are defined and implemented in line with an integrated approach. The development of such an approach must also take into account the social, ecological and economic effects of the 2018 Winter Games, and include all decision-makers as well as citizens into the process.

Usually, sustainability criteria solely refer to the implementation of the Games - while the development of the host site is not really taken into account. This lead project is designed to ensure not only that the Olympic and Paralympic Winter Games are implemented in a sustainable manner, but that sustainable development can also be assured for the host site itself. This objective is a sole positioning feature, which can be used as an orientation for future application processes.

In this overall examination, the lead project not only makes an important contribution to the implementation of sustainable Munich 2018 Winter Games, but also carries out an important social task, which goes far beyond the time frame of the 2018 Winter Games and hence presents an excellent example of practiced sustainability.

Objectives

This lead project will be used to secure the ecological, economic and social sustainability of Garmisch-Partenkirchen in the 21st century on the basis of a programme that is designed to extend beyond 2018. To this end, a systematic 'local sustainability strategy' for Garmisch-Partenkirchen will be developed as part of a first step, which considers all sustainability aspects. Building on this step, practice-relevant projects to secure sustainable development will be developed and implemented as part of a long-term programme until 2050. This project will not only involve technical solutions, but also holistic integrated approaches to improve the population's quality of life and strengthen the economic potential. Consideration will also be given to the use of innovative financing instruments.

In addition, adaptation measures used to minimise the risks directly associated with climate change and its effects, or which may be incurred as a result of the 2018 Olympic and Paralympic Winter Games in Munich, will also be defined and implemented. Because of the long time period between planning and implementation of adaptation measures, these activities must be considered from the beginning, and incorporated into the integrated total concept due to the diverse interaction between the prevention and adaptation strategies.

This approach will be used to break through the current practice of individual or insular solutions and will prepare system solutions for sustainability, which views the community as a whole and takes into account its linkages with the environment. While such a system approach does not exist at this time, it is nevertheless urgently required in order to derive and implement future-oriented measures to achieve political objectives in the area of sustainable development at the global and national level. This integrated, holistic and future-oriented approach is also groundbreaking for other small and medium-sized communities in Bavaria and Germany, and can also be transferred to other countries with the corresponding modifications.

Sustainability requires scientific and technological competence. This bundling of expertise is to be developed as part of this project in Garmisch-Partenkirchen through linkages with universities, colleges and companies and will be used for the transfer of know-how in interested communities or countries. Overall, the aim of this lead project is to fulfil the criteria necessary for Garmisch-Partenkirchen to be recognised for or honoured as a 'City of the World Decade for Sustainable Education' (UNESCO), as well as to meet the quality criteria for sustainable citizens' communities, the OECD standard for sustainability strategies and the criteria of the 2004 Aalborg Charta.

Project description

The project begins with the development of a 'local sustainability strategy', on the basis of which concrete measures will be defined and implemented as part of a long-term programme. The sustainability strategy will comprise the areas of social matters and demography, economy and tourism, health, environment and nature conservation and mobility, as well as climate change and energy, and will consider the close linkages between Garmisch-Partenkirchen and nearby communities on this and the other side of the border to Austria. Preparatory work in this regard has already been commenced. The time horizon is the year 2050, i.e., the aim is to let the lead project fully develop its effects far beyond the 2018 Winter Games.

To achieve the best possible acceptance of the project in the community and the region, thematic focus areas will be established to allow citizens, local technical and nature conservation associations, political decision-makers, and representatives of the responsible technical departments to get involved. The number and thematic orientation of these areas will be continuously scrutinised during the course of this project, and adjusted according to the progress made. Thematic focus areas include, among others:

- Climate protection, building and urban planning, in which concepts to achieve CO_2 neutrality (reduce emission by 80% by 2050) through energy efficiency and CO_2-free energy resources are developed
- Mobility and transportation, in which integrated mobility and transportation concepts using electro-mobility and bio fuels are developed and secured
- Sustainable management and tourism, in which measures to strengthen sustainable tourism (summer and winter) for the purpose of adapting to global change and the settlement of emission-free companies are developed
- Health, demography and social aspects, in which health of body, psyche and environment are strengthened and Garmisch-Partenkirchen responds to demographic change
- Nature conservation and landscape protection, which focuses on the maintenance of an intact natural environment with its existing biodiversity based on sustainable land management

- Education for sustainable development, in which players in (environmental) education are linked, and projects that motivate citizens to think and act with sustainability in mind are developed
- Communal climate adaptation, in which an adaptation plan for future extreme weather conditions and adaptation strategies for flooding and nature conservation as well as agriculture and forestry are developed
- Innovative financing instruments, which are used to support the implementation of defined measures

Implementation

The Municipal Council for the Market Town of Garmisch-Partenkirchen has already unanimously approved a decision on the sustainable development of this community. At this time, a local sustainability strategy is being developed for Garmisch-Partenkirchen with the financial support of the Free State of Bavaria; this strategy builds on strategies that already exist in Bavaria, such as the Bavarian Climate Adaptation Strategy and the Bavarian Sustainability Strategy which is currently being developed, and which serves as the basis for the subsequent development of the lead project. The project will be coordinated by a steering group which consists of members of the Municipal Council and administration as well as the managers for the focus areas.

Required measures are developed in the form of workshops and citizen forums, and presented on a continuous basis on an interactive Internet platform. Results will be summarised in a synthesis paper and finally submitted for approval to the steering group of the Municipal Council. A communal sustainability management system will be assembled for implementation purposes.

The implementation of this lead project will involve the Market Town of Garmisch-Partenkirchen and the respective business offices in charge, as well as universities, colleges, research institutions and professional associations and companies. This will ensure the trans-disciplinary implementation of this lead project. Participating companies will have an opportunity to test, improve and present to the public new innovative products and systems in the form of an 'open field trial'.

The lead project is cross-sectionally oriented and therefore has close relationships and overlaps with other lead projects within the Munich 2018 Environment and Sustainability concept. To prevent duplication, activities in the area of nature conservation and landscape protection which are required for the sustainable development of Garmisch-Partenkirchen will be implemented as part of the lead project 'Nature, cultural legacy and education'. The same applies to the focus area 'Education for sustainable development', which is closely linked with the lead projects 'Centre for Sustainability' and 'Nature, cultural legacy and education'. The purpose of the 'Centre for Sustainability' is to further develop strategies for problem solving and sustainability, promote education for sustainable development and secure the transfer of sustainability knowledge into other regions in Bavaria and worldwide.

Upon approval of the 'Garmisch-Partenkirchen as a model community for electro-mobility (GAP Emobil 2018)' project, the aspects contained in the 'Mobility and transportation' focus area for Garmisch-Partenkirchen will be implemented as part of GAP Emobil 2018. The exchange of information between the lead projects will be secured through the establishment of joint working groups.

5.3.3 BERGTOUR 2018 – SUSTAINABLE MOUNTAIN SPORT AND TOURISM DEVELOPMENT IN THE OLYMPIC REGION

Project title:	BergTour 2018 - Sustainable mountain sport and tourism development in the Olympic region
Main theme:	Sustainable sport and regional development
Implementation	Deutscher Alpenverein (DAV)

Background

Mountain sports are a part of tourism, which represents an important basis for the economy and livelihoods in the Bavarian Alpine Region. The Deutsche Alpenverein e.V. (DAV) is committed to ensuring that the 2018 Olympic and Paralympic Winter Games are prepared and held in a manner that is as compatible with nature and landscapes as possible. In addition, it plans to initiate and implement projects which generate real added value to nature conservation and environment protection in the Bavarian Alpine region.

