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ABOUT THE REPORT

This report aims to analyze the projects implemented by the city of Beijing to incorporate environmental sustainability into the 2008 Olympic Games and fulfil the environmental commitments made during the candidature phase. The study was conducted between February and July 2007, and the analysis includes data and information collected in Beijing between March and May 2007.

The report considers the programmes and projects developed by the Beijing 2008 Organizing Committee for the Games of the XXIX Olympiad (BOCOG) and the initiatives of relevant Beijing Municipal Government Departments, Bureaus, Agencies and Commissions within the boundaries of the municipal territory. Although aware that environmental issues are inextricably bound with social and economic issues, as well as human rights concerns, in looking at the preparations for the Games this report does not consider the social or economic aspects of the many initiatives examined, but focuses strictly on environmental consequences and implications. Nor, due to logistical constraints, does the report analyze the initiatives undertaken in the cities of Hong Kong, where the equestrian event will take place, Qingdao, host of the sailing competition, and Tianjin, Shanghai, Shenyang and Qinhuangdao, which will host some events of the football preliminaries.

The study is based on data and information officially released by the Chinese authorities and BOCOG, substantiated by field research conducted by the principal author. It takes into account visits to Beijing and meetings with Chinese officials undertaken by the UNEP Director of Communications and Public Information and UNEP's Chief of Outreach, responsible for coordinating UNEP's sport and environment programme. UNEP technical staff from the Division of Early Warning and Assessment provided additional information and comments.

The documents analyzed for the report include official reports released by BOCOG from 2003 to the present, including the most recent environmental technical report; 'Beijing 2008: Environmental Protection, Innovation and Improvement', reports issued by environmental non-governmental organizations (NGOs) on Chinese environmental issues, and the official presentation made by the Government during meetings with UNEP.

The principal author spent a total of four weeks conducting interviews and field inspections during two separate visits to Beijing in March and April 2007. The visits included surveys of environmental facilities and building sites, and meetings with BOCOG, the State Environmental Protection Administration (SEPA), the Beijing Municipal Government, environmental NGOs and communities in the urban area surrounding Beijing. Facilities inspected included Olympic venue construction sites, wastewater treatment plants, landfills, medical waste processing facilities, factories and energy production plants. The author gained additional information through in-depth and continuous review of media coverage of the Games.

The Construction and Environment Department of BOCOG was the main point of contact during UNEP's visits, with BOCOG facilitating meetings with other involved parties. At municipal level, the principal author met with representatives from the:

- » Beijing 2008 Project Construction Headquarters Office,
- » Beijing Water Authority,
- » Beijing Municipal Bureau of State Land and Resources,
- » Beijing Municipal Bureau of Industrial Development,
- » Beijing Municipal Commission of Development and Reform,
- » Beijing Environmental Protection Bureau,
- » Beijing Municipal Committee of Transport,
- » Beijing Municipal Administration Commission,
- » Beijing Gardening and Greening Bureau,
- » Beijing Gas Group,
- » Beijing Municipal Administration and Law Enforcement Bureau,
- » Olympic Science and Technique Commission,
- » Beijing Municipal Bureau of Culture Heritage.

A significant contribution was made by WWF International and WWF China, Greenpeace China, Conservation International China, Global Village Beijing, and IUCN headquarters and the IUCN China office, who all gave their perspectives on the sustainability of the Beijing Games. As well as providing information, these organizations also supported the project by reviewing the draft report.

Further review was provided by UNEP staff members, who also contributed to the report by supporting the development of its conclusions and recommendations. In the spirit of transparency, a draft of the report was shared with the IOC and BOCOG, as well as the NGO partners listed above, but it is important to note, however, that at no time did any organization or individual attempt to influence the review beyond pointing out errors of fact. It should also be noted that this is the first time that the IOC has endorsed an independent environmental review of an Olympic Games.

Notwithstanding the near total reliance on information provided by the Chinese authorities, UNEP is confident that the study has been carried out with the most accurate, impartial and scientific approach possible, and paints an independent picture of Beijing's efforts to incorporate the principles of environmental sustainability into the 2008 Olympic Games.

ABOUT UNEP

UNEP, established in 1972, is the voice for the environment within the United Nations system. UNEP acts as a catalyst, advocate, educator and facilitator to promote the wise use and sustainable development of the global environment. To accomplish this, UNEP works with a wide range of partners, including United Nations entities, international organizations, national governments, non-governmental organizations, the private sector and civil society.

UNEP work encompasses:

- » Assessing global, regional and national environmental conditions and trends
- » Developing international and national environmental instruments
- » Strengthening institutions for the wise management of the environment
- » Facilitating the transfer of knowledge and technology for sustainable development
- » Encouraging new partnerships and mind-sets within civil society and the private sector.

UNEP's Sport and Environment Programme

UNEP began work on sport and environment issues in 1994. The programme's objectives are to:

- » Promote the integration of environmental considerations in sports
- » Use the popularity of sports to promote environmental awareness and respect for the environment among the public, especially young people
- » Promote the development of environmentally friendly sports facilities and the manufacture of environmentally friendly sporting goods.

The International Olympic Committee (IOC) is a key partner in UNEP's sport and environment strategy. UNEP and the IOC have been working together since 1994 when they signed an Agreement of Cooperation to incorporate environmental issues in Olympic Games. The IOC subsequently established a Sport and Environment Commission to advise its Executive Board on environmental issues as they relate to the Olympics. UNEP is represented in the Commission. In 1999, UNEP collaborated with the IOC in developing an Agenda 21 for Sport and the Environment, which is currently being implemented by members of the Olympic Family and by several other sport organizations.

In 2007, IOC President Jacques Rogge and the IOC received the UNEP 'Champions of the Earth' award in recognition of the IOC's efforts to emphasize environmental sustainability as a core element of the Olympic Games.

Since 1995, the IOC has organized a biennial World Conference on Sport and Environment. UNEP has supported these conferences since 2003. The World Conference brings together

hundreds of representatives from National Olympic Committees and IOC-affiliated sports federations and associations to review their impact on the environment and their contribution to sustainability. Previous Conferences have been held in Torino, Italy, in 2003, and Nairobi, Kenya, in 2005, at UNEP's headquarters. The 2007 Conference will be held in Beijing, China, in October 2007 under the theme 'From Plan to Action'.

Beyond its involvement with the Olympic Movement, UNEP has also developed a wide-ranging programme with international sports federations, such as the International Association of Athletics Federations (IAAF), the Fédération Internationale de Motocyclisme (FIM). UNEP also worked closely with the local organizing committee of the 2006 FIFA World Cup in Germany, and is collaborating with the organizing committees for the 2010 FIFA World Cup in South Africa and the 2010 Commonwealth Games in New Delhi, India.

UNEP also organizes a biennial Global Forum for Sport and Environment with the Global Sports Alliance, a Japan-based not-for-profit organization that works on promoting the links between sport and the environment. The Forum works with a wide variety of stakeholders to recognize best practices on sport and the environment and to encourage sport organizations to do more for the environment. Previous Forums have been held in Tokyo, Japan, Lahore, Pakistan and Lausanne, Switzerland.

Environment and the Olympic Games

Since 1994, organizing committees of the Olympic Games have progressively increased their focus on environmental and sustainable development issues in preparing for and staging Olympic Games. All cities bidding to host the Games are required to have a comprehensive environmental programme which is followed through during the preparatory phase of the Games. Each Games is expected to leave a sustainable legacy and to use the opportunity of the Games to promote environmental awareness, policies and practices.

UNEP and the Beijing Olympic Committee of the Olympic Games (BOCOG) signed a Memorandum of Understanding (MoU) in November 2005 aimed at making the 2008 Olympic Games environmentally-friendly. Within the context of the MoU, UNEP is helping BOCOG to implement its environmental plans and projects during the preparations for the Games, including undertaking this independent review of its environmental commitments and actions. UNEP is also helping to improve communications between environmental NGOs and BOCOG, and will work with BOCOG to raise media awareness and understanding of the environmental achievements and challenges related to the Beijing 2008 Games.

Looking to the future, UNEP and the Vancouver 2010 Olympic Games Organizing Committee (VANOC) are discussing the development of a Memorandum of Understanding (MoU). The MoU is expected to be signed before the end of 2007. VANOC has already launched its first sustainability report, which looks at VANOC's six performance objectives: Accountability; Sport for Sustainable Living; Environmental Stewardship and Impact Reduction; Social Inclusion and Responsibility; Aboriginal Participation and Collaboration; Economic Benefits.



**Achim Steiner,
United Nations Under-Secretary-General
Executive Director, UNEP**

When the International Olympic Committee awarded the XXIX Olympic Games and the XIII Paralympic Games to Beijing in 2001, one of the criteria on which it judged all the candidate cities was their commitment to staging an environmentally conscious Olympics.

Since the mid-1990s, environmental considerations have been increasingly prominent in Olympic planning, with each Games expected to leave a sustainable legacy. There have been notable landmarks. Lillehammer in 1994, Sydney in 2000 and, especially, Torino in 2006 all set new benchmarks for environmental awareness and sensitivity.

Beijing's bid was notable for the broad reach of its environmental commitments, which ranged far beyond the immediate concerns of planning for the Games to an ambitious programme for greening and cleaning China's capital. As the IOC Evaluation Commission noted in 2001, the measures that Beijing had proposed would leave "a major environmental legacy for Beijing from the Olympic Games."

There is no doubt about the importance—indeed urgency—of these measures. China faces immense challenges in trying to protect its ecosystems and environment in the face of rapid economic expansion. These issues are prominent in Beijing's bid commitments.

In 2005, UNEP signed a Memorandum of Understanding with the Beijing Organizing Committee for the Olympic Games (BOCOG) to help them review their preparations related to environmental sustainability. Then, in 2007, IOC President Jacques Rogge further agreed that UNEP should conduct a substantive evaluation of Beijing's performance on sustainability issues.

FOREWORD

UNEP's concerns were two-fold. First, and most obvious, was to assess Beijing's performance against its commitments, and to provide comments where necessary. Secondly, in line with our mandate to provide inspiration and leadership in caring for the environment, we wanted to ensure that a wider public was able to learn from Beijing's challenges and achievements.

I am pleased to note that UNEP has received excellent cooperation throughout from the IOC, BOCOG and the local and national authorities. I would also like to take this opportunity to thank Chinese businessman and photographer Luo Hong for the financial support which made this review possible.

Those not familiar with the organization of an Olympic Games will recognize that it involves not just the organizing committee but also the local and national authorities. This report therefore examines the collective performance of BOCOG, the city of Beijing and other actors on the national scene in relation to Beijing's bid commitments. In doing so we looked at official documentation, conducted field visits, and consulted with local and international non-governmental organizations active in China.

What we discovered—and what this report shows—is that the award of the Games has provided a formidable impetus to cleaning up Beijing and improving its environment. While the city and the country have many challenges remaining, I think we can all genuinely take heart from the commitment that has been applied.

Where we have comments or reservations, they have been stated clearly. But there is no doubt that, with less than one year to go before the 2008 Olympics, Beijing is on track to deliver on its environmental promises.

EXECUTIVE SUMMARY

Challenge and opportunity characterize the award of the 2008 Olympic Games to Beijing. China's rapid economic development, with GDP growing at more than 11 per cent per year, has generated widespread concern about the environmental implications for China and the world, both within China and throughout the international community. In response, the Government of China has instituted a growing number of environmental initiatives and legislation designed to promote environmental sustainability as part of the country's ambitious growth strategy. With world attention increasingly on China, the staging of the 2008 Olympic Games in Beijing has given China an opportunity to showcase its commitment and ability to grow in an environmentally sustainable manner.

The challenge lies in the fact that Beijing's successful bid not only raised the city's profile internationally, but highlighted a number of environmental issues, not least the city's poor air quality, which remains a major concern for the Olympic Movement less than one year before the Games are due to commence.

The 'Green Olympics' initiative

Notwithstanding concerns over air pollution, this review is able to conclude that considerable effort has gone into fulfilling the letter and spirit of the promise by the Beijing Olympic Games Organizing Committee (BOCOG) to deliver a 'Green Olympics'

During the candidature phase in 2000, Beijing set ambitious environmental goals to show the world its commitment to sustainable development. Beijing's Municipal Government and the Government of China outlined 20 key projects to improve Beijing's environment, and an overall investment of US\$ 12.2 billion to improve sustainability (US\$ 5.6 billion over the period 1998-2002 and US\$ 6.6 billion between 2003-2007) under the Beijing Sustainable Development Plan. The project areas range from addressing air and water quality and waste management to including environmental considerations in new infrastructure development.

In order to speed up the environmental sustainability process, Beijing also decided to move forward the deadlines of several existing environmental targets in the Beijing 'Environmental Master Plan' (an environmental protection programme developed by the Municipal Government for 1997-2015). The results of these initiatives are now visible around the city. New wastewater treatment plants, solid waste processing facilities, increased forestation and green belt areas, and an improved public transportation fleet are now features of the new pre-Olympic Beijing.

In addition to the initiatives undertaken by the Municipality of Beijing, the Beijing Organizing Committee for the Olympic Games (BOCOG) is implementing several projects to deliver a sustainable Olympic and Paralympic Games in 2008. These initiatives range from waste management at the venues and sustainable transport during the Games, to cooperation with sponsors on environmental sustainability and dialogue with environmental NGOs.

However, one area where UNEP feels BOCOG could do more, especially in collaboration with local and international NGOs, is in promoting environmental awareness and action, especially during the Games themselves. Much of the outreach is focused on consumption and production related issues, in particular water, waste and pollution. UNEP feels more could be done to promote the broader framework of ecosystem protection, both among the Chinese public and among visitors to the Games. Given that it is likely that visitors to Beijing will be aware of the city's air quality issues, as well as other negative coverage of China's environmental problems, it makes sense to use the opportunity of their presence to try to highlight China's work to preserve and improve environmental conditions and protect ecosystems. This, in turn, may provide a useful tool to further educate and mobilize civil society and the private sector throughout China.

Greening the games

The city of Beijing has achieved significant progress in planning and building the required 31 competition venues for the Olympic Games, including 12 newly built venues, 11 renovated and expanded venues, and 8 temporary venues which will be dismantled after the event.

In accordance with its bid commitments, BOCOG has taken steps to build sustainable venues, paying particular attention to energy efficiency, use of eco-friendly materials, water conservation, and environmental management and control of building sites. An interesting innovation is the widespread use in the venues of ground, water or air source heat pump systems to provide buildings with heat in winter and air conditioning in summertime.

The excellent results achieved by BOCOG and the city of Beijing in phasing out ozone-depleting substances (ODS) well ahead of the deadline set at national level are also noteworthy. At the end of 2004, ODS, apart from HCFC and HFC (which are still used in the car air conditioning sector), were completely phased out in the city of Beijing, six years ahead of China's Country Programme deadline, and air conditioning and fire extinguishing systems in the Olympic venues are all ODS-free. In recognition of its achievement, the Secretariat of the Vienna Convention for the Protection of the Ozone Layer presented BOCOG with a public awareness award on the occasion of the 20th anniversary of the Montreal Protocol in September 2007.

There is, however, one area of concern. While BOCOG has established guidelines to encourage sustainability in most aspects of the Games, many of its requirements are not mandatory or enforceable. Final decisions on the environmental aspects of, for instance, transport, construction, accommodation and catering, are being taken on a voluntary basis by the actors involved in staging the Games. UNEP feels this reliance on goodwill and trust, while admirable, leaves too much leeway for taking shortcuts at the expense of environmental sustainability in the case of potential conflicts related to deadlines and budget overrun.

Another aspect that is absent from BOCOG's commitments and actions is a specific undertaking to offset the added carbon dioxide emissions created by staging the Games. This is increasingly a feature of high-profile events, and is an initiative being adopted by a growing number of sports organizations and private sector entities. Excellent examples include the HECTOR project devised by the organizing committee of the XX Olympic Winter Games in Torino, and the Green Goal programme of the 2006 FIFA World Cup.

Construction and air pollution define many people's image of Beijing, but the city authorities hope that after the Olympics the world will have a new view of Beijing as a dynamic and environmentally progressive city.

Although many of the initiatives undertaken by both BOCOG and the city of Beijing have been designed to reduce energy use and, hence, greenhouse gas emissions, both during the Games and beyond, it is not too late for BOCOG to openly declare a commitment on climate change and carbon offsetting.