Objectives

The objective of the BergTour 2018 project is to further develop mountain sports and tourism in the Bavarian Alp region at a qualitative level according to the three criteria of sustainability, namely 'Ecology, Economy and Social'. In this vein, the project includes numerous recreational activities - from hiking and gliding to ski mountain climbing and snowshoeing. Its objective is to secure extensive options related to these sports types, which are associated with a high degree of recreational and health value, for future generations and warrant the compatibility of all forms of mountain sports and their interactions with nature and society through the targeted use of planning instruments. Linkages between habitats must not be put at risk; rather, they must be improved through targeted educational and/or steering measures, thus securing the biological diversity in the project region for the long term. Another objective is to maintain the unique cultural and natural landscape of the project region as a valuable tourism-related capital for future generations.

The Deutsche Alpenverein recommends two regions in the Bavarian Alps as project areas: the administrative districts Garmisch-Partenkirchen and Berchtesgadener Land. With respect to the Berchtesgadener Land administrative district, there is ample data regarding the natural inventories found in the Berchtesgaden National Park and the Berchtesgaden biosphere reserve. Similar data for the Garmisch-Partenkirchen administrative district will be supplied by the lead project 'Nature, cultural legacy and education - Working Together in the Olympic Region', which is closely linked to the 'BergTour 2018' project.

The Deutsche Alpenverein views the above project areas as model regions. If successful, the project will gather information on the entire Bavarian Alpine region over the medium and long term.

The project regions are attractive recreational areas which are close to southern Germany's urban centres; they are well suited for virtually all forms of mountain sports and a destination for tourists from Germany, Europe and all around the world. At the same time, the project regions also represent valuable cultural and natural landscapes, which fulfil important ecological balancing and protective functions.

Tourists and sports enthusiasts put great pressure on these regions. To minimise conflicts, several innovative concepts for directing visitors have already been developed and successfully implemented

in many places. At the same time, there still remains a need for future action with regard to the increased use and diversity of new mountain sports activities. Climate change will pose great challenges for the project regions in the future. Funding requirements for the maintenance of the cultural landscape and the maintenance and improvement of transportation routes and tourism infrastructure will grow significantly.

Project description

The task of this project is to develop and implement measures for sustainable mountain sport and tourism development in the Bavarian Alps. The winter and summer sports examples listed below highlight a broad spectrum of potential activities and measures.

Measures for the summer (six months)

- Mountain hiking/Hiking paths

Mountain hiking currently enjoys a great deal of popularity. Interest in this sport is growing among young people, and it is expected that mountain hiking will continue to gain in popularity in the future. As ideal mountain hiking regions that offer many options ranging from enjoyable valley hikes to demanding mountain hikes in a great mountain landscape, the project regions have great tourism potential, which must be highlighted. The Deutsche Alpenverein manages a large hiking path network in the project region, which is maintained thanks to a lot of volunteer effort. Due to extensive visitor densities, change in user behaviour (e.g., mountain biking) and the effects of climate change (strong downpours, etc.), maintenance of the hiking paths is becoming increasingly costly. Hiking paths in the project region also do not meet generally requested quality criteria. Hiking paths and mountain paths must therefore be renovated, signs must be added, and they must be maintained for the long term, in accordance with uniform quality standards. To achieve this goal, the paths must be recorded in a geo-information system (GIS). On the basis of this information, along with the digital data of the Alpenverein maps BY Bayrische Alpen, it is possible to offer e.g., GPS applications (Apps) for GPS-compatible mobile telephones, as well as interactive maps on the Internet. Information such as data on DAV path classification (degree of difficulty), locations and offerings of mountain lodges, long-distance hiking paths such as the 'Via Alpina' or connections to bus and train routes is also communicated. The GIS will provide individuals who are maintaining the paths with specific information. Similar applications will be developed for all other mountain sports types in subsequent steps.

- Mountain biking/biking and other recreational activities

Mountain biking and biking in general are also very popular recreational activities where further growth is also expected. A comprehensive bike and mountain bike route network based on uniform quality criteria will be developed with representatives of all locally affected government agencies, associations, property owners, etc., and also offered in digital form. The route network will be connected to public transit stop locations. Bike/mountain bike routes, differentiated by degree of difficulty, feature uniform signage in the project regions. Rent-a-Bike stations for lending and dropping off bikes (as well as possibly other sports equipment such as electro bikes, inline skates, etc.) at different locations form another component of this attractive offering. Mountain biking can lead to conflicts in connection with hunting, property ownership and other user groups. To solve this problem, a systematic approach is adopted on the basis of the 'Environmentally friendly ski mountain climbing'

concept. The comprehensive bike and mountain bike route network, which is coordinated with the affected parties, will make a significant contribution to solving these types of conflicts.

Concepts and offerings that are similar to the concept just outlined for hiking and mountain biking/biking, will be developed as the project proceeds; e.g., climbing, kayak, gliding etc.[28]. It is important for all concepts to be finally combined into an overall concept that encompasses all mountain sports, since the interplay between recreational activities is important both with respect to nature conservation and environmental protection as well as social compatibility. The objective of the sustainable development of mountain sports in the Bavarian Alps can only be achieved with an overall concept for all sports types ('areal mountain sport concept').

- Other tourism infrastructure

Compatibility with nature and landscape must be warranted for the construction of other touristic infrastructure such as fun parks. The construction of this type of infrastructure may only take place in preferential areas, which are oriented along the Alpine Plan of the Bavarian Rural Development Programme (LEP) and comply with the requirements for developments which are outlined therein (see LEP B V 1.8.2). In addition, clear criteria for construction must be defined, and building permits may only be issued if these criteria are consistently met. Measures for a tourism development that corresponds with the criteria of sustainability may be funded.

Measures for the winter (six months)

- Ski mountain climbing/Snowshoeing

The DAV programme 'Environmentally-friendly ski mountain climbing' will be continued in view of securing the management of this region and for the purpose of results optimisation and success monitoring. New developments, such as snowshoeing and winter hiking or ski tours on ski runs will be included. Increased action for the protection of nature is needed particularly for snowshoeing activities. Often, outdoor enthusiasts also use terrain outside of the customary routes in ecologically sensitive areas. This development can be counteracted by conducting ecological and Alpine training of tour guides, guided tours and marked routes in avalanche-safe valley areas[29] as well as certified guide literature and maps. For the purpose of achieving a better communication of information/sensitisation of visitors, a specially trained group ('rangers') will be used to manage the ski tour areas.

- Free riding

'Free riding' - off-trail skiing and snowboarding with lift assistance - is very trendy at the moment. But 'free riding' is also associated with Alpine hazards, and leads to significant problems for forests and animals at a local level. Offensive concepts such as 'RespekTiere Deine Grenzen' (Know your limits) by the Vorarlberg provincial government[30] are being implemented in the project regions. Actions designed to communicate Alpine knowledge, such as the avalanche prevention project 'Check Your Risk' of the youth section of the Deutscher Alpenverein[31] are supplemented with ecological contents and are to become a fixed component of the Bavarian school curriculum.

[28] See e.g. http://www.dav-felsinfo.de

[29] e.g., marked snowshoe trails in Switzerland. See http://www.myswitzerland.com

[30] See http://www.respektiere-deine-grenzen.at/danke.htm

[31] See http://www.check-your-risk.de

- Ski tours on ski runs

The trend of 'ski tours on ski runs' is addressed with attractive offerings as well as increased steering measures, in order to minimise hazards and social conflicts. Marked, regularly prepared and secured climbing routes or information boards on different Alpine topics can unfold their desired effects in this regard.