Air quality

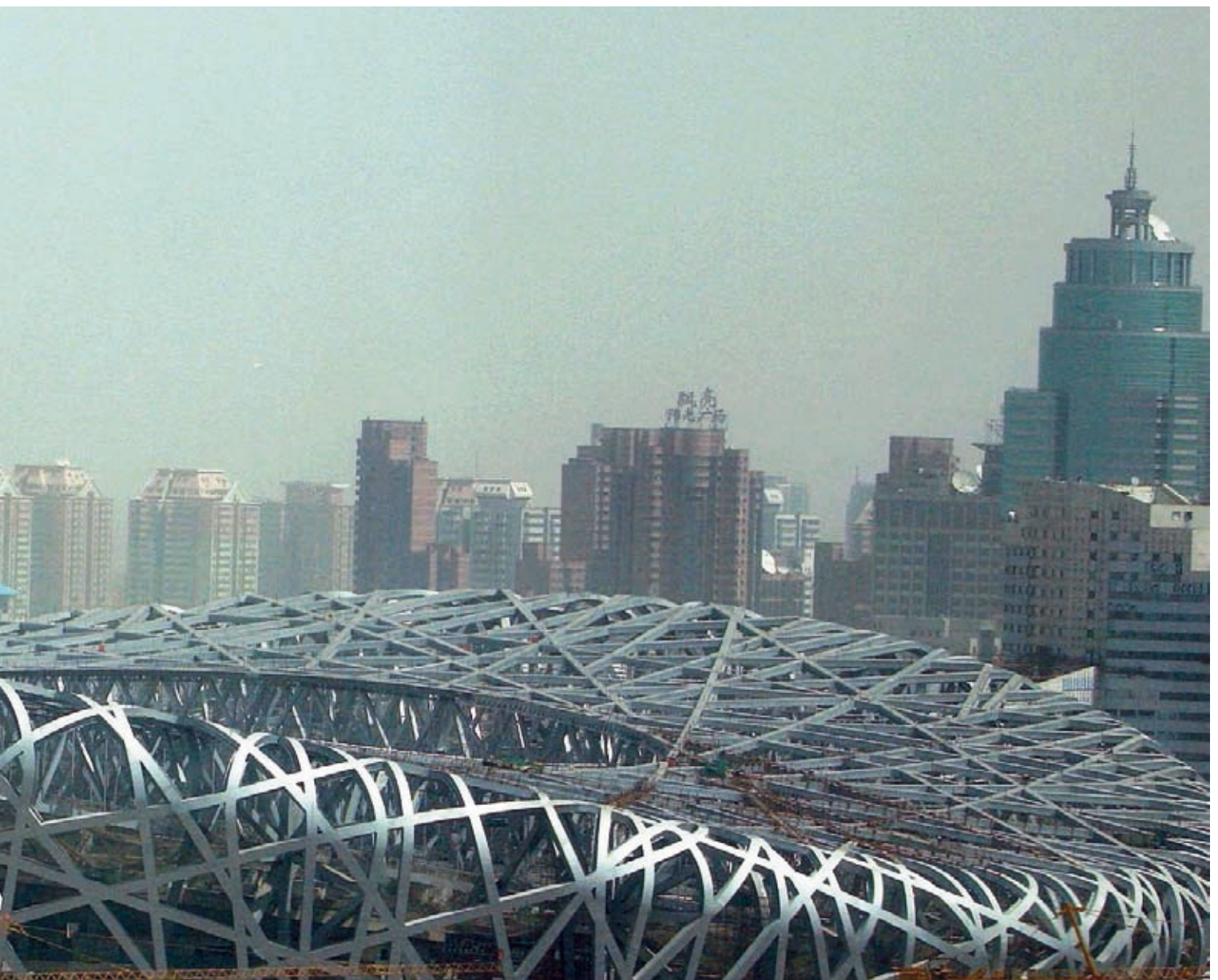
Beijing has implemented a number of initiatives to improve its air quality and reduce its air pollution. From the relocation and refitting of major polluting industries, to the conversion of coal burning boilers to cleaner fuels and the implementation of vehicle emission standards, the city can boast significant achievements. Most of these initiatives will benefit the citizens of Beijing long after the Games have closed, provided that the impetus brought about by hosting the Olympics is continued, with Games-related measures being adopted and implemented on a long-term basis by the authorities.



While it cannot be denied that the Beijing Municipal Government has made, and continues to make, strenuous efforts to improve air quality through addressing emissions from the transport, energy and industrial sectors, air pollution is still the single largest environmental and public health issue affecting the city.

The extensive use of coal and the growing number of motor vehicles, has contributed to the slow pace of improving air quality. The city's geographical location exacerbates the problem. The mountain ranges that surround Beijing block air circulation and prevent the dispersion of pollutants and natural cleansing of the air.

Particularly worrying are the levels of small particulate matter (PM_{10}) in the atmosphere, which is severely deleterious to public health. While the concentration of pollutants such as sulphur dioxide (SO_2), carbon monoxide (CO) and nitrogen dioxide (NO_2) dropped between 2000 and 2006, levels of PM_{10} remain well above World Health Organization Air



Quality Guidelines, sometimes by as much as 200 per cent or more. Compounding the problem is the high number of dust storms that plague the city, especially during the spring. For example, in the spring of 2006, the city endured 18 dust storms.

It is commonly accepted that improving air quality cannot be accomplished in a short period, or even over a period of a few years. Thus, while UNEP applauds Beijing's efforts, including initiatives to limit traffic volumes on specific days, it has to be recognized that only long-term planning, and the enforcement of measures over time will show significant results. On the basis of the data, especially PM₁₀, and despite the relatively positive trends of recent years, air quality remains a legitimate concern for Olympic organizers, competitors and observers, as well as for the citizens of Beijing.

Transport

The city has achieved results both in the area of new transport infrastructure and in renovating the public transportation fleet. New lines on the underground rail network are planned to open prior to the Games, public transportation hubs have been put into operation to serve ground lines and new roads and bridges constructed to relieve the heavy Beijing traffic.

However, it is worth noting that, as well as the attendant environmental impacts, building new roads generally only serve to encourage more traffic. UNEP would encourage Beijing to avoid primarily dealing with traffic congestion problems by building more roads, as has often happened in western cities. More effective and sustainable is improving the scope, capacity and efficiency of the public transport system, and also better encouraging the public to use that system through affordability and other incentives. BOCOG's own statistics indicate that Beijing's public transport system, which is due to be expanded, is already undersubscribed. This therefore begs the question of what the city can do to further encourage uptake of public transport options and cut down car use.

Many older buses and taxis have been scrapped and replaced with new ones that run on Compressed Natural Gas (CNG) or comply with the municipal vehicle emissions standards, enforced in the recent years by the city of Beijing. Out of a total operating fleet of 60,000 taxis and 19,000 buses, more than 47,000 old taxis and 7,000 old diesel buses had been replaced or refitted by the end of 2006. New buses powered by Compressed Natural Gas (CNG) were introduced to replace old buses: 3,795 CNG buses are now running in Beijing, one of the largest fleets of this kind operating in any city in the world. The Municipal Government has also implemented local standards for vehicle emissions equal to Euro I, Euro II and Euro III, to match internationally recognized vehicle emission limits. It is hoped that the Central Government will consider adopting such standards outside Beijing in the near future.

Private vehicles have to comply with the new regulations. More than 1,000 new vehicles are registered every day in Beijing and traffic is one of the main environmental issues in the city. Nonetheless, data provided by the authorities appears to show that air pollution directly attributable to vehicle emissions is being addressed by initiatives such as emissions control and monitoring and a vehicle environmental labelling system put in place by the Municipal authorities in 2001.

Energy and industry

Although many of Beijing's environmental commitments are not specific to the Olympics, the Beijing Games has undoubtedly provided a strong catalyst for many environmental measures. For example, Beijing's energy infrastructure is undergoing massive restructuring, with a gradual transition from heavy dependence on coal to cleaner energy sources, such as natural gas, as well as geothermal energy and, to a lesser extent, wind energy. The purchase of natural gas in the city increased tenfold between 1998 and 2006, from 320 million m³ to 3,520 million m³ and many coal-fired boilers and other appliances have been switched to less polluting energy sources or have been technically renovated to reduce pollution.

Reducing dependence on coal will help Beijing to improve energy efficiency and air quality. Nonetheless, the city remains heavily reliant on coal, with its associated environmental consequences, ranging from local air pollution to the long-range transport of toxic elements such as mercury.

The environmental impacts of the industrial sector have also decreased, due to the closure or relocation of some of the most polluting industries within the city's area and the development of new industrial areas in the city's suburbs. Other developments include the adoption of advanced environmental technologies, and the implementation of new pollution standards and an industrial pollution control system. The relocation of Capital Steel and Iron Group to a new more efficient plant outside of Beijing is an example of Beijing's efforts to reduce industrial pollution within the city's boundaries.

Water

Beijing has achieved substantial results in improving wastewater management, with many new wastewater treatment plants being built, along with an improved sewage network, and is on track to achieve its bid commitment of a total 2.8 million m³/day wastewater treatment capacity. City administrators have also made significant efforts to save and recycle water resources, which is increasingly important as the city has been affected by years of enduring drought. A variety of water saving schemes and rainwater collection and re-use systems have been designed and implemented in the Olympic Village and several competition venues.

Beijing has also made efforts to improve the quality and availability of drinking water, placing the protection of drinking water reservoirs and improving water quality high on the agenda. Nonetheless, there remains considerable room for improvement in the drinking water distribution network and in water quality at the user-end. At the source, water is in compliance with the quality standards set by the World Health Organization but, because of the antiquated distribution network, by the time the water arrives at the consumer's tap it is not the same quality as when it left the treatment plant.

Waste

Beijing has made considerable progress in the field of solid waste management. Using the general '3-R' circular economy principles of 'reduce, reuse, and recycle', Beijing has implemented a systemic approach to managing urban, industrial and hazardous waste, involving improving waste processing in the city, with new processing and disposal

facilities for urban and hazardous waste (industrial and medical) being built around the city. As a result, Beijing is close to achieving its goals for waste management set during the candidature phase. According to official data, 4.13 million tons were produced in 2006 in the eight central districts, while the overall processing capacity was close to 3.98 million tons, giving a processing rate of 96.5 per cent.

Beijing is also working to improve education and awareness among its citizens about the importance of separating waste for recycling and reuse. Recycling programmes are now visible in some residential areas in the central districts of the city. One of UNEP's concerns related to the Olympic Games, however, is that there is more emphasis on waste processing than on minimizing waste. A number of programmes have been developed for other major sporting events to reduce waste. UNEP feels this is an area where BOCOG could devote more attention.

Forestation and protected natural areas

A key area outlined in the bid commitments is forestation and developing new protected areas to improve green coverage in the city and its surroundings. Since winning the bid to host the Olympic Games, green coverage in Beijing, defined as the area covered by lawns and the shadow of trees and bushes, has expanded to more than 50 per cent of the city's area. Beijing has created three different green ecological zones in the mountain, plains and urban areas to create a green shelter for the city. At the end of 2006, the three ecological zones were nearly completed, including a total of 20 natural reserves to protect forests, wild plants and animals, wetlands, and geological formations.

Conclusion

Beijing has already achieved many of its bid commitments, for example on waste water treatment, water source protection and waste management, and appears to be well on the way to fulfilling all of them. In UNEP's view, this is an achievement in itself, especially considering that the Organizing Committee of the previous Olympic Summer Games failed to follow up on their environmental promises.

Beijing's old or nonexistent infrastructure, rapid development and geographical constraints mean the city still has considerable challenges to overcome, especially in the areas of air and water quality. Nonetheless, there is no doubt that the environmental projects developed in Beijing prompted or accelerated by the award of the Olympics represent a long-term positive legacy for the city, both in terms of new infrastructure and implementing new environmental technologies.

At the moment, some of these initiatives, such as vehicle emission standards, remain exclusive to Beijing. If the new environmental standards and measures taken in Beijing for the Olympics are adopted countrywide, and help to influence China's development, the award of the 2008 Olympic Games can be counted, from the environmental point of view, as a success.







PART ONE: GREENING THE OLYMPICS

Chapter 1: The bidding phase, the Beijing 2008 Environmental Commitments and The 'Green Olympics' concept

1.1 THE BID

On 1 February 2000 the city of Beijing began the application process to host the XXIX Olympic Games. Beijing had to compete against Istanbul (Turkey), Osaka (Japan), Paris (France), Toronto (Canada), Bangkok (Thailand), Havana (Cuba), Cairo (Egypt), Kuala Lumpur (Malaysia) and Seville (Spain).

The application process consisted of two phases. During the first phase, culminating in August 2000, Beijing was requested to fill in a questionnaire whose answers were assessed by a working group made up of external experts and IOC administration staff members. The cities of Beijing, Istanbul, Osaka and Paris advanced to the second round. During the second round, each candidate city was inspected by an Evaluation Commission, established by the IOC, between 1 September 2000 and 15 May 2001, when their final report on the candidate cities testified to the high quality of Beijing's application.

In its report, the Evaluation Commission wrote that: "It is the Commission's belief that a Beijing Games would leave a unique legacy to China and to sport and the Commission is confident that Beijing could organize excellent Games."

On the environment aspects of the bid, the Evaluation Commission noted: "Beijing currently faces a number of environmental pressures and issues, particularly air pollution. However, it has an ambitious set of plans and actions designed and comprehensive enough to greatly improve overall environmental conditions. These plans and actions will require a significant effort and financial investment. The result would be a major environmental legacy for Beijing from the Olympic Games, which includes increased environmental awareness among the population."

"Although many of the plans are not Olympic-specific, the bid has provided, and a Beijing Games would provide, an impetus and a catalyst for many measures, and their timing. The Beijing Municipal Government is committed to greatly reducing the pollution levels of Beijing, increasing environmental areas and protection, introducing environmental technology and controls, such as transport emission measures, and increasing sewerage treatment."

The Commission also observed that the centrepieces of the overall environmental plans and policies were:

- » the Beijing Sustainable Development plan (1998–2007), costing US\$ 12.2 billion, (with US\$ 3.6 billion already spent), including 20 key projects and a number of anti-pollution measures, such as removal or alteration of factories, conversion of businesses from coal to gas, and planting of trees
- » the ‘Olympic Green’ project incorporating 14 venues, the Olympic Village, and the 760 hectare ‘Forest Park’.



*The official
countdown clock
in Tiananmen
Square in Beijing*

“The Bid Committee claims the Beijing and OCOG environmental plans and actions will leave ‘the greatest Olympic Games environmental legacy ever,’ the Commission observed. “Initial environmental impact assessments (EIAs) have been conducted, and detailed EIAs will be done for all venues. The OCOG will have a budget of US\$ 118 million for Games environmental measures, spread across budgets of relevant departments. In accordance with this, environmental personnel, considerations and policies will be integrated into all departments and operations of the OCOG. There will be a comprehensive environmental education programme.”

On 13 July 2001, during the 112th Session of IOC in Moscow, Beijing was officially announced by the IOC President Juan Antonio Samaranch as the winner of the XXIX Olympic Games and the XIII Paralympic Games, to be staged in 2008.

The Games of the XXIX Olympiad will take place in Beijing from 8 August to 24 August 2008. Most of the competitions will be held in Beijing, while the equestrian event will take place in Hong Kong and the sailing competition will be in Qingdao. Tianjin, Shanghai, Shenyang and Qinhuangdao will host some events of the football preliminaries. The Games will award 302 gold medals for 28 sports and 38 disciplines.

The Games of the XIII Paralympics will be held on 6 September to 17 September 2008. All of the 20 sports will take place in Beijing, except for the sailing and the equestrian events which will be held in Qingdao and Hong Kong.

1.2 THE BID COMMITMENTS

The 2000 bid was not Beijing’s first. The city had already bid for the 2000 Olympic Games back in 1991, which was won by the city of Sydney (Australia). After the first application, Beijing widely improved its candidacy dossier, integrating a comprehensive environmental programme. The city made plans, among other initiatives, to relocate polluting industries, renovate old areas of the city, and improve waste management and the quality of its air and drinking water.

Several targets of the Beijing ‘Environmental Master Plan’ (an environmental protection programme developed by the Municipal Government for the period 1997-2015, funded by the World Bank) were integrated into the bid with accelerated deadlines, with some targets, originally scheduled to be achieved in 2010, set for 2008, the year of the Games.

As a result, US\$ 12.2 billion was allocated for funding 20 major improvement projects (US\$ 5.6 billion over the period 1998-2002 and US\$ 6.6 million between 2003 and 2007). Table 1.1 shows the 20 key goals set by the city of Beijing. These are examined in detail throughout this report.

TABLE 1.1: ENVIRONMENTAL GOALS FOR BEIJING BID COMMITMENTS

	Goal	Key word
1	Construction of the second Shan-Jing natural gas pipeline with a transport capacity of 4-5 billion m ³ /year, by 2007.	Energy
2	Conversion of coal burning boilers in the urban area, increased use of clean fuels and energy structure readjustment.	Energy
3	District heating supply to over 50% of the urban civil residential area. Electricity and geothermal heating coverage up to 16 million m ² .	Energy
4	Improvement of transport infrastructure and construction of key roads.	Transport
5	Improvement of the public transportation system. Use of clean fuels in 90% of public buses and 70% of taxis.	Transport / energy / air quality
6	Implementation of a vehicle emissions standard equal to Euro II for light vehicles by 2004.	Transport / air quality
7	Improvement of the management of flying dust in building sites and road construction. Prohibition of any kind of open air incineration. Coverage of outdoor storage areas of waste and other materials.	Air quality
8	Protection of Miyun and Huairou reservoirs (sources of drinking water) and improvement of their water quality. Implementation of the silt elimination and water clarification project in Guanting reservoir.	Water
9	Technical transformation and renovation of the Jingmi canal to improve water quality and flow.	Water
10	Readjustment of the agricultural structure to promote development of high quality, high efficiency and water saving agriculture. Strengthened efforts to reduce flying dust in the agricultural sector.	Water / air quality
11	Improvement of the city sewage network and wastewater treatment system. Achievement of a 2,8 million m ³ /day total wastewater treatment capacity by 2007.	Water
12	Construction of hazardous waste disposal facilities for a total capacity of almost 10,000 tons/year (including medical and radioactive waste processing and disposal plants).	Waste

13	Implementation of a safe urban domestic waste disposal system by 2007. Establishment of processing facilities for non-hazardous urban waste in the Beijing suburban area.	Waste
14	Reduction and control of industrial pollution. Implementation of industry pollution registration, monitoring and licensing system. Closing down of heavy polluting, high energy consuming and resource-wasteful enterprises.	Industrial sector / waste / water / air quality / energy
15	Relocation of more than 200 industrial enterprises from within the Beijing Fourth Ring Road. Readjustment of industrial structure. Relocation, closure or renovation of heavy polluting and energy consuming plants in the Beijing southeast area and Shijingshan district. Phase-out of old technologies. Improvement of environment quality in the southeast suburb and Shijingshan district.	Industrial sector / waste / water / air quality / energy
16	Achievement of 40% of green cover in the urban area. Establishment of a green belt alongside the Fourth Ring Road (100 m wide green belt on both sides of the road except for those sections running through already built up areas).	Ecosystem
17	Realization of the Five River Ten Road green belt. Accomplishment of nearly 50% of forest coverage rate. Realization of three green ecological belts in the mountain, plain and urban areas respectively.	Ecosystem
18	Strengthening of natural preservation zones and establishment and management of key conservation areas (such as wetlands, forests and bird habitats). Establishment of natural protection areas over 8% of the municipal area.	Ecosystem / protected areas
19	Formulation and implementation of an action plan to phase out Ozone-depleting Substances (ODS). Achievement of the target by 2005.	Air quality / ozone
20	Implementation of cutting-edge environmental technologies in the design of Olympic venues. Use of natural resource-efficient, non-polluting and recyclable materials for facilities and equipment. Preservation during the construction of Olympic venues of indigenous vegetation and ecological ecosystems. Protection of cultural relics. Improvement of green coverage. Promotion of public transportation and clean fuel vehicles in the Olympic transport system.	Venues design / natural resources / forestation / transport

Source: BOCOG

Beijing has already achieved many of its bid commitments, for example on waste water treatment, water source protection and waste management, and appears to be well on the way to fulfilling all of them. In UNEP's view, this is an achievement in itself, especially considering that the Organizing Committee of the previous Olympic Summer Games failed to follow up on their environmental promises.



1.3 THE 'GREEN OLYMPICS' CONCEPT

In addition to the commitments made by the Beijing Municipal Government, the Bid Committee set its own ambitious goals to deliver a successful Games without impacting negatively on ecosystems, and to stage a truly 'Green Olympics'. The commitments included supporting environmental education and awareness raising, cooperation with environmental NGOs, instituting environmental management systems, sustainable transportation during the Games, eco-design for the venues, green procurement (environmental-friendly purchasing of materials), green accommodation, tree planting and green marketing.

The 'Green Olympics' concept was launched in early 2000 by BOCOG and the Beijing Municipal Government to promote the environmental sustainability of the Games. It is part of the more general 'One World One Dream' concept, which underlines the BOCOG's commitment to Olympic values, among which sustainable development is a key element.

The 'Green Olympics' concept is reflected in the five Olympic Mascots: four are animals representing natural elements. The mascots promote environmental awareness and underline the Beijing's commitment:

- » Beibei is a flying fish and represents 'clear water'.
- » Jingjing is a panda, conveying the messages of environmental protection and 'Green Hills'.
- » Yingying is a Tibetan endemic protected antelope reflecting the Beijing commitment to Green Olympics and the 'Grass-covered Ground' idea.
- » Nini is a flying swallow, representing the concept of 'Blue Sky'.

The fifth mascot, Huanhuan, represents the Olympic Flame.



From left to right:
Beibei, Jingjing,
Yingying and Nini
© BOCOG

FIGURE 1.1: THE FOUR ANIMAL MASCOTS OF THE BEIJING GAMES.

The environmental message is also conveyed through the Green Olympics logo, launched by the Organizing Committee in September 2005. The Committee explains on its website: “The Green Olympics logo is composed of people and green trees. In the shape of an interlacing stripe, the green line, made from one stroke, looks like a dense tree crown or a flower in full-bloom filled with vitality and hope. The colour green fully embodies the idea of environmental protection and sustainable development. The lofty tree, formed by the tree crown and the people underneath, represents the harmonious unity between human and nature. The Green Olympics Logo is mainly used for activities of Green Olympics communication and education.”

FIGURE 1.2: THE GREEN OLYMPICS LOGO



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Chapter 2: Organizational structure and involved parties

Organizing an Olympic Games is a complex and multifaceted process that requires at least seven years of planning and great organizational and economic effort. Shortly after the IOC election, the winning city usually sets up a special Organizing Committee to fulfil the bid commitments and deliver the Games.

The Committee, the main actor in the process, works in close cooperation with the relevant public bodies (such as the hosting municipality, ministries and the central national government) and the private sector (such as sponsors, licensees and contractors), and coordinates the activities foreseen in the Host City Contract signed by the municipal administration, the National Olympic Committee and the IOC.

Many other bodies and stakeholders are increasingly involved in the organizational process as the Games approach, as well as many thousands of volunteers recruited to help to stage the Games.

The following paragraphs describe the main parties involved in the organization of the Beijing Games and, in particular, their main responsibilities related to implementing the environmental programme.

2.1 THE BEIJING 2008 ORGANIZING COMMITTEE FOR THE GAMES OF THE XXIX OLYMPIAD (BOCOG)

The Beijing 2008 Organizing Committee for the Games of the XXIX Olympiad (BOCOG) was established on 13 December, 2001, five months after Beijing won the bid for 2008 Games.

BOCOG's main task is to host a first-class Olympic Games, to implement the strategic concepts of 'New Beijing, Great Olympics', the official motto for Beijing's bid for hosting the 2008 Olympic Games, and to leave a positive legacy for Beijing in the world of sports.

In practical terms, this means that the Committee is responsible for staging all sport competitions and the opening and closing ceremonies, for managing the Olympic Villages that will host athletes and coaches, the Media Villages, the Main Press Centre, the International Broadcasting Centre, and the sporting venues.

The Committee also coordinates transport, medical and technical services, designs and promotes environmental and cultural programmes, manages the Olympic Torch Relay, oversees the accreditation process, and manages the overall image and presentation of the Games.

BOCOG is further responsible for implementing the following three concepts, selected as the priority strategies meant to characterize the Beijing Olympic Games:

Green Olympics

The city of Beijing identifies environmental protection and strict environmental standards as a key requisite for the design and construction of the Olympic Games facilities. BOCOG is charged with ensuring that environmentally friendly technologies and measures are applied in the construction of infrastructure and venues, and that urban and rural forestation and environmental protection are carried out. The Committee is also responsible for promoting environmental awareness among the general public, and encouraging the citizens of Beijing to make 'green' consumption choices.

High-tech Olympics

The second concept relates to the incorporation of the latest national and international technological and scientific innovations in the Games. The Beijing Olympic Games are an opportunity to showcase the city's high-tech achievements and innovations.

People's Olympics

The Beijing Olympic Games are the stage to spread Olympic values and to showcase Chinese culture—specifically Beijing's historical and cultural heritage. The Games also present the opportunity to promote friendship between peoples and races of the world and to encourage mental and physical health.

2.2 BOCOG'S ORGANIZATIONAL STRUCTURE AND THE ENVIRONMENT

The Committee is organized in several departments, each dealing with one or more tasks, from venue planning to environmental management. This organizational structure is expected to grow and evolve as the Games get closer. BOCOG is gradually building its staff and capacity in line with the demands of the Olympic preparations. By 2008, there will be more than 30 departments and nearly 4,000 staff under its umbrella.

Within the Committee, the Construction and Environment Department is responsible for the coordination and supervision of the construction of the Olympic venues and the relevant environmental protection issues.

The Deputy Director of the department, Yu Xiaoxuan, is directly in charge of the environmental sustainability of the Games. Mr. Yu coordinates two divisions: Environmental Management and Environmental Engineering.

The Environmental Management division is responsible for implementing the Environmental Management System of the Committee, for tracking the fulfilment of the bid commitments, for environmental communication, risk management, and cooperation with international organizations (such as UNEP and UNDP) and environmental NGOs. The Environmental Engineering division is in charge of managing the environmental aspects of the design and construction of the venues, one of the most high-impact areas of staging an Olympic Games, and of the venues' waste and cleaning programme.

Possibly the authority of these two environmental divisions to influence decision making is not as strong one may wish. While they can function as watchdogs on legal compliance on areas under their direct authority, in other areas their role is more advisory or consulting.

While BOCOG has established guidelines to encourage sustainability in several aspects of the Games, most of its requirements are not mandatory or enforceable. Many of the final decisions on the environmental aspects of, for instance, transport, construction, accommodation and catering, are being taken on a voluntary basis by the actors involved in staging the Games. UNEP feels that this reliance on goodwill and trust, while admirable, leaves too much leeway for taking shortcuts at the expense of environmental sustainability in the case of potential conflicts related to deadlines and budget overrun.

The role of BOCOG's senior management in championing the environmental programme or activities is also not clear. Since the work of BOCOG's various departments has environmental implications, incorporating environmental issues in their processes would be easier if there was a clear feeling that environmental impact was taken seriously from the top of the organization down, for instance by the institution of a systematic training programme on environmental issues for relevant staff in all departments.

While BOCOG has devoted considerable effort into fulfilling the letter and spirit of its promise to deliver a 'Green Olympics', for future such events, UNEP feels that the IOC might consider making strict environmental standards mandatory for all areas of Olympic planning, including procurement and relations with service providers and sponsors.



COMMENT

BOCOG's other departments include;

Media and Communications Department (environmental education and communication):

The department is responsible for information preparation and news release activities, media relations and general publicity, as well as the contents of the BOCOG official website and the Olympic education programmes.

Marketing Department (cooperation with sponsors on environmental projects):

The Marketing Department is responsible for all fundraising activities associated with the Beijing Olympic Games, and for the coordination of marketing activities, which include

*Paolo Revellino,
principal author
and researcher
of the report
(centre), with
representatives
from the
2008 Project
Construction
Headquarters
Office during a
field visit at the
Olympic Green.*

the sponsorship programme, the licensing programme, and the ticketing programme. This department is also responsible for the implementation of the IOC's marketing plan within the jurisdiction of the Chinese Olympic Committee.

Olympic Logistics Centre (green procurement programme):

The Centre is in charge of providing services and goods for the Olympic Games. It is mainly responsible for materials planning, and for the procurement, storage, distribution, tracking, management, retrofit and disposal of all the materials for hosting and staging the Olympic and Paralympic Games.

Games Services Department (green accommodation and catering):

The Games Services Department is responsible for accommodation, transportation, accreditation, catering and spectator services, and the operations of the Olympic Village and other venues for the Beijing Olympic Games and the Beijing Paralympics.

Venue Management Department (cleaning and waste management programme):

The Venue Management Department is in charge of coordinating and managing all activities taking place within the venues prior to and during the Games. During the preparation phase, the department leads the planning and coordination of all competition venues and non-competition venues to facilitate the venue-oriented tasks. During the Games, the



department will be part of the Main Operations Centre (MOC) and will directly manage the operations in every site.

Transport Department (sustainable transport):

The Transport is responsible for transport services and traffic management for Olympic Family the Beijing Olympic Games and Paralympic Games.

Olympic Torch Relay Centre (eco-friendly torch relay programme):

The Olympic Torch Relay Centre is responsible for planning the Beijing 2008 Olympic Torch Relay, including liaison with relay cities, route arrangement, torchbearer operations, ceremonies, celebrations, public relations, media communications, image design, marketing, brand management, security, laws and regulations, logistics and transportation.

2.3 BEIJING 2008 PROJECT CONSTRUCTION HEADQUARTERS OFFICE

The 2008 Project Construction Headquarters Office is a temporary public body established by the Beijing Municipal Government to oversee and coordinate construction of the Olympic venues and related infrastructure.

The 2008 Project Construction Headquarters is responsible for designing, planning and managing the construction of the venues; coordinating venue feasibility studies, and managing administrative issues (i.e. land requisition and resident relocation). The 2008 Headquarters Office is also in charge of resolving any problems which may arise during the construction phases.

The Headquarters Office also oversees and monitors building site compliance with safety, quality and environmental standards. Office personnel monitor compliance with the given deadlines and financial budget. Furthermore, the Headquarters Office guarantees implementation of technical criteria and quality requirements set by the International Olympic Committee (IOC) and the International Sports Federation. The Headquarters Office closely liaises on the above matters with BOCOG and the relevant governmental departments.

2.4 BEIJING MUNICIPAL GOVERNMENT

The Beijing Municipal Government is mainly responsible for implementing the 20 key environmental projects included in the bid commitments and plays an important role in the organization of the Olympic Games. A short description of the main municipal bodies involved in the process is given in the table opposite.

2.5 STATE ENVIRONMENTAL PROTECTION ADMINISTRATION (SEPA)

The State Environmental Protection Administration's main tasks are to protect natural ecosystems and control environmental pollution. The Administration is also in charge of nuclear safety, environmental law enforcement and promoting sustainable development among the general public.

SEPA formulates general and specific policies, laws and regulations, and administrative rules and regulations at national level; advises or comments on the environmental aspects of economic and development plans and formulates national environmental protection programmes. The main fields in which SEPA operates are air quality, water, soil, noise, solid wastes, toxic chemicals, vehicle emissions and marine environmental protection.

Many of the environmental standards and regulations that BOCOG and the Beijing Municipal Government have to comply with have been developed by SEPA, which has an overall guiding role in the environmental sustainability of the Games.

**TABLE 2.1: MAIN ENVIRONMENTAL TASKS AND RESPONSIBILITIES
OF SELECT GOVERNMENT AGENCIES**

Beijing Municipal Government	Main environmental tasks and responsibilities
Beijing Water Authority	Water legislation and enforcement; flood control; irrigation; water saving; water supply and wastewater treatment; waterworks construction and management; water resources development; water environment management.
Beijing Municipal Bureau of State Land and Resources	Development of geothermal energy
Beijing Municipal Bureau of Industrial Development	Closure or relocation of high polluting industries. Readjustment of production processes. Relocation of more than 200 factories from within the Beijing Fourth Ring Road.
Beijing Municipal Commission of Development and Reform	Development and enforcement of legislation and regulations on energy conservation; energy consumption reduction and efficiency. Implementation of energy-related projects.
Beijing Environmental Protection Bureau	Air quality. Conversion of coal-fuelled boilers. Reduction of vehicle emissions. Drinking water resources protection. Hazardous and radioactive waste management (establishment of disposal facilities). Industrial pollution control.
Beijing Municipal Committee of Transport	Public transportation (buses and taxis). Development of clean transportation projects. Construction of transport facilities (i.e. roads, underground rail, transport hubs)
Beijing Municipal Administration Commission	Urban waste management. Dust control. District heating in the urban area. Construction of medical waste disposal facilities.
Beijing Gardening and Greening Bureau	Forestation. Green coverage. Establishment and management of natural protected areas.
Beijing Gas Group	Natural gas and liquid petroleum gas (LPG) supply in the city of Beijing
Beijing Municipal Administration and Law Enforcement Bureau	Prevention and control of environmental pollution. Law enforcement.
Olympic Science and Technique Commission	Promotion of fuel cell technology
Beijing Municipal Bureau of Culture Heritage	Protection and conservation of cultural relics

Chapter 3: The city of Beijing and the Olympic system

3.1 THE CITY OF BEIJING

Beijing is the capital of the People's Republic of China and a city with a long history and cultural tradition. It is situated at the northern tip of the North China Plain, which opens to the south and east of the city, and is 150 km southeast of the Bohai Sea. The total area of the city occupies 16,400 km², of which 62 per cent is mountains and 38 per cent plains; the urban area occupies nearly 1,040 km².

Beijing is surrounded by mountains to the north and west. The northwestern part of the municipality is crowned by the Jundu Mountains, while the western part is framed by the Xishan Mountains. Major rivers flowing through the municipality include the Yongding River and the Chaobai River, part of the Hai River system that flows in a southerly direction.

© IOC John Huet



Beijing has a monsoon-influenced humid climate, characterized by hot and humid summers and cold, dry winters. Average temperatures in January are around -7 to -4 °C, while average temperatures in July are at 25 to 26 °C. Annual precipitation is over 600 mm, with 75 per cent of that in summer. Dust from erosion of deserts in northern and northwestern China result in seasonal dust storms that plague the city, especially during the spring.

The urban area of Beijing is in the south-central part of the administrative territory and is expanding rapidly. The urban metropolitan area is divided by concentric ring roads, of which the outermost runs through several satellite towns. The city is composed of 18 administrative districts and counties with a total population of nearly 16 million.

3.2 THE COMPETITION VENUES AND THEIR POST-OLYMPIC USE

The Beijing 2008 Olympic Games will host the competitions of 28 different sports, 26 of which will be in the city of Beijing. To accommodate the large number of sporting events, the city has planned to build a total of 31 competition venues: 12 newly-built, 11 renovated and/or expanded and eight temporary, to be used during the Games and dismantled shortly after the event.

The distribution of the venues in the city has been designed with one central area and three scattered competition areas. The centre is composed by the Olympic Green, carved out of the urban space of Beijing along the Fourth Ring Road. It has been identified as the location for the National Stadium (the so called Bird Nest), the National Aquatics Centre (the so called Water Cube), the tennis competitions and the archery and hockey competitions. The three other competition areas are the University Area (northwest Beijing), the Western Community (west Beijing) and the Northern Scenic Area (northeast Beijing).

According to the IOC Evaluation Commission's 2001 report on the cities bidding for the 2008 Olympics, "The organizational plan of venues, including the Olympic and Media Villages and the International Broadcasting Centre / Main Press Centre, is compact.

The location of the environmentally impressive 'Olympic Green', the good access to venues and short travel times mean a high quality sport concept, particularly for athletes. The significant venue construction programme appears achievable, and will ensure an excellent legacy for Chinese sport."

It is evident that a great deal of thought has gone into the environmental, functional and aesthetic elements of the design of the Olympic venues, and that the principles of the 'Green Olympics' concept have indeed informed key decision making from the outset of preparing for the 2008 Beijing Olympics.

Chapter 4: Greening the Games

4.1 THE BEIJING GREEN OLYMPICS

'Green Olympics' is one of the three main concepts that drives the Beijing 2008 Games and is considered as the main pillar of 'New Beijing, Great Olympics'. (The other two are 'High-tech Olympics' and 'Peoples' Olympics')

To implement the concept and to achieve the sustainability goals outlined in the candidature dossier, BOCOG created a Construction and Environment Department and has developed several sustainability projects.