The concept 'BayernMobil', which is yet to be developed, is designed to ensure that better tourism offerings do not lead to another increase in motorised single person transportation. Its objective is to promote and network car-free transportation and local public transit, resulting in attractive recreational offerings. 'BayernMobil' has the potential of becoming a link between Munich and the project regions, and thus contributing to climate protection. This includes an expansion of bus and train networks as well as special offers for mountain sports enthusiasts (e.g., introduction of a 'Mountain Card').

Implementation

A key factor in the implementation of this project is the inclusion of local and regional sponsors at an early stage. They include communities, rural district offices, agencies for food, agriculture and forestry (AELF), transportation agencies and tourism associations, the Berchtesgaden National Park, DAV sections in charge, nature conservation associations and mountain rescue services as well as tourism providers. It also requires a close linkage to the 'Nature, cultural legacy and education' lead project. In particular, insights on habitat conditions that are gained as a result must be available without limitations as a data basis for the development of innovative concepts to direct visitor flows.

Important project partners at a superordinate level include the Deutscher Alpenverein and the Deutscher Olympischer Sportbund (DOSB), the Bavarian state government, the Bayerische Staatsministerium für Wirtschaft, Infrastruktur, Verkehr und Technologie (StMWIVT), the Bayerische Staatsministerium für Umwelt und Gesundheit (StMUG), the government of Upper Bavaria as well as the Akademie für Naturschutz und Landschaftspflege (ANL). Additional nature conservation associations will be included depending on the progress of the project.

The Deutsche Bahn (DB) should also be included as a central mobility partner. In addition, close co-operation with Regionalverkehr Oberbayern (RVO), Regionalverkehr Allgäu and private trains, as well as the Bayerische Oberlandbahn (BOB) is also desirable. Mobility partners for individual transportation may consist of automakers who are leaders in the environmental sector.

Funding of the BergTour 2018 will be assumed by a foundation. A board of trustees, which is the most important committee of this foundation, will consist of one representative each of the Deutscher Alpenverein, the Deutscher Olympischer Sportbund, the Bavarian state government, ministries in charge, state agency for the environment, administrative districts, communities, nature conservation associations, BAYERN TOURISMUS Marketing GmbH and Bavarian tourism associations. This body assumes a controlling function and votes on important decisions. An administration unit for project management purposes will be allocated to the foundation 'Sustainable mountain sport and tourism development in the Bavarian Alps'; it is responsible for coordinating the project and awarding funding, including controlling. A first step of project management consists of the development of a detailed bundle of measures, which builds on a requirements analysis. This process will be carried out as part of a workshop for a supra-regional working group consisting of members of the board of trustees and other experts. The bundle of measures must be discussed, further developed and specified at the administrative district level and the involvement of regional working groups as part of a second step.

Under the premise of homogenous sustainable mountain sport and tourism development in the Bavarian Alps, suitable measures will be selected and implemented in a third step.

5.3.4 OLYMPIC GREEN: GREEN MOVES

Project title:	Olympic green: Green moves
Main theme:	Sustainable sport and regional development
Implementation:	State capital Munich

Background

The design, maintenance and expansion of attractive green space with recreational functions for the population are important topics in all urban planning processes. In recent times, green and open spaces located near residential areas, which are used for recreational purposes, have become very important: jogging, biking, hiking or Nordic walking are just some examples of sporting activities which are performed outside of fixed sports venues.

Objectives

The purpose of this lead project is to maintain and strengthen the functions of Munich's open spaces for recreation, sport, games, communication, biotope network, maintenance of open spaces, climate balance and urban design. The expansion of the Munich green system results in improved infrastructure for outdoor exercise and thus creates better conditions for an increased enjoyment of exercise among a broader public. This can be achieved particularly through reliable and connected outdoor paths, which can be used for a variety of sporting types (e.g., jogging, walking, biking, cross-country skiing, Bavarian curling, sledding). Also included in the green system are sports facilities, swimming lakes, etc., so that other sports types can be easily connected with activities on the green paths. One example of such a network is the corridor between the Olympic Park and the Three Lakes Plate which acts as a connection to Olympic sports venues.

The project has positive effects on three main themes of the Environment and Sustainability concept:

- Protection of the climate: CO_2 prevention by reducing car traffic (for recreational purposes), long-term fixing of CO_2 in forests; improved climate in urban areas through cool and clean air.
- Protection of natural resources: maintenance of large unsealed areas with positive effects on soil, water balance, air and climate.
- Sustainable sport/regional development: promotion of popular sports, co-operation with surrounding areas (e.g. also in form of regional nature parks). Coordination of goals of further settlement development with landscape development, both within the city as well as surrounding communities.

Project description

At the core of this lead project is the consistent further development of the green system within the city, as well as securing and further developing the green belt at the city edge, also in connection with surrounding communities. Key contents of landscape concepts are made up of statements on the natural scenery, uses in agriculture, recreational focus areas and areas that are close to nature. Outdoor bike and foot paths form the backbone of the green network, both within and outside of the city. These are the ways in which different recreational areas can be achieved without extensive detours and barriers. Recreational areas are comprised of a mosaic of open spaces that are used in

different ways: mainly as agricultural and forested areas and areas close to nature in the green belt and as parks, sports areas, small gardens and cemeteries in the urban area. The main focus for the implementation of path concepts is on closing existing gaps and the overcoming barriers between the recreational areas.

Implementation

Existing concepts for the design and further development of attractive green spaces are to be utilised and further developed. In addition, new concepts for the entire green belt and partial segments must be developed. Significant improvements, particularly with regard to the bike and foot path network, for the green connection Olympic Park - Three Lakes Plate and also for the entire area of the Munich North landscape concept can be implemented by 2018. The comprehensive expansion of an interconnected green path system also strengthens the model character of Munich as a bike- and pedestrian-friendly large urban centre and improves the overall quality of life in the city. The landscape concepts must then be secured through the land utilisation plan and integrated landscape planning; in addition, key components must be protected as landscape or possibly as nature conservation regions. To this end, efforts should be undertaken to achieve a coordinated course of action with the surrounding communities and the implementation of these concepts as part of the urban land-use planning for these communities.

Many large cities are subject to construction-related growth pressures, which are usually associated with an expansion of residential areas into surrounding green areas. Munich's goal is to address this type of pressure mainly in the urban centre. To this end, it is necessary to improve both the urban green system as well as the surrounding landscape into a recreational area.

Some sub-goals - protection status for the entire Munich Green Belt, expansion of the connection between Olympic Park and Three Lakes Plate, optimisation of bike and foot path systems - can be achieved by 2018 if the required funds are provided. Other improvement measures for the path network and green/open spaces must also be considered as a long-term task. Finally, the connections between the green and open space network and club sports, along with the ability to connect sports clubs to non-organised recreational sports, must be reviewed.

The key players responsible for implementation are the state capital Munich, neighbouring communities, joint associations and the regional planning association. In addition, the population, municipal council, district committees, agenda groups, property owners, agriculture as well as the federal and Bavarian governments will also be included in the project.

LEAD PROJECTS FOR EDUCATION FOR SUSTAINABLE DEVELOPMENT

5.4 LEAD PROJECTS FOR EDUCATION FOR SUSTAINABLE DEVELOPMENT

5.4.1 CENTRE FOR SUSTAINABILITY

Project title:	Centre for Sustainability
Main theme:	Education for sustainable development
Implementation:	Free State of Bavaria

Background

The superordinate objective of sustainable development is to secure the ecological, economic and social foundation of current and future generations. Therefore sustainable development is one of the most important future challenges of today. The establishment of an interdisciplinary centre for sustainability in Garmisch-Partenkirchen with a broad responsibility for application-oriented sustainability strategies represents a future-oriented contribution that not only guarantees sustainable Olympic and Paralympic Winter Games, but will also be able to set ecological, societal and economic trends for the entire Alpine region far beyond 2018 in the form of an 'Olympic legacy'.

Objectives

A key focus area of the Centre for Sustainability is the creation of linkages between theory and practice. At the forefront of this process is knowledge transfer and the implementation of action concepts. The objective is to develop application-oriented regional strategies for global sustainability issues by combining existing technical and research knowledge. The Centre for Sustainability will serve the participating institutions - universities and non-university research institutions - as a platform for joint interdisciplinary co-operation in education and research, with a focus on the particularly sensitive Alpine region.

Using the centre as a media centre during the Winter Games (Snow Park Media Centre) would also secure the objective of the sustainable subsequent use of Olympic facilities.

Project description

The Centre for Sustainability is to be an important bridge between research and science on the one hand, and politics, administration and the economy on the other hand. In line with its bridging function, the Centre for Sustainability would work closely with communities, technical agencies as well as business and business associations. It is a way of establishing the conditions for a rapid transfer of sustainable innovations and technologies into society and practice, and to warrant a close working relationship between research and application.

The design and focus areas, with a particular focus on the sensitive Alpine region, will be developed by a scientific expert committee. In addition to the expertise provided by the technically relevant and nearby universities (LMU München, TU München, FH München, FH Weihenstephan), local non-university research institutions (Institute for Meteorology and Climate Research, Atmospheric Environmental Research Section (IMK-IFU), at the Karlsruhe Institute of Technology (KIT), Garmisch-Partenkirchen location, as well as the Schneefernerhaus Environmental Research Station (UFS)) and other partners will also be included. The connections to sport, and the potential of sport organisations

to achieve a contemporary anchoring of the sustainability objectives will be adequately taken into account. One possible idea towards the long-term successful establishment of such a centre consists of a consortium of these and possibly other partners.

Implementation

A prerequisite for the successful implementation of the Centre for Sustainability is the preparation of a coherent concept that offers added value to both the region as well as participating partners. For this reason, the first step should consist of the establishment of the above-mentioned expert group with the involvement of the local research institutions and communities. The expert group could be accompanied by an external start-up advisory board. The expert group will develop a concept regarding the content-related and organisational direction of the interdisciplinary Centre for Sustainability in Garmisch-Partenkirchen and clarify funding issues by the middle of 2011.

In the case of a successful Olympic application, this period would be followed by a two-year start-up period from the middle of 2011 to the middle of 2013. One initial step might involve the appointment of a start-up director, who manages and drives forward the development of the centre. At the same time, a business office would be set up and the required key team would be assembled on location. In addition, contacts to participating partners would be established, and their performance would be specified. Another requirement is the creation of the areal conditions for the intended range of services.

It is planned that the active operating phase will begin on location in the middle of 2013, hence long before the start of the Olympic and Paralympic Winter Games, along with the gradual development of the range of services that will be offered.

Full operations would be considered following the Winter Games, since this would require structural adjustments to the rooms of the Media Centre.

Building costs for the construction of the Media Centre with a usable space of more than 10,000 square metres are expected to range between EUR 20-25 million, and have been provided for in the non-OCOG budget. The required funding for the operation of the Centre (scientific and administration staff, maintenance, etc.) will be determined by the above expert group by the middle of 2011. The international visibility of the Centre for Sustainability should also provide opportunities with regard to procuring sponsoring contributions and third party funding.

5.4.2 360° OLYMPIC UND PARALYMPIC MANAGERS

Project title:	360° Olympic und Paralympic Managers
Main theme:	Education for sustainable development
Implementation:	Stiftung Sicherheit im Skisport (SIS)

Background

Sports and recreational activities are an important part of modern life. Large sporting events such as the Olympic and Paralympic Winter Games create excitement among millions of people, but they also have negative impacts on the environment and nature. Around 150 large sporting events - centralised and decentralised, one-time and repeat events - are held every year in Germany alone. They are held in cities, modern stadiums or sensitive natural spaces, attracting 25 to 30 million visitors per year. Since athletic events are increasingly taking on an 'event' character, today's sporting events often have much more impact on the environment: litter, noise, roads covered with parked cars or wide tracks through forests and meadows - these are some of the more negative side-effects of these large events. Added to these are effects which are neither visible nor noticeable at first glance: higher emissions of greenhouse gases and air contaminants generated by inbound and outbound visitors, consumption of land and materials for the construction and expansion of new sports venues, as well as considerable energy and water requirements for the events themselves (BMU & DOSB 2007).

This makes it all the more important to communicate in-depth knowledge about sustainable development to the broader public, particularly children and youth as the up and coming generation. Large sporting events are also an ideal communication tool for conveying important messages related to sustainable development.

Objectives

People become especially excited about a new idea if they are given a chance to become involved in its implementation. The 'Lead project 360° Olympic und Paralympic Managers' links two factors: knowledge about the problems associated with a defined sport and open space, and an opportunity to become involved in solving these problems. This project is primarily directed at children and youth in schools and clubs, with the intention of communicating the idea of sustainability to this target group by way of innovative and barrier-free methods:

- through the communication of knowledge regarding the interaction of sports (events) and general issues such as climate change and reducing the stress on resources,
- through active and fun outdoor exercise,
- through insights into the interests and conflicts of use related to nature conservation, hunting, forestry and agriculture, tourism and sport,
- through communication of the sustainable handling/management of nature using testimonials (idol-style),
- through active participation in winter sporting events in the form of environmental scouts.

Knowledge about fragile habitats and biotopes, rules and restrictions, but also individual experience, leaves young people with an understanding of the interaction and effects of individual behaviour. Fun and sports in nature and the outdoors promotes an openness to new things and a willingness to learn.

The Winter Games contribute to understanding among the world's peoples. The project '360° Olympic und Paralympic Managers' also has an invigorating effect on the Olympic and Paralympic movement: young people experience friendship, solidarity and fair play without discrimination, and become familiar with the sustainability aspects of their own, as well as others', actions. Barrier-free offerings promote integration and help to create contacts and remove prejudices.

Project description

This lead project will focus primarily on offering nature sports camps for children and youth throughout the year. At the camps, participants will become familiar with the principles, problems and requirements for planning and implementing a large sporting event in a special natural space. To this end, they will receive real documents from the planning period and the required background information. In addition, they will research certain information on their own and learn to understand the different positions of the involved players. The groups will develop their own plans for the construction measures (in a fictitious form). The plans and identified conflicts will be compared with real events and conflicts.

This theory will be supplemented with active outdoor sports activities. So-called environmental scouts will be trained in co-operation with schools; the scouts will look after the sustainable implementation of the activity and prepare contents together with the athletes in the classroom. Children and youth will learn more about the dependence of humans on nature, obtain an understanding of system correlations and the feedback obtained from their own actions, such as: if I waste resources, I contribute to climate change and the disappearance of snow. If the partner 'nature' is damaged or injured, outdoor activities will no longer have the same value.

Germany is home to a particularly large number of sports clubs with millions of members - almost every third German is a member of a sports club. This fact can be used to familiarise many people with the goals of sustainable development. Hence the DOSB will be announcing a club competition as part of the preparations for the Winter Games. The competition will consist of the preparation of individual sustainability concepts and their implementation in club-based sporting events. To ensure that interested clubs have a basic familiarity with the goals of sustainable development and are able to see opportunities for putting these ideas into practice, they will be provided with informational material on the Internet and in print, as well as a DVD including information about environmentally-friendly sporting events. The selected approach, namely to involve as many people as possible in the educational process as part of a competition, aims not to preach at people but rather offer them independent opportunities for action. Because it is by working through and implementing an issue, such as the sustainable implementation of an event, that people become aware of their own effectiveness.