Since its establishment, the BOCOG Construction and Environment Department has managed the environmental aspects of the multiple Games related activities, from Olympic venues construction, marketing, procurement, accommodation and transport, to catering and communication to name a few.

The undergoing work is carried out in close cooperation with other BOCOG Departments, with a 'teamwork' approach, showing that the environment is a concern of the whole Committee and that the environmental principles have been incorporated in the day-to-day activities.

4.2 THE ENVIRONMENTAL MANAGEMENT SYSTEM

To approach the environmental aspects of the Games systematically and to set a comprehensive framework under which to coordinate all the sustainability projects, BOCOG started in early 2002 to design an Environmental Management System (EMS) complying with the international standard ISO 14001.

The overall concept of the ISO 14001 standard is to establish an organized approach to reduce the impact of the environmental aspects which an organization has under its control. Hence the standard is meant to help organizations minimize their operational negative impacts on the environment (i.e. air, waste, water), to comply with applicable laws, regulations, and other environmentally oriented requirements, and continually improve their environmental performance.

The President of the Organizing Committee signed the environmental policy, outlining BOCOG's overall strategy in the domain, and in 2003 and 2004 BOCOG implemented the

environmental policies and procedures issued to manage the relevant impacts and trained its staff on the environmental aspects of the Games.

EMS's purview includes several activities such as securing venues, planning and construction; selecting the Games partners; the green office project; catering services; materials procurement; accommodation services; torch relay; transportation; communication and organization of large-scale events.

The Committee passed the ISO 14001 (ed. 1996) certification audit in September 2005 and one year later was also certified according to the new 2004 release of the standard.



BOCOG's ISO 14001 certificate

An aspect that is absent from BOCOG's commitments and actions is a specific undertaking to offset the added carbon dioxide emissions created by staging the Games. This is increasingly a feature of high-profile events, and is an initiative being adopted by a growing number of sports organizations and private sector entities. Excellent examples include the HECTOR project devised by the organizing committee of the XX Olympic Winter Games in Torino, and the Green Goal programme of the 2006 FIFA World Cup. While many of the initiatives undertaken by both BOCOG and the city of Beijing have been designed to reduce energy use and, hence, greenhouse gas emissions, both during the Games and beyond, UNEP feels that BOCOG has missed an opportunity for the Games to embrace what has fast become a standard process. UNEP understands that the non-governmental organization Conservation International (CI) has been asked by BOCOG to calculate the carbon footprint for the 2008 Games, and that several government agencies, and other public and private entities have links to CI's carbon calculator from their web sites. Nonetheless, UNEP recommends that BOCOG considers developing and implementing a carbon neutral programme that offsets, at a minimum, all the emissions that are generated within China as a result of the Games.

4.3 ENVIRONMENT AND THE OLYMPIC VENUES

The city of Beijing planned to construct 31 competition venues for the Olympic Games, including 12 newly built venues, 11 renovated and expanded venues, and eight temporary venues that will be dismantled after the event. The construction process started in December 2003 and is planned to be completed by the end of 2007.

BOCOG, in close cooperation with the 2008 Project Construction Headquarters Office of the Beijing Municipal Government (hereafter 2008 Headquarters Office), developed three different documents to ensure the sustainability of the design and building phases:

- Environmental Protection Guidelines for the Olympic Projects,
- Environmental Protection Guidelines for the Renovated or Expanded Olympic Projects, and
- Environmental Protection Guidelines for the Temporary Projects

The guidelines, which provide recommendations on venue planning and design focus on energy conservation in the buildings, eco-friendly materials, water resources protection, waste management and noise pollution. The guidelines have been included in the call for tenders for the design contracts and have guided the venues' project design process. They also include some information on the environmental management of the Olympic venues.

According to data released by the 2008 BOCOG Headquarters Office, environmental impact assessments were carried out for all the Olympic venues. To minimize environmental impacts

of the venues, relevant departments of the Beijing Municipal Government recommended compliance procedures for the venues.

Deciding the geographical locations of the venues took environmental considerations into account. Natural protected areas, drinking water sources, and treatment plants, such as the Miyun Reservoir, Guanting Reservoir, Huairou Reservoir and the No. 8 Drinking Water Factory and its surroundings, were ruled out as possible locations.

The venues are spatially distributed in Beijing according to a design of 'one centre plus three areas'. This design encompasses one central Olympic Green and three districts: the University District, the Western Community District and the Northern Scenic District.

The following tables list the competition venues planned in the city, the environmental technology used, the budget allocated for each of them (where available), and their Olympic and post-Olympic use. The venues' post- Games use will set the 'hard' infrastructure legacy of the Games: opening new sport, recreational and commercial infrastructure for the benefit of the citizens of Beijing.



Beijing's National Stadium, known as 'the Bird's Nest' is the centrepiece of the Olympic Green, seen at left in an architect's model.

TABLE 4.1: VENUES AND THEIR POST- OLYMPICS USES

Venue	Sport	Project	Budget (USD million)	Project Description	Post-Olympic use	Post-Olympic owner
National Stadium	Athletics Football	New venue	247.51	Total planned area 258,000 m ² ; main stadium for the Games; two warm-up fields attached; 91,000-seat capacity.	To be used for international and domestic athletics competitions and football events; the biggest of its kind in Beijing to provide services for public sporting events, entertainment and other commercial purposes	Beijing Municipal Govt.
National Indoor Stadium	Gymnastics, Handball (finals)	New venue	46.21	Total planned area 80,400 m ² one warm-up field attached.	To be used for public sporting events, including high-profile sports competitions; available for shows and performances, exhibitions and other entertainment activities	Beijing Municipal Govt.
National Aquatics Centre	Swimming, Diving, Water polo (finals), Synchronized Swimming	New venue	108.76	Total planned area of 79,500 m ² ; 6,000 permanent and 11,000 temporary seats	A large multifunctional aquatics centre after the Games; available for public sports and entertainment.	Beijing Municipal Govt.
Fencing Hall	Fencing Modern Pentathlon (Fencing and Shooting)	Temporary venue	10.61	Temporary venue located inside the Convention Centre; total planned area 56,200 m ² .	Venue to be dismantled after the Games	Beijing Municipal Govt.
Olympic Green, Archery Field	Archery	Temporary venue	7.8		Venue to be dismantled after the Games	Beijing State-owned Assets Management Company

Venue	Sport	Project	Budget (USD million)	Project Description	Post-Olympic use	Post-Olympic owner
Olympic Green, Tennis Centre	Tennis	New venue	n.a.	Total planned area 28,400 m ² .	Tennis competitions and training	Beijing State- owned Assets Management Company
Olympic Green, Hockey Field	Hockey	Temporary venue	n.a.	Total planned area 17,000 m ² .	To be partially dismantled after the Games and partially reserved for competitions and training.	Beijing State- owned Assets Management Company
Olympic Sports Centre Stadium	Football (competitions and training) Modern Pentathlon (Horse riding, track events)	Renovated venue	28.57	Total planned area 37,000 m ² ; 40,000 seats capacity.	To be used as a training facility for the national teams, available for high-profile sports competitions and commercial purposes, such as concerts and performances, congregations, exhibitions and other big events; available for the public sporting.	State Sport General Administration
Olympic Sports Centre Gymnasium	Handball (preliminaries)	Renovated venue	7.13	Total planned area 47,400 m ² ; 2 warm-up fields attached.	To be used as a training facility for the national teams, available for high-profile sports competitions and commercial purposes, such as concerts and performances, congregations, exhibitions and other big events; available for public sporting.	State Sport General Administration
Ying Tung swimming pool	Water polo (preliminaries), Modern Pentathlon (swimming)	Renovated venue	28.41	Total planned area 43,000 m ²	To be used for domestic aquatics events and the training of national and provincial teams; available for public sporting and other commercial purposes.	State Sport General Administration

Venue	Sport	Project	Budget (USD million)	Project Description	Post-Olympic use	Post-Olympic owner
Beijing Shooting Range (Clay Target Field)	Shooting (competitions and training)	Renovated venue	4.4	Total planned area 6,000 m ²	To serve as a training facility for the national teams; available for various international and domestic events; open to the public to promote the popularity of shooting	State Sport General Administration
Beijing Shooting Range Hall	Shooting (competitions and training)	New venue	37.91	Total planned area 45,600 m ²	To be used as a training facility for the national teams; available for international and domestic competitions; open to the public to promote the popularity of shooting.	State Sport General Administration
Laoshan Bicycle Moto Cross(BMX) Venue	BMX	Temporary venue	n.a.		Venue to be dismantled after the Games	Shijingshan District Govt
Laoshan Velodrome	Cycling (Track) (competitions and training)	New venue	43.13	Total planned area 32,900 m ² ; 6,000 seats capacity.	To be used as a training facility for national teams; available for both international and domestic cycling events, and public sporting.	State Sport General Administration
Laoshan Mountain Bike Course	Cycling (MB)	Renovated venue	7.49	Total planned area 8500 m ²	To be used as a training facility for national teams; available for both international and domestic cycling events; part of the venue to accommodate offices and a driving school.	State Sport General Administration
Urban Cycling Road Course	Cycling (RD)	Temporary venue	0.5	Competitions held along the Beijing Road in the Haidian District (Beijing)	Venue to be dismantled after the Games	Sports Bureau of Beijing Municipal Govt.

Venue	Sport	Project	Budget (USD million)	Project Description	Post-Olympic use	Post-Olympic owner
Fengtai Softball Field	Softball	Renovated venue	n.a.	Total planned area 8,400 m ² ; two training fields attached (the training fields with 3,000- 3,500 temp. seats will be used as back-up for competitions)	To be modified and open to the public as multi-sports facilities, including indoor and outdoor tennis courts, basketball and baseball fields, a shooting range and a football training field	Fengtai District Govt.
Wukesong Indoor Stadium	Basketball	New venue	283.05	Total planned area 63,000 m ² ; two warm-up fields attached	To be used for various sports events, big performances, public sporting use (mainly ball games) and sports training; part of the venue to be adapted into a fitness club	Haidian District Govt.
Wukesong Baseball Field	Baseball	Temporary venue	n.a.	Total planned area 12,000 m ² ; the training field with 3,000 temporary seats will be used as back-up competition field.	Venue to be dismantled after the Games	Haidian District Govt.
Shunyi Olympic Rowing- Canoeing Park	Rowing Canoe/ Kayak (flat water, slalom) Swimming Marathon (training and competitions)	New venue	79.5	Total planned area 20,000 m ²	Courses and facilities to be fully utilized and adapted into an environmentally- friendly aquatics centre and recreational park; to be used also for international and domestic events and trainings.	Shunyi District Govt.

Venue	Sport	Project	Budget (USD million)	Project Description	Post-Olympic use	Post-Olympic owner
Beijing University of Aeronautics and Astronautics Gymnasium	Weightlifting	Renovated venue	2.11	Total planned area 20,000 m ²	Available for sports competitions, cultural performances and meetings; open to both the students and the general public.	Beijing University of Aeronautics and Astronautics
Peking University Gymnasium	Table Tennis	New venue	n.a.	Total planned area 26,900 m ² ; 7,500 seats capacity.	To be used for various sports events, like table tennis, handball, basketball, badminton and volleyball; available for professional training, university students physical education and meetings, and performances	Beijing University
China Agriculture University Gymnasium	Wrestling	New venue	n.a.	Total planned area 25,600 m ² ; 6,000 permanent and 2,000 temporary seats capacity.	To be used as the University sports facility; also available for meetings and performances.	China Agriculture University
University of Science and Technology Beijing Gymnasium	Judo, Taekwondo	New venue	n.a.	Total planned area 24,000 m ² ; 4,068 permanent and 3,956 temporary seats capacity.	To be used as the University gymnasium for the students; available for physical education, training and competitions, meetings and various performances.	Beikeda University
Beijing Institute of Technology Gymnasium	Volleyball	Renovated venue	n.a.	Total planned area 20,000 m ²	To be used as the University gymnasium; also available for meetings and performances.	Beiligong University

Venue	Sport	Project	Budget (USD million)	Project Description	Post-Olympic use	Post-Olympic owner
Capital Indoor Stadium	Volleyball	Renovated venue	7.16	Total planned area 53,000 m ² ; the attached No.1 and No.2 fields will serve as warm-up fields during the Games	To be used for ice-sports training and competition, available for public use and sports competitions such as volleyball, basketball, badminton and gymnastics.	State Sport General Administration
Beijing University of Technology Gymnasium	Badminton, rhythmic (competitions and training)	New venue		Total planned area 20,000 m ²	To be used as the university cultural and sports centre, as well as the training base for the International Badminton Federation and the national teams; open to the public	Beigongda University
Workers' Stadium	Football (competitions and training)	Renovated venue	3.69	Total planned area 80,000 m ²	The spectator area, the catering area and the logistic compound to be modified after the Games to serve sports events and other commercial purposes like concerts, exhibitions and performances.	Beijing Federation of Trade Unions
Workers' Indoor Arena	Boxing	Renovated venue	3.68	Total planned area 48,000 m ²	The spectator area, the catering area and the logistic compound to be modified after the Games to serve sports events and other commercial purposes like concerts, exhibitions and performances.	Beijing Federation of Trade Unions
Changyang Park Beach Volleyball Ground	Beach Volleyball	Temporary venue	n.a.	One competition court, two warm-up courts, and six training courts	To be dismantled after the Games	Chaoyang Park Development and Management Corp.
Triathlon Venue	Triathlon	Temporary venue	9.77	n.a.	To be dismantled after the Games	Changping District Govt.

TABLE 4.2: VENUES AND ENVIRONMENTAL TECHNOLOGY

Venue	Heat pump systems	Photovoltaic systems (Street Lighting)	Solar energy systems (Water Heating)	Green Coverage	Water-Saving Facilities	Rain Water Collection
Olympic Green Tennis Center	Geothermal heat pump system	Solar energy lawn and street lights	Solar water heating system hot water system installed on top of the building roof.	5.25 ha	350 m ² /d capacity grey water treatment system. Water re-used in the tennis centre. Zero sewage water discharge	Expected 20,000m ² /year rainwater collection and recycle. A dedicated tank will be installed before the Games.
National Stadium	Geothermal heat pump system: The system extends under the approximately 6,200 m ² of the soccer field.	130 KW power generation capacity photovoltaic system Set on the roof of the stadium.		5.2 ha		Expected 58,000 m ³ /year rainwater collection capacity through the rooftop and ground systems.
National Indoor Stadium	Geothermal heat pump system to supply tap water, heating and air-conditioning	100 KW capacity photovoltaic system to provide lightening to the venue's square and underground parking lot. Set on the southern facade of the building and part of the roof.		2.06 ha	Water saving devices applied to toilet flushing; trees and lawns irrigation.	Expected 20,000 m ² /year rainwater collection by permeable bricks paving.
National Aquatics Centre				1.51 ha	Water-saving-technology applied to toilet flushing, plants and landscape watering. Anti-penetration concrete used for the swimming pool floor.	Expected 10,500 m ² /year rainwater collection, treatment and re-use for landscape watering and cooling tower. The collection area is 29,000m ² collection area located in the rooftop of the building.
Olympic Green Archery Field			Solar water heating system for staff bathrooms and athletes changing rooms. Maximum water usage per day: 3.6 m ³	Olympic Green Hockey and Archery fields. Total area 3.3 ha	Sewage water treatment and re-use for watering purposes.	Permeable bricks used for paving; water collection system.

Venue	Heat pump systems	Photovoltaic systems (Street Lighting)	Solar energy systems (Water Heating)	Green Coverage	Water-Saving Facilities	Rain Water Collection
Olympic Green Tennis Center	Geothermal heat pump system	Solar energy lawn and street lights	Solar water heating system hot water system installed on top of the building roof.	5.25 ha	350 m ² /d capacity grey water treatment system. Water re-used in the tennis centre. Zero sewage water discharge	Expected 20,000m ² /year rainwater collection and recycle. A dedicated tank will be installed before the Games.
Olympic Village	Reclaimed water heat pump system: the system powered by reclaimed water from Qinghe Sewage Treatment Plant. It provides cooling supply in summer and heating supply in winter to the whole residential area (more than 400, 000 m ² connected to the system). The system is expected to save 60% of electrical energy.	Streetlamps with dedicated photovoltaic panels in the venue's lawns, courtyards and streets. Some of the street lights use a combination of wind and solar energy.	Vacuum glass tubes solar collectors installed over an area of 6,000m ² on the roofs of the buildings to provide hot water in residential areas.	10 ha	Water saving-technology applied to toilet flushing and plants and landscape watering	On site biological sewage water treatment plant. Water re-used for irrigation, toilet flushing, vehicle cleaning and other purposes (treatment capacity: 300 m ³ /day) Permeable bricks used for venue's paving, roads and squares. A new technology for rainwater penetration and rainwater reserve located on the top of the underground car park.
Olympic Green Hockey Field			Solar water heating system for staff bathrooms and athletes changing rooms. Maximum water usage per day: 7.17 m ³	Olympic Green Hockey and Archery fields. Total area 3.3 ha	Sewage treatment and re-use for watering.	Permeable bricks used for paving; water collection system.
BJ Shooting Range Hall		Solar energy street lights.	Solar collectors installed over an area of 31 m ² d. Hot water produced per day: 4.5m ²		Sewage treatment plant featuring capillary filtration technology with low maintenance costs.	
Laoshan Velodrome			Solar collectors installed over an area of 2000m ² to supply hot water in athletes' dressing rooms and in the training centre.		Water saving technologies (control of tap-water flow pressure; adoption of measurement instruments on the water supply points)	Rainwater collected over an area of 1.8 ha by natural penetration and dedicated collection pipes.

Venue	Heat pump systems	Photovoltaic systems (Street Lighting)	Solar energy systems (Water Heating)	Green Coverage	Water-Saving Facilities	Rain Water Collection
Fengtai Softball Field		Combined use of a 27 KW grid-connected photovoltaic system set on the southern and western facades of functional house; solar energy street lights.	Vacuum glass tubes to provide hot water to the venue's stadia.			
Wukesong Indoor Stadium		100 KW grid-connected photovoltaic system set on the building's walls and solar street and lawn lights.				Rainwater collection system on the roof of the buildings and in the venue's ground.
Shunyi Olympic Rowing-Canoeing Park	Water source heat pump system.	150 solar energy street lamps section.			Water saving technologies (control of tap-water flow pressure; adoption of measurement instruments on the water supply points) HDPE anti-penetration film used on the floor of the competition water body (700,000 m ²) On site sewage water treatment plant (treatment capacity: 320 m ³ /day)	Expected 85% of rainwater collection and re-use in the venue's water body.

Venue	Heat pump systems	Photovoltaic systems (Street Lighting)	Solar energy systems (Water Heating)	Green Coverage	Water-Saving Facilities	Rain Water Collection
Peking University Gymnasium	Geothermal heat pump system: it can exploit thermal energy from the soil to provide 310 KW cooling and 493 KW heating power to the first floor rooms for a total connected area of 300 m ² .		Solar collection area of 300 m ² to heat the water in the swimming pool.		Water saving technologies (control of tap-water flow pressure; adoption of measurement instruments on the water supply points). Anti-Penetration concrete on the floor; Water recycle system; air temperature control system to reduce water evaporation	
China Agriculture University Gymnasium		Solar energy street lights				
University of Science and Technology Beijing Gymnasium		Solar energy street lamps	Solar water heating system to supply athletes' bathrooms and sauna			Permeable bricks used for paving; water collection system.
Beijing University of Technology Gymnasium	Geothermal heat pump system				Sewage treatment plant featuring capillary filtration technology with low maintenance costs.	
Chaoyang Park Beach Volleyball Ground		Grid connected photovoltaic system and solar energy street lights	Rotating solar panels installed over an area of 400 m ² to heat water		Water saving technologies (control of tap-water flow pressure; adoption of measurement instruments on the water supply points)	Expected 105,000m ² /year rainwater collection and reuse to top up the water level of the venue's lake.
Olympic Media Village	Air source heat pump and solar water heating system to heat tap water and the water in the swimming pool		Solar water heating system installed over an area of about 220m ² on the top of the building to supply hot water to the bathrooms and the swimming- pool.	3.9 ha	Water-saving-technology applied to toilet flushing, plants and landscape watering.	Expected 3,000m ² /year rainwater collection through permeable paving bricks and collection pipes installed on the roof of the buildings and in the venue's roads and lawns.

Source: BOCOG; 2008 Headquarters Office

4.4 THE OLYMPIC VENUES: ENERGY

Natural lighting

The venues' designers used natural lighting in various ways at the different venue locations. At the National Aquatics Centre (called the Water Cube), the ceiling and the walls are made of translucent membrane to allow in natural light. The design focused on lighting indoor areas with sunlight, creating an aesthetic connection between interior and exterior while also reducing energy consumption.

Natural lighting at the National Aquatics Centre is constantly readjusted by changing the colour and thickness of the membrane according to the current use of the venue. In other venues, such as the National Indoor Stadium and the Laoshan Velodrome, the designers used transparent polycarbonate panels with insulating, age-resistant and anti-ultraviolet capabilities for the structure.

Beam-pipe illumination technology was applied to the lighting design of underground spaces in many Olympic projects. This technology uses pipes to guide the sun's rays into underground facilities. Specially designed pipes take in light at dedicated inlets at ground level and then reflect and diffuse it to the underground facilities. The beam-pipe system is in place to illuminate corridors, toilets and parking lots in different venues (i.e. Olympic Green and National Indoors Stadium).

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Headquarters Office

FIGURE 4.1: ILLUSTRATION OF BEAM-PIPE ILLUMINATION TECHNOLOGY





Heat pump systems

Heat pumps are systems designed to move heat from one source to a different location via work. The technology is often used to move heat from a low temperature heat source to a higher temperature heat sink. Heat pumps are most commonly used in air conditioning systems; reversible-cycle heat pumps provide temperature regulation in water chillers and in refrigerating devices.

Commercial application of heat pump technology is currently expanding. Heat pumps are gradually becoming popular choices for home heating as well as cooling. Two common types of heat pumps are air-coupled and ground-coupled heat pumps (also known as geothermal heating). The difference between the two systems is that in air-coupled systems, heat is transferred from indoor air and outdoor air, whereas ground-coupled heat pumps transfer heat from indoors to the ground.

In the Olympic design and construction process, the designers decided to use both heat pump systems in the venues in order to achieve the twofold goal of environmental protection and energy conservation. Olympic projects incorporate either geothermal or air-coupled systems according to the geological conditions of each venue. As a result, designers chose a combination of ground, water or air source heat pump systems at the eight Olympic stadiums.

The Water Cube building site and a detail of its translucent membrane.

Photovoltaic systems (street lighting)

Solar powered devices were chosen to light lawns, courtyards and streets of several venues. Two different systems were chosen at these locations:

- » Streetlamps with photovoltaic panels on top of each of them to power the light bulbs,
- » Traditional streetlamps connected to the photovoltaic grid in the venues.

Solar energy has been featured, for instance, in the Feng Tai baseball Stadium, where a 27 KW photovoltaic system supplies energy to the building, and in the National Stadium where a 130 KW photovoltaic system lights the facilities.



Streetlamp with photovoltaic panels on its top at the Fengtai Softball Field.

Solar energy systems (water-heating)

Solar panels were installed in select Olympic venues to heat tap water. The water is used for showers, toilets, dressing rooms and swimming pools. In the Olympic Village for instance, a 6,000 m² solar water-heating system connecting all the apartments of the complex, auxiliary facilities and the kindergarten will be used throughout the Games.

UNEP believes that the variety of clean energy and energy saving solutions being employed by the venue designers in Beijing provide a positive showcase for designers and planners throughout the region, and an inspiration for future Games organizers.



COMMENT

4.5 THE OLYMPIC VENUES: TRANSPORT

Transportation is a critical factor in staging the Games due to its impact on the city and the huge numbers of spectators, athletes and media representatives involved. With the goal of delivering an effective, efficient and sustainable service, BOCOG's Transport and Construction and Environment Departments are developing a strategy for sustainable mobility during the Games, focused on two pillars:

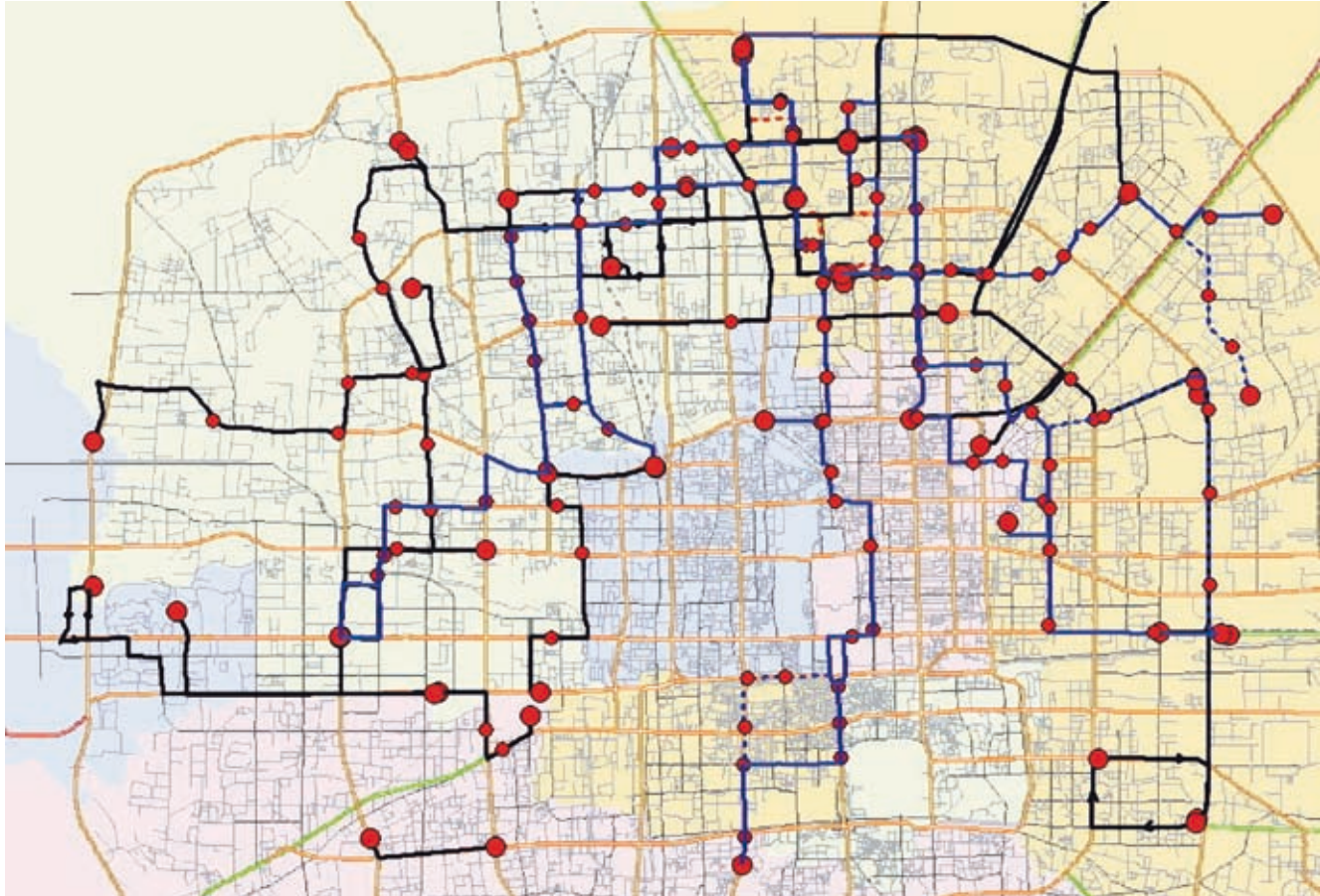
- » Reinforcing public transportation,
- » Using of low emissions vehicles (cars, vans and buses).

Public Transportation

The strategy envisages free rides on the Beijing public transport system for those spectators holding a ticket for the Olympic competitions. The figure overleaf shows the public ground lines that the spectators will be allowed to use for free, in addition to the underground lines.

On the basis of the Games schedule, the free public transport service will operate for a total of 51 days, from the opening of the Olympic Village (15 days prior to the Olympic Games Opening Ceremony) till the closure of the Paralympic Village (36 days after the Olympic Games Opening Ceremony), as shown in the table overleaf.

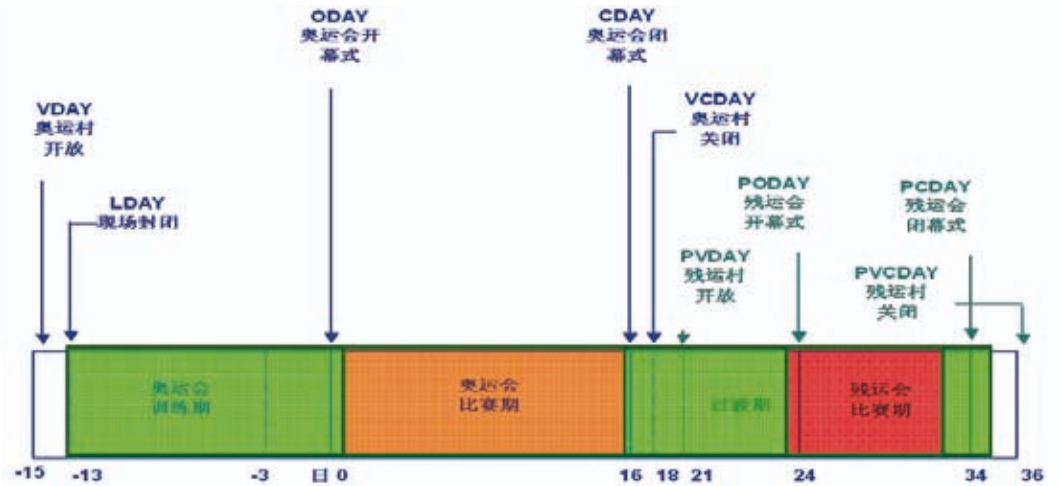
FIGURE 4.2: FREE PUBLIC TRANSPORT NETWORK



Source: Beijing Transportation Research Centre

FIGURE 4.3: FREE PUBLIC TRANSPORTATION CHART

VDAY: Opening of the Olympic Village
LDAY: Load in
ODAY: Olympic Games Opening Ceremony
CDAY: Olympic Games Closing Ceremony
VCDAY: Closure of the Olympic Village
PVDAY: Opening of the Paralympic Village
PODAY: Paralympic Games Opening Ceremony
PCDAY: Paralympic Games Closing Ceremony
PVCDA Y: Closing of the Paralympic Village



Low emission vehicles

According to the Beijing Games Organizing Committee, part of the fleet dedicated to transporting the Olympic Family will be low, zero emission, or electric vehicles. A fleet of 200-300 bicycles will be available in the Olympic Park and Olympic Village.

The fleet of coaches and buses during Games will comprise 2,260 vehicles: 400 will be propelled by natural gas and the others by diesel fuel. All of them will have less than 100,000 km on the odometer or will be vehicles newly registered after 2005.

According to BOCOG, the Olympic fleet of 3,060 cars, minivans and small buses powered by petrol engines will meet national environmental, technical and safety standards and requirements. BOCOG is also working on the 'Beijing Olympics Transport Services Environmental Protection Guidelines' to detail vehicle emission and maintenance standards that will guide BOCOG's Transport Department policies.

UNEP applauds the introduction of 400 natural-gas-powered buses to the Olympic fleet, but feels there is considerable room for improvement in the petrol-powered small vehicle fleet, given the wide availability of a number of cleaner fuel vehicle options.



COMMENT

TABLE 4.3: SMALL VEHICLES BY TYPE AND CAPACITY

Vehicle Type	Number	Engine Capacity	Fuel Type
Audi A6 (5 seats)	692	2.0 L	Gasoline
Magotan (5 seats)	30	1.8 L	Gasoline
Passat (5 seats)	150	1.8 L	Gasoline
Sagitar (5 seats)	698	1.6 L	Gasoline
Octavia (5 seats)	780	1.6 L	Gasoline
Istana (9-15 seats)	178	2.3 L	Gasoline
Turan (7 seats)	532	n.a.	Gasoline

Source: BOCOG Transportation Department

4.6 THE OLYMPIC VENUES: WATER

Water-saving technologies

A variety of water-saving technologies have been applied in the Olympic Village and competition venues, focusing on saving and reusing water in the bathrooms (toilet flushes and taps) and in the gardening/irrigation activities.

Controlling water flow pressure of taps, and installing double flush toilets and infrared control devices, have been the main techniques for reducing water consumption in sanitary services.

In addition, 40 non-flush toilets will be installed in the Olympic Green, equipped with dedicated sewage treatment systems. Nearly 2,400 m³/day of sewage will be treated and reused in the area for landscaping and irrigation purposes. BOCOG will also provide non-flush temporary toilets in those areas without water supply systems during the Games.



Permeable blocks in the paving at the Fengtai Softball Field are among a variety of rainwater collection and reuse systems in the Olympic Village and other competition venues.

The facilities design also includes advanced water-saving technologies and equipment for green area irrigation, such as:

- » Intelligent irrigation systems to control the irrigation time and irrigation frequency
- » Preferential use of rainwater collected in dedicated tanks
- » Water-saving sprayer and micro-irrigation or drip-irrigation systems
- » Preferential night-time irrigation to reduce water evaporation

In some water sports venues, the designers adopted water-saving materials such as anti-penetration concrete, designed to prevent water from leaking out and being wasted. Such material was used to line the National Swimming Centre and the Peking University swimming pool. High density polyethylene (HDPE) anti-penetration film was used to line the water body of the Shunyi Rowing-Canoeing Park

Rainwater collection and reuse

A variety of rain water collection and reuse systems have been installed in the Olympic Village and several competition venues. These include water-penetrating materials (permeable blocks and grass plots) constructed in the paving of the venues' outdoor spaces in order to collect rainwater.

The chosen materials have the twofold purpose of preventing and controlling heavy rains and floods, as well as collecting rainwater for future irrigation use through dedicated pipes and reservoirs. For example, in the Olympic Green, a total area of 144,000 m² has been equipped with permeable rain water collection materials. In the National Aquatic Center, 10,500 m³ of rain water will be collected and reused every year through the 29,000 m² collection area designed on the building rooftop. In the Olympic Media Village, at least of 3,000 m³ of rainwater will be captured using water permeable bricks, pipes and wells installed on the building roofs, roads, and green areas.

4.7 THE OLYMPIC VENUES: WASTE AND CLEANING

BOCOG has the direct responsibility of managing the waste generated in the venues during the Games. To fulfil the task and achieve the pledged goal of 100 per cent of sorted waste and 50 per cent of recycled or reused waste, the Construction and Environment Department of the Committee has developed the 'Olympic venues cleaning and waste management plan' and related standards, policies and procedures.

The overall strategy has been outlined in three different documents:

- » The 'Venue Cleaning and Waste Management Strategic Plan' (February 2005).
- » The 'Venue Cleaning and Waste Management Operation Outline' (August 2005).
- » The 'Demonstration Venue Virtual Plan' (late 2005).

According to the plans, the owners of the Olympic Venues will be directly responsible for the cleaning and management of waste generated by the Games, while the Beijing Municipal Administration Commission will be in charge of the transport, processing and final disposal of waste. All parties will have to operate in accordance with the recommendations, policies and procedures issued by BOCOG.