Implementation

This project is under the patronage of the Stiftung Sicherheit im Skisport (SIS) and organises internships for youth in clubs and schools. By working together with students, teachers, club trainers and educational staff, the young generation becomes sensitised to the correlations between sports and the environment.

The binding nature of this project is provided by the implementation of the project 'ticket2nature' (honoured by the German UNESCO committee), upon which the lead project '360° Olympic und Paralympic Managers' is built. In addition, the lead project is also linked to the project ‘Education for

sustainable development for winter sporting events', which involves, among other things, the design of a base (learning facility outside of school) with permanent sport-ecological courses in Schwarzwald am Notschrei, together with the Stiftung Sicherheit im Skisport, its regional partners, the sponsor association Nordic Center e.V, state forestry administration and the organisation committee of the 2010 Junior World Championships. The multi-day 'ticket2nature' camps are directed at children and youth aged 10 - 16, regardless of their type of school or club. At these camps, children and youth engage in daily outdoor activities. During the winter, the main emphasis is placed on snowshoeing, backcountry skiing, cross-country and Alpine skiing and snowboarding. In the summer, the sports programme consists of mountain biking, Nordic blading, Nordic walking, hiking, climbing and slacklining. In addition, programme items are also designed for evening activities, where nature events that took place during the day are reflected upon and intensified through live role plays.

5.5 FINANCING OF LEAD PROJECTS

Table 28: Detailed cost estimate for the 18 lead projects

Lead project	OCOG budget (in EUR million)		Non-OCOG budget (in EUR million)		Total budget (in EUR million)		Implementation
	from	to	from	to	from	to	
Plus-Energy Villages 2018			24.00	36.00	24.00	36.00	City of Munich
Sustainable Olympic Park 2018			7.00	11.00	7.00	11.00	City of Munich
Green building materials 2018			0.80	1.20	0.80	1.20	OCOG
100 sports clubs reduce 2018 t CO_2/a*			4.80	7.20	4.80	7.20	Deutscher Olympischer Sportbund
Positive national climate balance sheet 2018					0.00	0.00	OCOG
Climate compensation for international air travel	4.00	6.00			4.00	6.00	OCOG
Green fleet 2018: Efficient and renewable	1.60	2.40	2.40	3.60	4.00	6.00	OCOG
Visitor mobility: Right of way for public transport	0.80	1.20			0.80	1.20	OCOG
Improving the biotope quality of Alpine sports venues			1.00	2.00	1.00	2.00	Landesbund für Vogelschutz in Bayern
Temporary land use			1.60	2.40	1.60	2.40	OCOG
Recycling economy 2018			0.80	1.20	0.80	1.20	OCOG
Healthy nutrition 2018	1.00	3.00	0.80	1.20	1.80	4.20	OCOG
Fair procurement and merchandising 2018	0.40	0.60			0.40	0.60	OCOG
Nature, cultural legacy and education			3.00	7.00	3.00	7.00	Garmisch-Partenkirchen administrative district
Sustainable Garmisch-Partenkirchen			4.00	8.00	4.00	8.00	Market Town of Garmisch-Partenkirchen
BergTour 2018**	2.40	3.60	0.80	1.20	3.20	4.80	Deutscher Alpenverein
Olympic Green: Green moves			8.00	15.00	8.00	15.00	City of Munich
Centre for Sustainability			20.00	25.00	20.00	25.00	Free State of Bavaria
360° Olympic und Paralympic Managers**	0.24	0.36			0.24	0.36	Stiftung Sicherheit im Skisport
Total	**10.44**	**17.16**	**79.00**	**122.00**	**89.44**	**139.16**	

* Financing discussions not completed to date. Final financing still open

** Basic financing. Additional procurement of funds after awarding

SUMMARY AND OUTLOOK

6

SUMMARY AND OUTLOOK

The IOC requirement for candidate cities is clear: the Games must prevent negative impacts on the environment and leave a 'positive green legacy' in the region.

Bewerbungsgesellschaft München 2018 GmbH does not view this merely as an obligatory requirement but rather as a central and strategic building block for the application and implementation of the 2018 Olympic and Paralympic Winter Games in Munich. It is the reason a comprehensive Environment and Sustainability Concept has been developed for Munich 2018, which contains all the important areas of action - from resource and energy consumption, catering and merchandising to education and regional development.

The Institute for Outdoor Sports and Ecology at the German Sport University in Cologne and the Eco Institute - two internationally recognised institutions in this area - were commissioned with the preparation of this study. Please note: The concept does not comprise a theoretical paper prepared by experts, but was developed as part of a close working relationship with the planning group, ARGE München 2018 - AS&P/ ProProjekt, and in particular also with the involvement of public environmental representatives, relevant NGOs in the fields of sports, nature and environmental protection, as well as a large number of other experts and players:

- Bundesumweltministerium – BMU,
- Bundesamt für Naturschutz – BfN,
- Bayerisches Staatsministerium für Umwelt, Gesundheit – STMUG,
- Bayerisches Landesamt für Umwelt – LfU,
- Government of Upper Bavaria,
- State capital Munich,
- Berchtesgadener Land,
- Garmisch-Partenkirchen and Ohlstadt,
- Deutscher Olympischer Sportbund, DOSB, Sports Venues and Environment section,
- Deutscher Skiverband (Environment and Sustainable Development),
- Deutscher Alpenverein – DAV,
- Landesbund für Vogelschutz – LBV,
- Deutscher Naturschutzring – DNR,
- Naturfreunde,
- Verkehrsklub Deutschland,
- as well as other external experts and players in the sustainability area.

The establishment of the 'Environment' expert commission, which is made up of high-ranking members, underlines the strategic importance of this topic within the bid committee and for the entire application process.

Based on its 18 lead projects, the vision of 'Sustainable Green Games' for Munich 2018 can indeed come true. And in addition: the idea of a green legacy, in the truest sense of the word, will be fulfilled beyond the 2018 Olympic and Paralympic Winter Games and competitions.

The vision of sustainable Games will be implemented with a strategy that brings together the entirety of the activities and projects of the Environment and Sustainability Concept. Integration is assured with the binding consideration of environmental and sustainability aspects in all the relevant topics of the full overall concept of Munich 2018, and is documented as a fundamental building block for the entire application, all the way through the corresponding formulations regarding the key figures of the Bid Book.

One important cornerstone is the environmental screening, which collects and analyses ecological data related to each competition site, analyses the planned and existing transportation infrastructure, and creates the foundation for the first climate-neutral Olympic and Paralympic Winter Games thorough a comprehensive climate analysis.

The region is well equipped for Munich 2018. Many sports venues are already existence, and at the highest international standards. Of the sports venue area, 74% consists of ski runs, ski jumping facilities, buildings and tracks that are already extensively being used for sporting purposes at this time, and which do not require any permanent structural adjustments. For the Winter Games, 21% of the area will be temporarily used, whereby the regeneration and restoration of agricultural spaces and sports fields in the Olympic Park can be ensured. The Event Arena and Olympic Ice Sport Centre will be replaced by new buildings, which means there will be no additional sealing of open surfaces as part of the Winter Games. Only a small part of the total area - approximately 1% - must be structurally redesigned or expanded for the Olympic and Paralympic Winter Games.