Beijing already has experience with greening a sporting event. The strategy that will be used in the games was tested during the 11th World Softball Championships held from August 27 to September 5, 2006 in the Fengtai Sport Centre. This was the first of a series of Olympic test events that the IOC requires Beijing to host in the year leading up to the Games. 425 athletes and team officials from 15 nations and regions joined the Championships, as well as more than 80 officials from the International Softball Federation (ISF) and several media representatives. According to the organizers, a total of 48,734 kg of waste was produced by the event:

- » 32,207 kg was sorted as recyclable waste.
- » 11,013 kg was sorted as compostable waste.
- » 5,514 kg was managed as mixed waste, not suitable for recycling.

Of all the waste generated, 100 per cent was safely treated and disposed, and 88.7 per cent was recycled.



UNEP

COMMENT

The final results of the BOCOG waste and cleaning programme will be available, for obvious reasons, only after the Olympic Games. One of UNEP's concerns, however, is that the current emphasis is on waste processing rather than minimizing waste. Programmes have been developed, such as the 'Cup of the Cup' programme of the 2006 FIFA World Cup, to minimize waste by promoting reusable cups. Such programmes have the dual effect of minimizing waste and educating the public about the issue. For example, UNEP would encourage adoption of a programme to discourage widespread use of wooden disposable chopsticks.

4.8 THE OLYMPIC VENUES: ENVIRONMENTAL MANAGEMENT AT BUILDING SITES

The 2008 Headquarters Office, the Beijing Municipal Environment Protection Bureau, and other relevant departments of the Beijing Municipal Government, in close cooperation with BOCOG, regularly inspect and monitor the construction sites of the Olympic venues to guarantee that the environmental management guidelines are implemented and the construction materials correspond to the set requirements. In addition, ISO14001 compliant systems have been established in all Olympic construction sites by multi-level management organizations.

To prevent and reduce noise pollution, working hours in the building sites are restricted and high volume activities are prohibited from 22:00 pm to 6:00 am. In exceptional cases, noise can be authorized by the relevant Municipal Government Departments, but with a given limit of 55 db. Contracted building companies have also been requested to use low-noise vibration machines and saws and to insulate noise polluting machinery.

*An Olympic Green
building site*



Dust control

Measures to control dust have been taken at all Olympic building sites as well as elsewhere in Beijing. Quarterly inspections have been carried out jointly by the Office of Municipal Construction Commission, the Beijing EPB, and the BOCOG Construction and Environment Department since 2001 to check that construction companies implement required dust control measures, which include:

- » Covering rubble and earth heaps with matting-like materials
- » Use of green plants and hardened roads in construction sites
- » Watering the building sites
- » Cleaning vehicles at the building site exits

To control road dust pollution, Beijing has increased mechanical sweeping on the urban roads and invested in road sweeping and cleaning equipment. The Municipal Government published new standards for road sweeping and cleaning in the city, “to facilitate the long-term development of the control and management of the dust of our city.”

TABLE 4.4: INVESTMENT IN SWEEPING AND WASHING VEHICLES 2003-2006

Year	Number of purchased vehicles	Investment (yuan)	US \$ equivalent
2003	121	3,747,0000	4,992,338
2004	94	35,360,000	4,711,211.78
2005	150	59,950,000	7,987,475
2006	351	144,970,000	19,315,168

Source: Beijing Municipal Administration Commission

TABLE 4.5: TOTAL MUNICIPAL AREA MECHANICALLY SWEEPED AND CLEANED

Year	Total area mechanically swept (m ²)	Area washed (m ²)
2003	21.54 million	n.a.
2004	24.19 million	n.a.
2005	26.57 million	30.35 million
2006	32.44 million	36.76 million

Source: Beijing Municipal Administration Commission

1.00 CNY=0.132949 USD. <http://www.xe.com/ucc/convert.cgi>. 12 September 2007

From 2003 to 2006, the city invested about 244 million yuan (US \$32,492,176) to purchase 557 mechanized sweeping vehicles and 159 road washing vehicles, thereby increasing the machinery sweeping ratio for the main roadways of the city from 65 per cent in 2003 to the present 89 per cent at present. The washing ratio for the main roadways also increased to 83 per cent.

The Municipal Government decided to use high-efficiency wide vacuuming vehicles and multifunctional washing vehicles that combine vacuum, sweeping and washing technologies. To save water, road washing makes some use of reclaimed water, thus saving treated water suitable for drinking. At present, reclaimed water used for washing urban roads accounts for 27 per cent of that used for all road sweeping and cleaning activities. It is not clear how much of the remainder is treated water or water from untreated sources, such as canals.

To further control dust in the city, stringent administrative licenses for solid waste transport vehicles are enforced, and solid waste transport activities are checked regularly.

With the vast amount of construction in Beijing in particular, and in China generally, the improved standards prompted by Beijing's hosting of the Olympics may hopefully have a knock-on effect throughout the governance of the construction industry throughout the country.



COMMENT

4.8.1 THE OLYMPIC VILLAGE

BOCOG dedicated special attention to the environmental aspects of the design of the Olympic Village. The venue features innovative technologies, such as a heat pump system, photovoltaic panels, beam-pipe illumination, solar collectors, water saving devices, and rainwater collection.

The Olympic Village is located northwest of the Olympic Green, and covers a total area of 27.5 ha. The buildings extend over an area of 530,000 m² and will accommodate 16,800 athletes and officials in the Games, and 6,000 residents after the Games.

Particularly interesting is the water heat pump system installed to provide winter heating and summer air conditioning to the residential area. The real innovation of this technology is in the heat pump energy source: the pump is powered by treated and discharged water from the Qinghe sewage treatment plant.

Nearly 75,000 m³ of water, out of the 400,000 m³ treated in the Qinghe plant, will be used by the system for power generation. The temperature difference between the treated water and the external air temperature is 15°C in winter and 10°C in summer. The heat pump uses the temperature difference to cool or heat the indoor air through fan-coil units in summer and for floor heating units in winter.

By using sewage water, the waste gains one more use before being finally discharged. The 2008 Headquarters Office estimates that nearly 3,600 tons of coal will be saved each year with the energy use that is offset through the sewage water pump technology.

The Olympic Village also features a vacuum glass tube solar collection system installed on the buildings' roofs to heat the tap water provided to athletes. The solar collection system covers a total area of over an area of 6,000 m². The collection tubes have been installed as part of the roof gardens on the buildings, and are an integral part of the housing design, even improving the look of the buildings. The 2008 Headquarters Office has estimated that this solar heating system will save nearly 2,400 tons of coal per year.

Special attention was given to the building that will serve as a kindergarten after the Games when the Olympic Village is turned in a residential area. The architecture was designed to save as much energy as possible, through, for instance, orienting the building to take in sunlight in winter, and an exterior sun shading system to cool the inner spaces in summer time.

Additionally, the building features high window to wall area ratio, high-transparency windows, beam-guide pipes, and a sunroof to maximize natural lighting. The designers have succeeding in designing a people-oriented, healthy, comfortable and energy-saving environment in the Village. The use of natural-light technology is expected to reduce the energy consumption of the future kindergarten by 60 per cent. The World Wide Fund for Nature (WWF) has also cooperated with BOCOG to boost the use of certified and sustainable timber for flooring and doors in the buildings.

*Model of the
Olympic Village.*



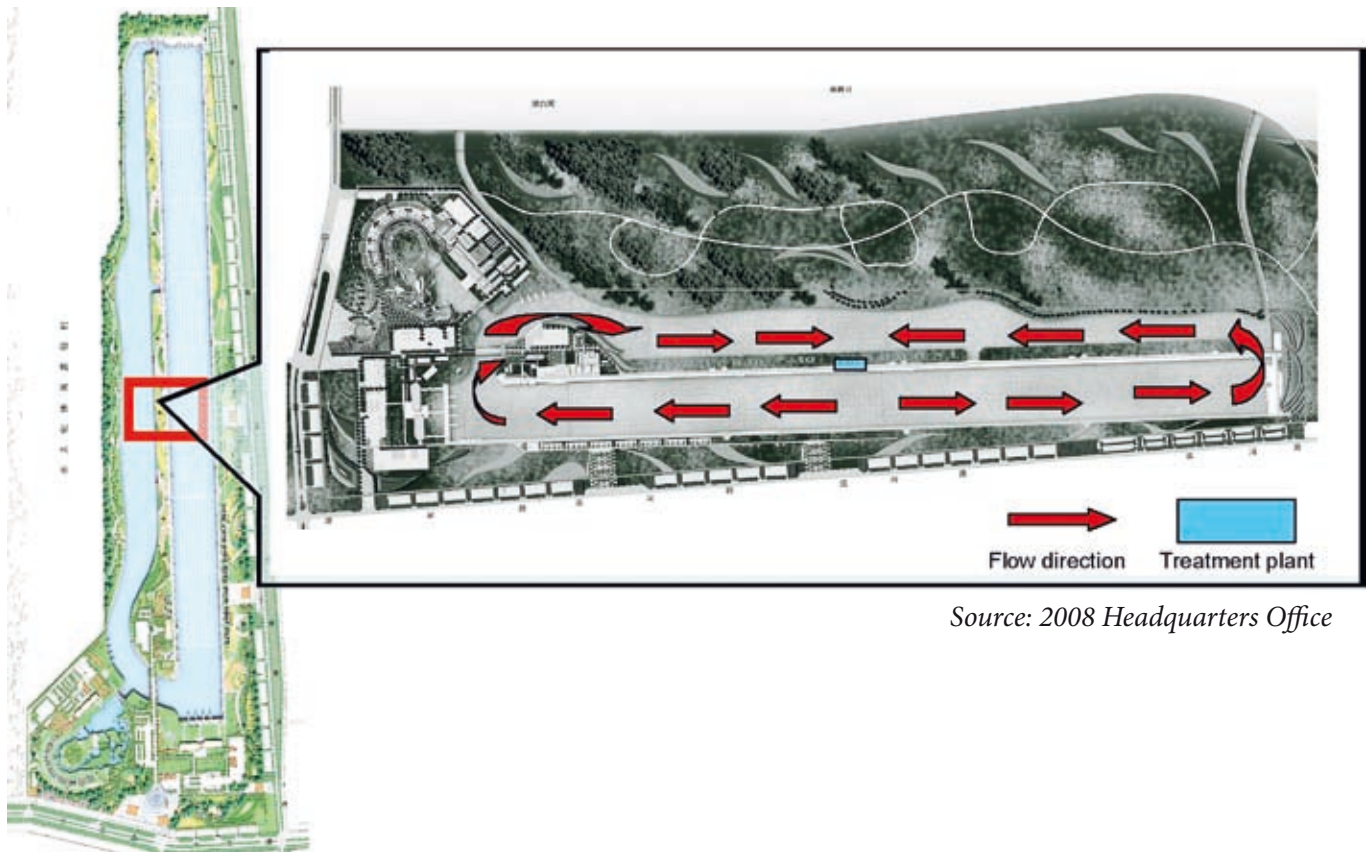
4.8.2 THE SHUNYI ROWING AND CANOEING VENUE

The Shunyi Canoe and Rowing Park is located in the northeastern part of Beijing in Shunyi County, about 40 km from the Olympic Village. The venue is linked to the city by an expressway and extends between a well developed residential area and a well-known recreational site. The venue is next to the Chaobai River and surrounded by forests and farmlands.

For the first time in the Olympic history, rowing and canoeing venues have been combined in just one facility, to economize building construction. To fulfil the twofold objective of servicing rowing and canoeing, the water body has been divided into different functional areas:

- The slalom area,
- The flat water course.

FIGURE 4.4: WATER TREATMENT CONCEPT AT THE SHUNYI ROWING AND CANOEING VENUE



Source: 2008 Headquarters Office

Facts about the Shunyi Canoe and Rowing Venue

Total surface of the venue	162.59 ha
Surface occupied by buildings	18,400 m ²
Earth excavation volume	2,000,000 m ³
Water surface area	About 640,000 m ²
Water body total volume	1,760,000 m ³
Green coverage	500,000 m ²

Source: 2008 Headquarters Office

To minimize soil disturbance outside the venue, the nearly 2,000,000 m³ of excavated earth was completely re-used within the building site for backfill and landscaping.

The water body has a total volume of about 1,760,000 m³ and has to be refilled through a pipe system, since the Chaobai River, which runs close to the venue, has dried up due to the drought that has affected Beijing over the last years. The water has therefore to be supplied from the Miyun Reservoir, the current main drinking water source for the city of Beijing, representing a significant consumption of this precious resource.

The 2008 Headquarters Office estimated that one third of the water body capacity (nearly 600,000 m³) will have to be refilled each year. To put this in context, the city of Beijing's water needs, according to official data, account for nearly 200 million m³ per year. This it means that the replenishment of the basin alone accounts for more than one full day of water consumption for the city, not to speak of the initial recharge.

To partially solve the issue, the designers used HDPE film to cover the floor of the water body, covering a surface of nearly 700,000 m². In addition, the water body is kept in constant motion to avoid eutrophication. A 72,000 m³/day water treatment plant has been built in the centre of the water park. After being treated, the water is discharged again into the competition course.

The rainwater collection system at the venue was similarly prioritized. Rainwater is collected from around the open surfaces of the venue to refill the course

4.9 THE OLYMPIC VENUES: ENVIRONMENTALLY FRIENDLY MATERIALS

The three 'Environmental Protection Guidelines' issued by BOCOG to guarantee the sustainability of the Olympic venues (new, renovated or temporary) provide the main framework for the choice of building materials, including special recommendations for green building materials.

Construction efforts have focused on the environmental aspects of painting and design materials, using wooden panels to avoid high contents of formaldehyde, and eliminating ozone-depleting substances. Alternative materials, such as wooden and plastic composites were considered in all phases of construction.

The environmental non-governmental organization Greenpeace has offered to help BOCOG to identify and track sources of illegally logged timber. Greenpeace submitted their publication 'Suggestion on Wood Stock for the Olympics' as well as the UNEP-WCMC publication 'Species in Trade' to help BOCOG identify the best timber procurement practices. UNEP recommends that BOCOG take full advantage of these resources to ensure that all timber procurement comes from certified sustainable sources.

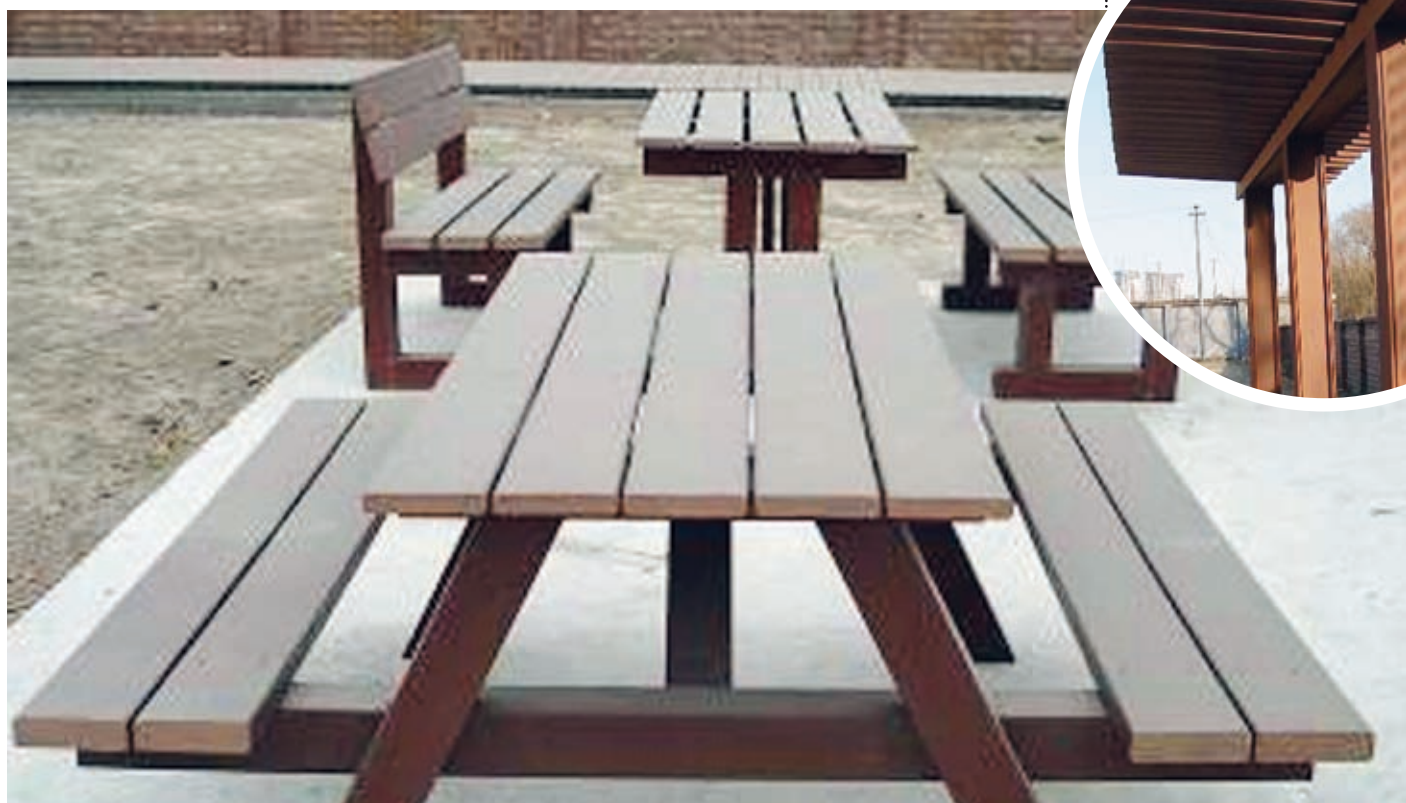


Plastic-wooden composite

A composite material made of wooden and plastic waste was widely used in construction of structures in the Olympic Village and the Olympic Green. Because of its anti-corrosive and weather-resistant characteristics, the composite proved particularly suitable for decorating the facades of buildings, lining floors and constructing window shutters.

It has also been used as a substitute for wood, thus reducing timber use, as well as for picnic tables and shelters in the Olympic Green area, and for lining concrete bridges.

Plastic-wooden composite tables and shelter
© 2008 Headquarters Office



4.10 THE OLYMPIC VENUES: OZONE LAYER PROTECTION

As a developing country, China has committed to a complete phase-out of chlorofluorocarbons (CFCs) by the end of 2010 and hydrochlorofluorocarbons (HCFCs) by the end of 2040 under the Montreal Protocol.

The Montreal Protocol on Substances that Deplete the Ozone Layer is an international treaty designed to protect the ozone layer by phasing out the use and production of a number of substances believed to be responsible for ozone depletion. According to the Protocol, China, as a developing country, should reduce and phase out Ozone-depleting Substances (ODS) in steps shown in table 4.6.

The Government of China, on the basis of the deadlines of the Montreal Protocol, developed its own country programme, with more stringent phase-out targets.

TABLE 4.6: ODS PHASE-OUT TARGETS

ODS	Time	Targets
CFCs, Halons, and Carbon Tetrachloride	1 July 1999	At average 1995-97 levels
	2005	50% reduced
	2007	85% reduced
	2010	Phase-out
Methyl Chloroform	2003	At average 1998-2000 levels
	2005	30% reduced
	2010	70% reduced
	2015	Phase-out
methyl bromide	2002	At average 1995-98 levels
	2005	20% reduced
	2015	Phase-out
HCFCs	2016	At 2015 levels
	2040	Phase-out

TABLE 4.7: CHINA OZONE COUNTRY PROGRAMME

Industries	Time	Phase-out Targets
Halons	2005	Halons 1211 phase-out
	2010	Halons 1301 phase-out
Auto Air-condition	1 Jan.2002	Newly produced automobiles use HFC-134a as refrigerant agent
Foaming Agent	2010	Phase-out
Chemical Industry	2010	Phase-out
	Jan.2006	CFC-113 phased-out
Cleaning Industry	Jan.2004	Carbon Tetrachloride phase-out
	Jan. 2010	TCA phase-out
Tobacco Industry	31 Dec.2006	Phase-out
Refrigerant	2010	CFC-12 and CFC-11 phase-out
	2040	HCFC-22 phase-out

Source: BOCOG

The Beijing phase-out programme

In 2000, no manufacturers were producing ODS in Beijing, and those substances necessary for industrial uses were imported from other cities in China or from abroad. ODS consumption in Beijing was mainly related to the following industrial sectors:

- » Fire-fighting industry, 13 tons/year (fire extinguisher agents).
- » Tobacco industry, 33 tons/year (used in the Beijing Cigarette Factory).
- » Refrigeration for industry, commerce and household use, 0.68 tons/year (refrigerant agents).
- » Cleaning industry, 49.73 tons/year (mainly in the fields of mechanical engineering, electronic industry, precision instruments and dry cleaning; 27.02 tons of CFC-113 and 22.71 tons of Methyl Chloroform).
- » Insulation/foam industry, 663.2 tons/year (50 tons of CFC-12 and 613.2 tons of CFC-11).
- » Car air conditioning.

In the city, overall ODS consumption was about 790 tons/year by the end of 2001; nearly 1.3 per cent of the entire ODS consumption in China.

As shown in the table below, the Beijing Municipal Government set an ambitious programme to phase out the ODS and decided to bring forward the national deadlines.

TABLE 4.8: ODS PHASE-OUT IN BEIJING

Sector Target		Phase-out Date		Time in advance
		China	Beijing	
33 tons in Tobacco Sector		31 Dec.2006	31 Dec.2002	4 years
13 tons in Fire-fighting	Halon1211	1 Jan.2005	1 Jan.2002	3 years
	Halon1301	1 Jan.2010	1 Jan.2003	7 years
663.2 tons in Form Sector		1 Jan.2010	31 Dec.2004	6 years
49.73 tons in Cleaning Sector	CFC-113	1 Jan.2006	31 Dec.2004	2 years
	CTC	1 Jan.2004	Phased out	3 years
	TCA	1 Jan.2010	31 Dec.2004	5 years
0.68 tons in Refrigeration for Industry and Commerce		31 Dec.2005	31 Dec.2004	1 years
Auto Air-condition		1 Jan.2002	1 Jan.2002	synchron
Aerosol Sector		31 Dec.1998	31 Dec.1998	synchron

Source: BOCOG

At the end of 2004, all ODS, apart from HCFC and HFC (still used in the car air conditioning sector), were completely phased out in the city of Beijing, 6 years ahead of the China's Country Programme.

BOCOG ozone-friendly policies

Within the framework of the UNEP-BOCOG MOU on the Games, the UNEP OzonAction programme provided BOCOG with overall conceptual guidance to help them to avoid the use of ozone-depleting chemicals at all of the Games facilities and venues, suggested specific implementation activities and helped promote cooperation with other entities involved in ozone protection, and followed up on their progress through regular review meetings with the Committee as well as with their equipment suppliers. BOCOG has used eight main procurement guidelines to make the Games 'ozone friendly'.

A survey carried out at the end of 2006 by the Beijing Municipal Research Institute of Environmental Protection on the fulfilment of the BOCOG ODS guidelines revealed that no CFC-based refrigerants had been used in the Olympic venues. BOCOG has also confirmed that they have not only avoided the use of CFCs (two years ahead of Montreal Protocol schedule) but also avoided HCFCs (32 years ahead of Montreal Protocol schedule).

Twenty-one of the Olympic facilities installed central air conditioning systems. Of the 18 venues which had already signed the purchasing contracts at the time of the Beijing Municipal Research Institute of Environmental Protection survey, 14 had opted for R134a and the other four had chosen lithium bromide as part of the CFC phase-out process. Individual air conditioners, most of which run on R410A, were installed in 17 venues. In addition, nine venues used R134a, R407C and other coolants which are not harmful to the ozone layer.

Regarding fire extinguishing facilities, 18 venues had signed purchasing contracts for ODS-free fire extinguishing products by the end of 2006. All of them had avoided halon based substances (another ODS), opting for other chemicals such as heptafluoropropane or ammonium phosphate salt.

The Coca Cola Company has committed 4,000 bottle coolers that will use natural refrigerants. McDonald's has also engaged to not use any ozone depleting substances. Haier has promised to not use any CFCs and has developed new refrigeration products with natural coolants and solar energy.

The use of carbon tetrachloride and methyl chloroform has been prohibited for cleaning, laundry and electronic circuit boards. The catering supplies from greenhouse sheds will be required to avoid the use of substances such as methyl bromide fumigants.

The UNEP OzonAction office has described BOCOG's strategy for an ozone-friendly Games as an "extraordinary achievement" and very good news on the eve of the 20th Anniversary of the Montreal Protocol. BOCOG has also won a 20th anniversary public awareness award from the Secretariat of the Vienna Convention for the Protection of the Ozone Layer.



4.11 THE OLYMPIC VENUES: GREEN COVERAGE

BOCOG and the 2008 Headquarters Office prioritized landscaping and greening of the venues, specifically the Olympic Green. At the Olympic Green, landscaped green areas cover a total surface of 910 ha out of the total 1,159 ha area (ratio: 78.5 per cent).

Given Beijing's climate, the designers of the green spaces and experts of the Beijing Municipal Gardens Bureau chose to plant mainly drought- and heat-enduring plants around the venues, giving preference to local indigenous species.



*Tree planting
at the Olympic
Green*

*The Olympic
Forest Park*

Special attention was dedicated to the concept of an Olympic Forest Park, to be located in the northern part of the Olympic Green. Engineers of the Forest Park idea designed a harmonious environment for visitors through a mix of hills, water, and vegetated areas. After the Games, the Park will remain protected, serving as a green lung for the surrounding boroughs and the Olympic Village residential area. The Park covers an area of 580.5 ha, and green coverage accounts for nearly 79 per cent of the total surface.



TABLE 4.9: LAND USE IN THE OLYMPIC FOREST PARK

	Water	Green Coverage	Plazas	Roads	Buildings
Area (ha)	78	459	11.6	29.3	2.6

Source: Planning and Design Institute of Tsinghua University

Nearly 61 per cent of the total green area will use newly planted trees, while the remaining 39 per cent will be formed by preserved existing forest.

4.12 TORCH RELAY

According to the Olympic tradition, the Olympic Flame will be lit in Olympia, Greece, on March 25, 2008, from where it will start its trip across the Continents.

The Torch route will pass through natural sensitive areas as well: one of the highlights of the trip will be the attempt, in May 2008, to bring the Olympic Flame to the highest peak, Mount Qomolangma (Mount Everest), in one of the most fragile ecosystems in the world.

According to the official Chinese media, a new highway will be built at the base of the Mount Everest region for the occasion: “The new road will begin at the base of the mountain in China’s Tibet region and replace a rough 108-kilometre (67-mile) track that leads to the northern base camp, the Xinhua news agency reported. Construction of the 150-million-yuan (US \$20 -million) highway began on Monday [18 June 2006] and will take about four months to complete”, according to Xinhua. The road is being built to “ease the path of those bearing the Olympic torch,” Xinhua said. “Organizers of next year’s Beijing Olympics have said they intend to include the summit of Mount Everest in the 130-day torch relay leading up to the Games.”

The relay, which will traverse five continents, will begin in Beijing on March 31 next year, with the attempt to reach the summit of Everest slated for May. The Xinhua report also said the new highway “would help ease the way for the growing number of tourists who are travelling to base camp, which is 5,200 metres (17,160 feet) above sea level.”

To avoid major environmental impacts, where possible, and to support the organization of the Torch Relay, the BOCOG’s Construction and Environment Department developed the ‘Guide to Environmental Protection for Beijing Olympic Torch Relay’. The Guidelines contain general rules and recommendations on the:

- » Environmental behaviour of people involved in the activity, such as torchbearers, media workers and spectators
- » Environmental protection of ‘World-Class Scenic Areas’, ‘State-Class Natural and Cultural Scenic Areas’ and ‘Urban and Rural Areas’
- » Use of environmentally-friendly materials. It is mentioned that the torch itself will be made of recycled materials.

Only a part of the requirements contained in the Guidelines are mandatory. For example, despite a guideline stating that, “all activities relevant to the Olympic Torch Relay must strictly follow the regulations concerning protection of natural heritage sites; participants should adopt the principle of not causing any harm to the heritage involved” (Guide to Environmental Protection for Beijing Olympic Torch Relay), the highway at the base of Mount Everest was approved.



UNEP

COMMENT

According to the Chinese authorities, the new Qomolangma (Mount Everest) highway complies with national environmental regulations. However, there is still cause for concern about the short- and long-term environmental impact of easing access for large numbers of tourists into such an ecologically fragile area.

An environmental message displayed in one of the Beijing's hotels.



4.13 PROCUREMENT

BOCOG's Olympic Logistic Centre is responsible for assessing the purchasing needs of the whole Committee and providing materials and services.

In the purchasing process, the Logistic Centre works with the Construction and Environment Department to check that the potential supplier complies with environmental laws and regulations and gives preference to those companies certified according to the ISO 14001 standards. All the purchased goods should comply with national environmental protection requirements and products standards and products carrying an environmental label should be preferred.

Additionally, in order to guide the purchasing process and guarantee the sustainability of some specific goods, the Construction and Environment Department has developed guidelines for printing products and boats (used by the Committee's staff in the sailing events) and has submitted them to the Logistic Centre. Since most of the purchases will be made in the last year prior to the Games, data regarding the results of the implementation of the guidelines are not yet available.

4.14 ACCOMMODATION

BOCOG Games Services Department is in charge of providing both accommodation and catering services for the Games. One of its main tasks is to contract the hotels required to welcome the Olympic Family during the Games (i.e. the International Olympic Committee and the International Sport Federation). To support sustainable delivery of accommodation services, the Construction and Environment Department developed the 'Environmental Protection Guidelines for the Beijing 2008 Hotel Services' in 2004.

The guidelines provide suggestions for improving the environmental management of accommodation companies, mainly focusing on energy efficiency and water conservation. BOCOG suggests, for instance, to increase by 1°C the air conditioning systems in Summer and to decrease by 1°C the heating temperature in Winter, and encourages hotels to switch to energy saving light bulbs.

The Guidelines are found in an appendix to the standard 'Agreement on Olympic accommodation and reception services' (the standard contract signed by BOCOG and the Beijing hotels), where the signatories are requested to meet the requirements on a voluntary basis. To promote their implementation, BOCOG has provided training to hotel managers and staff about environmental aspects of the accommodation sector.

In early 2006 the China National Travel Administration (NTA) launched the new environmental standard 'Green Travel Hotel (LB /T007—2006)', developed on the basis of the BOCOG's Guidelines and meant to strengthen the Committee's efforts and increase the

environmental performance in the sector. The new standard applies not only to the hotels contracted for the Games and classifies the structures as Gold or Silver Leaf on the basis of the fulfilment of the NTA standard's requirements.

In October 2006 the Beijing Green Hotel Assessment Committee started assessing the 637 Beijing star-rated hotels against the 'Green Travel Hotel' standard. At the end of 2006, 77 hotels were ranked as 'Gold Leaf', and 57 hotels were awarded the 'Silver Leaf' level. BOCOG, in coordination with NTA, determined that the hotels fulfilling the Green Travel Hotel standard would be certified as complying with their Environmental Protection Guidelines as well.

In February 2007, BOCOG contracted 122 hotels of the 637 that were initially assessed: of the contracted hotels 43 have the Golden Leaf level certification and 8 have the Silver Leaf certification.



UNEP feels that BOCOG's green procurement guidelines, including for accommodation and catering, are inadequate insofar as they ask only for voluntary compliance. BOCOG could have developed more tailored and more stringent guidelines for various sectors and services. It is also not clear how useful it is to award hotels with 'Gold Leaf' and 'Silver Leaf' certification unless there is an obvious incentive for them to improve their environmental credentials.

4.15 CATERING

To support the sustainability of the catering services during the Games, the Construction and Environment Department developed the 'Environmental Protection Guidelines for Beijing 2008 Catering Services'.

The Guidelines provide useful environmental suggestions to the BOCOG's catering contractors and focus on four different topics:

- 1: Environmental management: the guidelines suggest the preferential selection of catering companies that are ISO 14001 certified and encourage the potential contractors to comply with existing environmental laws and regulations, use food with green labels, take care of their environmental impacts and avoid open air barbecues.
- 2: Resources protection: this section of the guidelines provides information on energy efficiency and saving. It also suggests the contractors to avoid the use of plastic tableware and minimize the use of other disposable tableware, cutlery and wooden chopsticks.
- 3: Pollution control: the section gives information on how to prevent and control water, air and noise pollution.
- 4: Waste management.

The above environmental requirements are met by the contractors on a voluntary basis and are not compulsory. As the catering services will be delivered during the Olympic and Paralympic Games, the final results of the programme are not yet available.

4.16 MARKETING

BOCOG's marketing programme is composed of two major sub-programmes, managed under the direct responsibility of the Committee's Marketing Department:

The Sponsorship sub-programme, under which the sponsoring companies are allowed to associate their logo with the Olympic five rings and promote their corporate brand under the 'Olympic Sponsor' flag.

The Licensing (licensed merchandising) sub-programme which contracts companies to manufacture and sell products featuring the Beijing 2008 Olympic Games logo.

The sponsorship process

According to the Committee, as a preliminary step in selecting the national sponsors, the Marketing Department asks the Environmental Department to conduct an environmental assessment of potential partners to evaluate their environmental performance. The Committee declared that the paper-making industry, for instance, has been excluded from the programme for environmental concerns, even though quite a few manufacturers of paper expressed their strong interest in sponsoring the Games.

Once past the first evaluation, the potential sponsors are requested to present their environmental qualification, either local or national, which is regarded as a relevant aspect to become sponsors of the Beijing 2008 Games. According to the Marketing Department, 51 of the total 54 sponsors are locally or nationally environmentally certified.

The final step to be accepted as a sponsor of the Games concerns the sponsorship contract; the sponsor is requested to ensure that its materials procurement, manufacturing, and business activities comply with the relevant national or industrial environmental standards. The sponsor also must commit to maintain a good environmental public image. It is also required to supply, in case of 'Value in kind' agreement, environmentally friendly products for the Games.

It is worth mentioning that environmental requirements influence the choice of the sponsors, but are not mandatory, and that the Construction and Environment Department regrettably does not have veto power on sponsor selection.



The licensing process

The potential licensees are requested to present, among other documents, any environmental certifications they possess. The baseline requirement is a certificate issued by the local government that guarantees that the manufacturer complies with all environmental regulations applicable to its products and manufacturing process. The ISO 14001 certification is evaluated as a preferential qualification. According to the Marketing Department, all the 59

licensed manufacturers comply with at least one of the above environmental requirements. BOCOG has also included in the licensing contracts an environmental clause: it requires that the manufacturer provides licensed products which meet the governmental and BOCOG's environmental requirements and guidelines.

In addition, the Organizing Committee has recently raised the environmental protection standard by requiring the licensed manufacturers to cut down the packaging for the licensed products and to use more environmentally friendly materials in their production process.

The Sponsors Advisory Group

BOCOG established a sponsor advisory group to encourage sponsors, among other programmes, to abide by environmental laws and regulations, deliver environmentally-friendly technologies, products and services on the occasion of the Olympic Games and develop communication and education programmes.