The declared goal for Munich 2018 is to design the Olympic and Paralympic Winter Games in a climate-neutral manner. The climate balance sheet has shown that the Games will generate approximately 420,000 tonnes of greenhouse emissions during the event period. The most significant aspect in this regard - at 284,000 tonnes of CO_2 - relates to international inbound and outbound air travel. By implementing low-emission and emission-reducing technologies, and increasing the use of renewable energies, the Environment and Sustainability Concept can directly prevent 34,100 tonnes of CO_2 in Munich, Garmisch-Partenkirchen, Schönau am Königssee and the region. The remaining emissions will be fully compensated for with specific measures, whereby the purchase of certificates or participation in emission trading systems will be expressly avoided. Since a portion of compensation projects will develop their impacts over many years, it can be assumed that it will be possible to avoid more greenhouse gas emissions than will actually be incurred during the Games.

In addition to meeting the minimum requirements based on integral environment and sustainability management and an orientation to binding guidelines, four main themes are at the forefront of this concept:

- A. Climate protection,
- B. Protection of natural resources,
- C. Sport and regional development,
- D. Education for sustainable development

Its centre piece is the implementation of 18 concrete lead projects. These projects, initiatives and educational programmes will appeal to all citizens, pick up on the key areas of action of sustainable

development and educate broad sections of the population to environmental protection and nature conservation. They follow the triad contained in the idea of sustainability and address ecological, economic and social aspects in the region and far beyond. Not least, they are a special feature of the application for Munich 2018 in the context of international competition and secure a positive ecological balance sheet with respect to the Winter Games far beyond 2018.

A. PROTECTION OF THE CLIMATE (THE FIRST CLIMATE-NEUTRAL OLYMPIC AND PARALYMPIC WINTER GAMES)

'Plus-Energy Villages 2018'

The permanent structures of the Olympic Villages in Munich and Garmisch-Partenkirchen will be planned and constructed as part of the lead project to create Plus-Energy villages which will produce more energy than they consume. Energy consumption for household electricity and energy for heating and hot water will be minimised in accordance with the newest technical possibilities. The remaining energy requirements of the passive houses will be covered solely by renewable energy resources and the surplus generated by photovoltaics and combined heat and power generation.

'Sustainable Olympic Park 2018'

The objective of this lead project is the renovation of the 1972 Olympic sports venues while maintaining and strengthening the unique character of the Olympic Park. The existing buildings of the 1972 Olympic Park which will be used for the 2018 Games will generate at least 30% fewer greenhouse gas emissions by 2018 (as compared to 2010) through comprehensive energetic renovation activities which will also incorporate heritage building considerations.

'Green building materials 2018'

Ecologically advantageous building materials such as wood and low-CO_2 cement will be used for all building projects connected with Munich 2018. In addition, as part of the lead projects, all tenders will emphasise the use of as much recycled steel (electrical steel) as possible, as the production of this steel generates significantly lower greenhouse gas emissions as compared to furnace steel, and also reduces the stress on iron ore resources. In general, recycled materials will be given preference to all other materials where possible.

'100 sports clubs reduce 2018 t CO_2/a'

This lead project is used to carry the strategy of the Environment and Sustainability Concept for Munich 2018 across the region and into the entire country, and will make a significant contribution to reducing CO_2 emissions. The operating objective of this lead project is to compensate for a portion of remaining greenhouse gas emissions that will remain even after the implementation of direct emission savings by the Munich 2018 Environment and Sustainability Concept through additional renovation measures in the area of German popular sports. This project ensures that the issue of climate protection is anchored in the German sports system and the broader public through sports as a medium.

'Positive national climate balance sheet 2018'

With the objective of financing measures for the over-compensation of unavoidable CO_2 emissions, the association 'München 2018 klimagerecht' will be established for the purpose of promoting the appropriate additional climate protection measures at the regional and national level (see also additional lead project 'Climate compensation for international air travel'). The measures will overcompensate for any greenhouse gas emissions generated by Munich 2018, and which cannot be directly prevented during the Games by efficiency measures or the use of renewable energy resources. These measures will consist of climate protection projects which are associated with a real reduction in greenhouse gas emissions once implemented.

'Climate compensation for international air travel'

The objective here is to compensate for non-avoidable greenhouse gas emissions (approx. 284,000 tonnes) associated with the international inbound and outbound travel of athletes, officials and private spectators on a global level with investments in additional climate protection projects (CDM projects with additional gold standard).

'Green fleet 2018' and 'Visitor mobility: Right of way for public transport'

The objective of the 'Green fleet 2018' lead project is to ensure that vehicles and buses used to transport athletes, coaches, IOC, NOC and IF delegations and media representatives, which are used on the order of the organisation committee, are exclusively equipped with alternative engine concepts (electric vehicles, bio fuels) and fully supplied with fuels that have been produced in a renewable fashion. In addition, the 'E-Mobility: Model community Garmisch-Partenkirchen' project will also be making an important future-oriented contribution. The hybrid buses used for visitors in the form of Park+Ride shuttle transportation will also meet these requirements. The objective of the lead project 'Visitor mobility: Right of way for public transport' is to ensure that more than 50% of spectators will travel to Munich, Garmisch-Partenkirchen and Schönau am Königssee by public transport.

B. PROTECTION OF NATURAL RESOURCES (SPACE-NEUTRAL AND NATURE-COMPATIBLE GAMES)

'Improving the biotope quality of Alpine sports venues'

The primary focus of this lead project is on ensuring that the biotopes and species that are prevalent in the regions are maintained and safeguarded. It will implement targeted measures designed to develop or improve high-quality biotopes and species habitats. This project is a major contribution to the maintenance and development of natural resources and biodiversity, the permanent maintenance of the region's attractiveness, both from the view of the population and tourists, and not least for the purpose of achieving environmentally compatible Games. It therefore makes a major contribution towards maintaining the Alpine convention and supports the common goals of nature conservation and sports associations.

'Temporary land use'

This lead project develops, tests and applies methods and materials for the temporary conversion of agricultural areas. Its objective is the use of building materials that reduce the stress on resources and

are not harmful from an ecological and health standpoint, the use of systems to reduce soil compaction for unsealed surfaces, and methods for the rapid restoration and regeneration of soils and previous vegetation stock. In this vein, subsequent events will be able to benefit from these insights.

'Recycling economy 2018'

The ability to limit the generation of waste and associated resource consumption to a minimum is the declared objective of this lead project.

'Healthy nutrition 2018'

The intent of this project is to procure from regional origins 100% of basic foodstuffs offered in athletes' canteens and at sports venues. Of these, at least 50% would be produced according to organic cultivation methods. This would lead to a permanent improvement regarding the sale of these products before and after the Games.

'Fair procurement and merchandising 2018'

All merchandising products produced specifically for the Munich 2018 Olympic and Paralympic Winter Games and which feature the host city logo will be produced in compliance with humane working conditions, and with a high proportion of recycled or ecologically produced materials.

C. SPORTS AND REGIONAL DEVELOPMENT (GAMES FOR SUSTAINABLE SPORTS AND AREAL DEVELOPMENT)

'Nature, cultural legacy and education - Working together in the Olympic region'

This lead project will strengthen the ecological and cultural value of the Bavarian Alps and forelands by linking natural habitats, and at the same time securing the sustainable use of a historically developed cultural landscape. By linking nature conservation and cultural regions, the intention is to meet the economic requirements of the municipalities, maintain the natural resources for the people living in the region, and secure biological diversity for the long term. To this end, participants will be actively integrated into the coordination processes. The provision of relevant environmental education initiatives guarantees a high level of acceptance regarding these issues among the people living in these regions.

'Sustainable Garmisch-Partenkirchen'

The ecological, economic and social sustainability of Garmisch-Partenkirchen in the 21st century will be ensured based on a programme designed for the long term. Instead of implementing individual measures and solutions, a systemic approach will be used to develop a networked and scientifically secured solution for all regional players. Insights gained as a result will be made available to similar communities around the world.

'BergTour 2018'

The objective of this project is to further develop (at a qualitative level) mountain sports and tourism in the Bavarian Alp region and its unique natural and cultural landscapes according to the three criteria of sustainability: 'Ecology, Economy and Society'. To this end, it will be necessary to develop concepts

and new project ideas that target sustainability, and to include, expand and link proven existing concepts.

'Olympic Green: green moves'

The important functions of Munich's green system connecting with the Olympic Park are to be strengthened for recreation, sports, games, communication, biotope network, maintenance of open spaces, climate balance and urban design. To this end, the intention is to create a continuous green connection from the Olympic Park and its adjacent quarters to lake district the north of Munich.

D. EDUCATION FOR SUSTAINABLE DEVELOPMENT

'Centre for Sustainability'

The establishment of an interdisciplinary centre for sustainability in Garmisch-Partenkirchen with a broad area of responsibility in the area of application-oriented sustainability strategies represents a future-oriented contribution that not only guarantees sustainable Olympic and Paralympic Winter Games, but will also be able to set ecological, societal and economic trends for the entire Alpine region far beyond 2018 in the form of an 'Olympic legacy'.

'360° Olympic and Paralympic Managers'

This lead project organises work and planning assignments for youth in clubs and school classes. By taking part in hands-on work in the project area (habitat maintenance, removal of barriers, ski run design, etc.), young people will have the opportunity to personally experience the correlations between sport space development and the environment, as well as their own relationship with nature. By working together with students, teachers, club trainers and educational staff (multipliers), the next generation is effectively made aware of the system which includes sport and environment, as well as our natural resources. The idea of using education to encourage sustainable development can be made widely popular using the large media presence at various winter sporting events and the 2018 Olympic and Paralympic Winter Games, so that environmental education forms a permanent part of media reporting activities.

At this stage, the Environment expert commission again expressly states that all 18 projects have been accorded the same level of significance, and that each is indispensable to the vision of 'Sustainable Green Games'.

MUNICH 2018 GREEN LEGACY

Munich 2018 will have positive long-term effects on the athletes, the Olympic family, visitors and people whose natural surroundings and landscape is in the region. The 2018 Olympic and Paralympic Winter Games intend to demonstrate

- how demanding environmental standards can be implemented.
- how sustainability strengthens local and regional value chains and therefore secures workplaces.
- that large sporting events such as the Olympic and Paralympic Winter Games can bring about a neutral effect on the climate.
- how intervention in protected areas, mountain forests and significant biotopes can be prevented or minimised.
- how compact sports venue planning reduces congestion, the permanent sealing of open areas as well as costs.
- that the Olympic and Paralympic Winter Games can be used to awaken an awareness of environmental protection and sustainable and healthy lifestyles within the population, sports organisations, athletes and guests.
- the importance of open spaces which are used for nature- and landscape-compatible sports activities, youth promotion and education, recreation and health.
- that the Olympic and Paralympic Winter Games can be used as a platform to drive and communicate international knowledge and the transfer of technology through innovative methods and measures for environmental protection and sustainability.

The Environment and Sustainability Concept forms a part of the resolution adopted by the Federal Government, the Free State of Bavaria, the Munich City Council, the Garmisch-Partenkirchen Municipal Council, the Berchtesgadener Land County Council and the decision-making bodies of the Deutscher Olympischer Sportbund (DOSB). In this context, the committees assume the objectives and contents of the concept and wish to underline the great importance accorded by all those in charge to the environmental and sustainability targets as an essential component of the application and implementation of the 2018 Olympic and Paralympic Games.

Following final approval, the Environment and Sustainability Concept will be submitted to the evaluation commission of the International Olympic Committee (IOC) in February/March 2011. At that time, it will also form a binding part of the total application as regards the IOC. The Environment and Sustainability Concept will be included in the Host City contract signed by the IOC and the applicant once the Games have been awarded. The hosts of the Olympic and Paralympic Winter Games thereby commit to implement the Environment and Sustainability Concept in the form that has been developed.

Sustainability takes time, and sustainable development is always a continuous process. With this Environment and Sustainability Concept, Munich 2018 therefore signals the importance that has been

attributed to this issue very early on in the application process. Some lead projects will already be starting this year and will be implemented regardless of the application process. Hence Munich 2018 is already beginning to turn the idea of 'Sustainable Green Games' into reality - to the benefit of the region and its people, but also as a precursor of the Olympic movement, which is increasingly addressing issues related to the future prospects and sustainability of international sports.

7

INDICES

7.1 LIST OF FIGURES

7.2 LIST OF TABLES

7.3 LIST OF MAPS

7.4 LIST OF ABBREVIATIONS

ADAC	Allgemeiner Deutsche Automobil-Club e.V.
ANL	Bayerische Akademie für Naturschutz und Landschaftspflege (Bavarian Academy for Nature Conservation and Landscape Management)
ARGE	Arbeitsgemeinschaft für Beschäftigung München GmbH (Working Group for Employment Munich Ltd.)
Art.	Article
BayNatSchG	Bayerisches Naturschutzgesetz (Bavarian Nature Conservation Act)
BenE München	Bildung für eine nachhaltige Entwicklung in München e.V. (Education for Sustainable Development in Munich Inc.)
BNE	Bildung für nachhaltige Entwicklung (Education for sustainable development)
BfN	Bundesamt für Naturschutz (Federal Nature Conservation Office)
BGL	Berchtesgadener Land
BHG	Bayerischer Hotel- und Gaststättenverband e.V.
BImSchV	Verordnung zur Durchführung des Bundes-Immissionsschutzgesetzes (Regulation for the implementation of the federal emission protection act)
BMI	Bundesministerium des Inneren (Federal Interior Ministry)
BMU	Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit (Federal Ministry for the Environment, Nature Conservation and Reactor Safety)
BMVBS	Bundesministerium für Verkehr, Bau und Stadtentwicklung (Federal Ministry for Transportation, Construction and Urban Development)
BOB	Bayerische Oberlandbahn GmbH
BTL	Biomass-to-Liquid
CEM I	Portland cement
CEM III	Blastfurnace cement
CO_2	Carbon dioxide
DAV	Deutscher Alpenverein e.V.
DB	Deutsche Bahn AG
dB(A)	Sound volume in decibels
DEHOGA	Deutscher Hotel- und Gaststättenverband e.V.
GEMIS	Global Emission Model for Integrated Systems
DGNB	Deutsche Gesellschaft für nachhaltiges Bauen e.V.
DIN	Deutsches Institut für Normung e.V.
DOSB	Deutscher Olympischer Sportbund (German Olympic Sports Association)
DSHS	Deutsche Sporthochschule Köln (German Sport University Cologne)
EEG	Erneuerbare-Energien-Gesetz (Renewable Energies Act)
EEV	Enhanced Environmentally Friendly Vehicle
EMAS	Eco Management and Audit Scheme

EMM	Europäische Metropolregion München e.V.
EnEV	Energieeinsparverordnung (Energy-saving regulation)
Engl.	English
EU	European Union
etc.	et cetera
E.V.	Eingetragener Verein (Registered Association)
FFH	Fauna-Flora Habitat
FIFA	Fédération Internationale de Football Association
FIS	Fédération Internationale de Ski
G	gram
GaPa	Garmisch-Partenkirchen
GIS	Geographic information system
GmbH	Company with limited liability (Germany)
gGmbH	Non-profit company with limited liability (Germany)
GOK	Geländeoberkante (top ground surface)
GPS	Global Positioning System
GRZ	Grundflächenzahl (site occupancy ratio)
GVO	Gentechnisch veränderte Organismen (genetically modified organisms)
Ha	Hectar
IAAF	International Association of Athletics Federations
IBC	International Broadcasting Center
IF	International Federations
IHA	Hotelverband Deutschland e.V.
IHK	Industrie und Handelskammer (Chamber of Industry and Commerce)
ILO	International Labor Organisation
Incl.	Inlusive
INÖK	Institut für Natursport und Ökologie (Institute for Outdoor Sports and Ecology) at the German Sport University in Cologne
IOC	International Olympic Committee
ISO	International Organization for Standardization
Km	Kilometer
KWh	Kilowatt hour
LBV	Landesbund für Vogelschutz in Bayern e.V.
LEED	Leadership in Energy and Environmental Design
LfU	Bayerisches Landesamt für Umwelt (Bavarian State Office for the Environment)
LH	State capital
LIHR	Lausanne Institute for Hospitality Research

LMU	Ludwig-Maximilians-Universität
M	Meter
M2	Square meter
NN	Metres above sea level
Max.	Maximum
Min	Minutes
MMC	Main Media Center
MWh	Megawatt hour
NGO	Non-Governmental Organization
NO2	Nitrogen oxide
NOC	National Olympic Committee
OCOG	Organising Committee for the Olympic Games
OK	Organisation Committee
PAN	Pestizid Aktions-Netzwerk e.V.
PDCA	Plan-Do-Check-Act
PET	Polyethylene terephthalate
PIK	Potsdam-Institut für Klimafolgenforschung (Postdam Institute for Climate Research)
Pkm	Kilometers per person
PM10	Fine dust
PR	Public Relations
P+R	Park and Ride
PV	Photovoltaic
RCE	Regional Centre of Expertise
RFI factor	Radiation Forcing Index
RVO	Regionalverkehr Oberbayern GmbH
SIS	Stiftung Sicherheit im Skisport (Foundation for Ski Safety)
StMUG	Bayerisches Staatsministerium für Umwelt und Gesundheit (Bavarian State Ministry for Environment and Health)
StMWIVT	Bayerisches Staatsministerium für Wirtschaft, Infrastruktur, Verkehr und Technologie (Bavarian State Ministry for Economy, Infrastructure, Transportation and Technology)
SWM	Stadtwerke München GmbH
T	Tonne
THG	Greenhouse gas
TREMOD	Transport Emission Estimation Model
TU	Technical University
TV	Television

U value	Heat transfer coefficient
UIC	International Union of Railways
UN	United Nations
UNB	Untere Naturschutzbehörde (Nature Conservation Authority)
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
VHS	Volkshochschule (Adult Education Centre)
WWF	World Wide Fund For Nature

8

LITERATURE

Abfallwirtschaftsbetrieb München (2008): Geschäftsbericht 2008 (Munich Waste Management (2008): 2008 Annual Report). Access at: http://www.awm-muenchen.de/fileadmin/PDF-Dokumente/awm/br_ber08.pdf

Adelphi Research gGmbH (2009): Energiekampagne Gastgewerbe (Hotel and restaurant industry energy campaign). Access at http://www.energiekampagne-gastgewerbe.de

Amstutz, M. & Schegg, R. (2004): Hotel Power – Energieeffizienz und CO_2-Emissionen der Schweizer Hotellerie (Hotel Power - Energy efficiency and CO_2 emissions in the Swiss Hotel Industry). Lucerne/Lausanne

atmosfair gGmbH (Hrsg.) (2009): Der Emissionsrechner (Emissions calculator). Access at https://www.atmosfair.de/index.php?id=5

Bayerischen Hotel- und Gaststättenverbandes e.V. (BHG) (2009): Das Bayerische Umweltsiegel (The Bavarian Environmental Seal). Access at http://www.gastgeberbayern.de/qualitaetssiegel/umweltsiegel/

Bleher, D., Stahl, H., Schmied, M. & Teichert, V. (2008): Green COP. Environmental Concept for the 9th Conference on Biological Diversity Bonn Germany 2008'. Berlin

Bundesamt für Naturschutz (Hrsg.) (2008): Menschen bewegen - Grünflächen entwickeln (Moving people - Developing green spaces). Bonn-Bad Godesberg

Bundesministerium für Ernährung, Landwirtschaft und Verbraucherschutz (BMELV) & Max Rubner-Institut (Hrsg.) (2008): Nationale Verzehrsstudie (National consumption study). Karlsruhe

Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit (BMU) & Deutscher Olympischer Sportbund (DOSB) (Hrsg.) (2007): Green Champions für Sport und Umwelt (Green champions for sports and environment). Guideline for environmentally-friendly large sporting events. Berlin & Frankfurt am Main

Deutsche Gesellschaft für Nachhaltiges Bauen e.V. (DGNB) (Hrsg.) (2009): Das Deutsche Gütesiegel Nachhaltiges Bauen (The German Quality Seal for Sustainable Construction). Stuttgart

Europäische Metropolregion München e.V. (2009): Information about the region. Access at http://www.greatermunicharea.de/index.html?id=1787

Gastl, R. (2005): Kontinuierliche Verbesserung im Umweltmanagement (Continuous improvements in environmental management). The CIP requirement under ISO14001 in theory and corporate practice. Zurich

Hamele, H. & Eckardt, S. (2006): Umweltleistungen europäischer Tourismusbetriebe Instrumente, Kennzahlen und Praxisbeispiele (Environmental performance of European tourism operations Instruments, key figures and practical examples). A contribution to sustainable tourism development in Europe. Saarbrücken

Harnisch, J. & Müller, N. (2007): A Blueprint for a Climate Friendly Cement Industry. How to Turn Around the Trend of Cement Related Emissions in the Developing World. Nuremberg

International Olympic Committee (IOC) (o.J.): Olympic Movement`s Agenda 21. Sport for sustainable development. Lausanne

International Olympic Committee (IOC) (2007): Technical Manual on Transport. Lausanne

Maquila Solidarity Network (2008): Homepage. Access at http://en.maquilasolidarity.org/

OlympSchG 2004: Gesetz zum Schutz des olympischen Emblems und der olympischen Bezeichnung vom 31.März 2004 (BGBl. I S. 479) (Law for the protection of the Olympic emblem and Olympic name of 31 March 2004 (Federal Gazette I p. 479)

Pestizid Aktions-Netzwerk e.V. (PAN) (2009): Bio-Baumwoll-Wegweiser (Organic cotton handbook). Access at http://www.pan-germany.net/baumwolle/Version2/de/hintergrund.html

Pröbstl, U., Reiser, B., Dorsch, C. & A. Hanak (2009): Landschaftspflegerischer Begleitplan zum Bau und zum Betrieb einer Doppelsesselbahn am Guiberg in Garmisch-Partenkirchen (Landscape management support plan for the construction and operation of a double chairlift on the Guiberg in Garmisch-Partenkirchen). Unpublished appraisal commissioned by Garmisch-Partenkirchen. 31 pages

Schulz, W., Burschel, C., Weigert, M., Liedtke, C., Bohnet-Joschko, S., Kreeb, M., Losen, D., Geßner, C., Diffenhard, V. & A. Maniura (2001): Lexikon Nachhaltiges Wirtschaften (Lexicon of sustainable management). Munich

Stiftung pro natura – pro ski (2003): Auditing in Skigebieten – Leitfaden zur ökologischen Aufwertung (Auditing in ski areas - Guideline for ecological improvement). Liechtenstein

Verein Deutscher Zementwerke e.V. (vdz) (Hrsg.) (2008): CEM II- und CEM-III/A-Zemente im Betonbau (CEM II- and CEM-III/A cement in concrete construction). Sustainable solutions for building with concrete. Düsseldorf

Wildemann, H. (2009): Stadtwerke – Success factors of European infrastructure and utility providers. Munich7


MÜNCHEN 2018
Candidate City