At the end of 2006, members of the group included Coca Cola, General Electric, China Bank, China Netcom, SinoChem, Sinopet, Volkswagen, Adidas, Stategrid and UPS Unipresident.

Sponsors' environmental initiatives

BOCOG encourages sponsors to take an active part in the protection of environment and invites them to participate in the Committee's environmental activities, such as tree planting or environmental education. Sponsors are also encouraged to make plans to improve the environmental aspects of their manufacturing facilities and processes.

The China National Petroleum Corporation is implementing, for instance, a project to reduce the VOC (Volatile Organic Compounds) emissions from their storage facilities; Sinopec is working to supply cleaner fuels and State Grid has plans to develop and promote energy production from renewable sources.

Other sponsors, such as Coca Cola, Volkswagen, China Mobile and Haier, have programmes focused on reducing water and energy consumption, delivering environmentally-friendly products and promoting environmental communication and education among the public, especially the youth.

4.17 EDUCATION AND COMMUNICATION

To raise awareness about environmental issues and to spread the 'Green Olympics' concept, the Construction and Environment Department of BOCOG has been implementing several projects in the domains of education and communication in close cooperation with the Beijing Municipal Government, environmental NGOs, schools, and local communities.

EDUCATION

BOCOG focused its projects on raising awareness of the environment in primary and secondary schools, thereby targeting the younger generation of Chinese citizens. BOCOG organized projects in Beijing and around the country.

The major educational initiatives include:

The Beijing 2008 Primary and Secondary School Olympic Education Programme

Implemented at national level in 2006 in cooperation with the Ministry of Education, the project involves 0.4 billion students and is aimed at establishing Olympic Model Schools, where the Olympic values are taught, practised and promoted. The project encourages students to adopt environmentally friendly lifestyle. Up to October 2006, 556 schools had been nominated as Olympic Model Schools, including 200 schools from Beijing.

The Green School Project

Green schools are those that take environmentally friendly measures in their day-to-day activities and teach environmental values. The project has been implemented in the city of Beijing and in October 2006 counted a total of 728 schools.

The 'Reserve a Barrel of Water this Summer' Initiative

The project has been implemented in the primary schools of the Beijing 18 districts and counties by the Youth League Beijing Municipal Committee, the Young Pioneers Beijing Working Committee and BOCOG, with the support of Coca-Cola. It is aimed at developing water saving initiatives and communicating the importance of water saving.

Generally, UNEP feels that education and communication is an area where BOCOG could do more, especially in collaboration with local and international non-governmental organizations, to promote environmental awareness and action. Much of the outreach is focused on consumption and production related issues, in particular water, waste and pollution, and is targeted at a limited audience. We feel more could be done to take advantage of the unique opportunity presented by hosting the Games for BOCOG to help to promote the broader framework of ecosystem protection, both among the Chinese public and among visitors to the Games.

Given that it is likely that visitors to Beijing will be aware of the city's air quality issues, as well as other negative coverage of China's environmental problems, it would make sense to use the opportunity of their presence to try to highlight China's work to preserve and improve environmental conditions and protect ecosystems. This, in turn, may provide a useful tool to further educate and mobilize civil society and the private sector throughout China. However such programmes need advance planning and there is little evidence at this stage that such an effort is being adequately considered.



Green Dreams, Colourful Olympics Painting Competition

In 2005 and 2006 BOCOG, in partnership with the China National Youth Palace Association, organized a painting contest for the students of the Beijing primary and secondary. In 2005, more than 2000 students, from about 100 schools, participated in the competition. In 2006, the competition was extended to over 20 provinces, municipalities and autonomous regions and nearly 8000 drawings were received from the students. The selected paintings were exhibited at a show and will be used to decorate the Olympic Village.

COMMUNICATION

BOCOG has developed several initiatives to spread the message of environmental values among the general public. Among the major projects, it is worth highlighting:

The Green Community and Green Home Campaign

The project is aimed at raising environmental awareness among Beijing families and communities, and developing initiatives related to water and energy saving, waste sorting and green consumption. The Campaign has been launched in Beijing and, by the end of 2006 involved 886 communities.

The 'One Day, No Engine Sounds' Campaign

The initiative encourages Beijing citizens to use means of transport other than cars to raise awareness about air and noise pollution. After the launch of the project in October 2006, 504 Institutions, including 407 car clubs, joined the Campaign, which was implemented during the FOCAC (Forum on China-Africa Co-operation) Beijing Summit from November 2 to November 5 of that same year.

The Beijing Green Map Initiative

The project, developed by BOCOG and the Municipal Environmental Protection Bureau, encourages Beijing citizens to label the environmental and cultural facilities around the city.

The Green Olympics, Green Action Team

The Team was established in 2004 by BOCOG and the Beijing Environmental Protection Bureau to promote Olympic environmental values, sustainable development principles, good energy saving and water saving practices and environmental awareness in general. The members of the Team hold lectures and implement promotion initiatives in different places such as in schools, factories, universities, libraries and communities.

In the framework of environmental communication, BOCOG also printed several publications on the 'Green Olympics' theme, including the IOC Agenda 21, the BOCOG Environmental Guidelines for Construction of Olympic Venues, the BOCOG Environmental Reports for the years 2003, 2004 and 2005/2006, the 'Beijing 2008: Environmental Protection, Innovation and Improvement' report, and the 'Green Dreams, Colourful Olympics' paintings.

The Close to the Nature Hand in Hand with Fuwa Exhibition

The travelling exhibition, created by BOCOG and the Beijing Association for Science and Technology, raises awareness about the living environment and habit of the four animal-like Fuwa, the Olympic animal mascots (the fish, the Tibetan antelope, the flying swallow and the panda). Several environmental NGOs joined the exhibition.

Four out of the five mascots use input provided by NGOs, to showcase water conservation, forest protection, grasslands, and caring for and conserving biodiversity. The mascots provide general messages on the environment along with specific suggestions on how people can be more environment-friendly. An English translation of these messages can be found at www.chinagreentravel.com. Unfortunately, this information is not featured on the official Green Olympics website. Overall, however, BOCOG's website provides reasonable visibility to environmental sustainability, though the inclusion of 'Environment' in the prominent tabs at the left of the home page would serve to raise awareness even more.



Once known for its environmentally friendly bicycle traffic, Beijing is now famous for its crowded freeways.
© IOC John Huet

PART TWO: GREENING BEIJING





Chapter 5: Air Quality

5.1.1 GREENING BEIJING

As the IOC Evaluation Commission noted in 2001, Beijing “has an ambitious set of plans and actions designed and comprehensive enough to greatly improve overall environmental conditions. These plans and actions will require a significant effort and financial investment. The result would be a major environmental legacy for Beijing from the Olympic Games, which includes increased environmental awareness among the population.”

“Although many of the plans are not Olympic specific, the bid has provided, and a Beijing Games would provide, an impetus and a catalyst for many measures, and their timing. The Beijing Municipal Government is committed to greatly reducing the pollution levels of Beijing, increasing environmental areas and protection, introducing environmental technology and controls, such as transport emission measures, and increasing sewerage treatment.”



Beijing's variable air quality has been the subject of considerable media attention in the run-up to the Games
© Still Pictures

Air quality is one of the major concerns of the Beijing Games' stakeholders, from the international media to the athletes who will compete there in August 2008. The IOC president, Jacques Rogge, was quoted in the media in August 2007 saying he "could not be more happy" about the state of preparations in Beijing. "Since I've been involved in Games preparations, which is since Sydney, they are the best prepared of all." Nonetheless, Rogge has echoed the widespread concern about the city's air pollution, even floating the possibility of rescheduling some events. "Sports with short durations would not be a problem, but endurance sports like cycling are examples of competitions that might be postponed or delayed," he said.

The main causes of air pollution in Beijing include the presence of many polluting industries and the large number of new vehicles registered daily in the city. The city's geographical position further exacerbates poor air quality. Beijing is surrounded by mountains that don't allow pollutants to disperse and the area is subject to severe sandstorms.

To fulfil its bid commitments, the Beijing Municipal Government began working to improve air quality in 1998. The prevention and abatement of air pollution has been reinforced, with a specific focus on vehicle emissions, industrial pollution, energy use and the construction sector.

Air quality has improved for some of the monitored pollutants. However, it can may take years to determine significant changes in air quality. Relevant progress may be evident only in the medium- to long-term. International attention on this issue is increasing with the approach of the Games. While this review lists several initiatives undertaken by the Beijing authorities and Games organizers to improve air quality, it would appear that more effort may be needed to address the legitimate concerns of the International Olympic Committee and other stakeholders.



5.1 NATIONAL AIR QUALITY STANDARDS

In terms of air quality standards, the city of Beijing is subject to the Standard II National Ambient Air Quality Standards (GB 3095 – 1996). These regulations set limits for major air pollutants such as sulphur dioxide (SO₂), carbon monoxide (CO), nitrogen dioxide (NO₂) and particulate matter (PM₁₀).

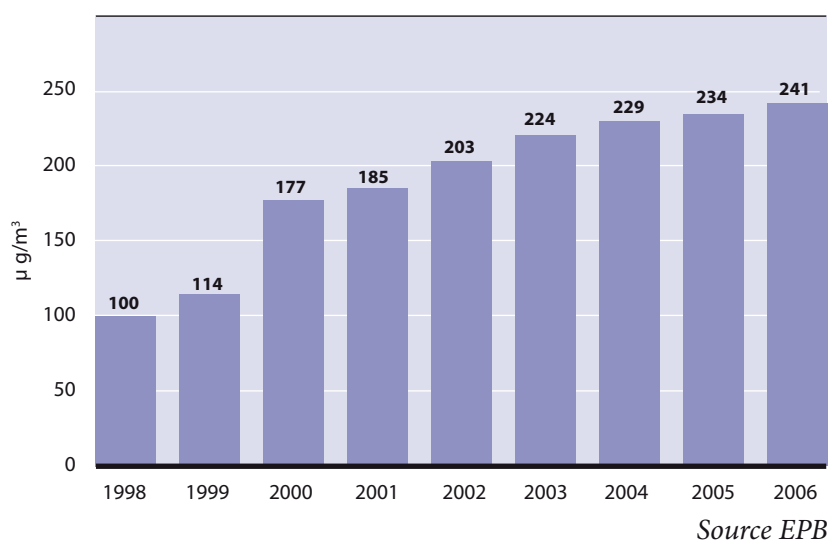
Ozone (O₃), which is generated through a photochemical reaction that takes place when nitrogen dioxide and volatile organic compounds are exposed in the sun (UV) radiation, is not among the parameters currently monitored by the city of Beijing. Ozone is produced in higher quantities during the summer months because of the reaction involving UV radiation and this is of particular concern because the Games will be staged in the month of August 2008. Further investigation into ozone levels is necessary.

According to data released by the Beijing Environmental Protection Bureau (EPB) from measurements from 27 monitoring stations in the municipal area, the number of days with air quality equal to or above the National Standard increased each year from 1998 to 2006.

TABLE 5.1: STANDARD II NATIONAL AIR QUALITY STANDARDS

Pollutant	Mean Level	Upper Limit of Standard II	WHO standards
SO ₂	Annual Mean	60 µg/m ³	
	24-hour Mean	150 µg/m ³	20 µg/m ³
	Hour Mean	500 µg/m ³	
PM ₁₀	Annual Mean	100 µg/m ³	20 µg/m ³
	24-hour Mean	150 µg/m ³	50 µg/m ³
NO ₂	Annual Mean	80 µg/m ³	40 µg/m ³
	24-hour Mean	120 µg/m ³	
	Hour Mean	240 µg/m ³	200 µg/m ³
CO	24-hour Mean	4,000 µg/m ³	
	Hour Mean	10,000 µg/m ³	

FIGURE 5.1: NUMBERS OF DAYS WITH AIR QUALITY EQUAL OR ABOVE NATIONAL STANDARD, 1998-2006



5.2 ANNUAL CONCENTRATIONS OF AIR POLLUTANTS IN THE CITY OF BEIJING

The tables below show the annual average concentration of major air pollutants in Beijing. The Environmental Monitoring Centre, managed by the Beijing Environmental Protection Bureau, collected and disseminated the data.

FIGURE 5.2: ANNUAL MEAN OF SO₂ CONCENTRATION IN BEIJING, 2000-2006

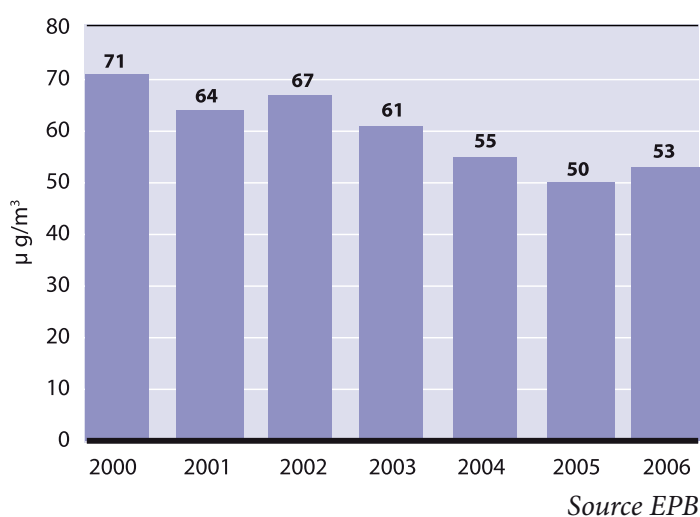


FIGURE 5.3: ANNUAL MEAN FOR NO₂ CONCENTRATION IN BEIJING, 2000-2006

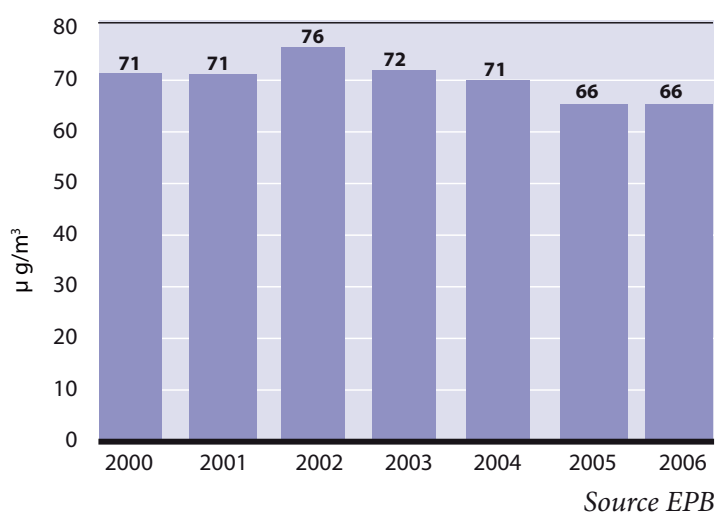


FIGURE 5.4: ANNUAL MEAN FOR CO CONCENTRATION IN BEIJING (MILLIGRAMS), 2000-2006

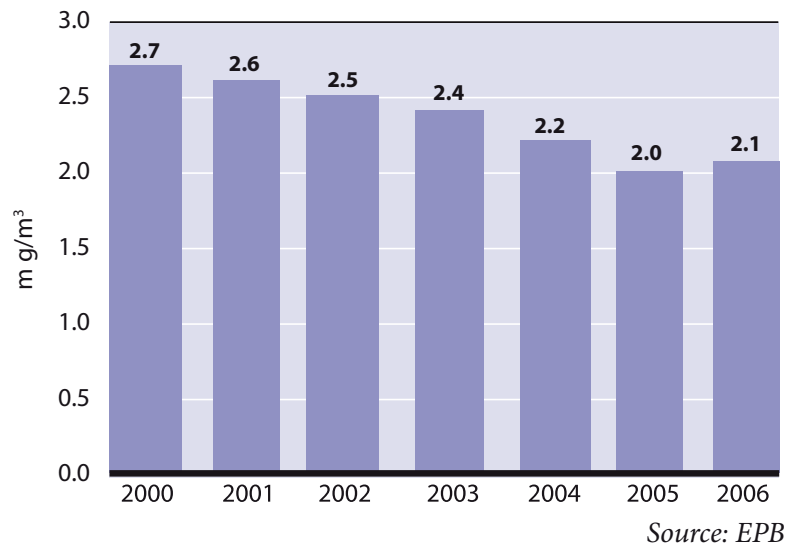
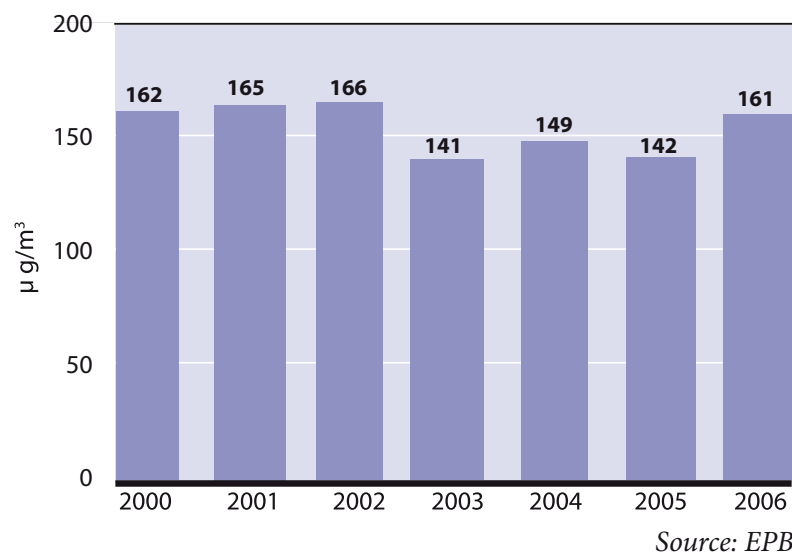


FIGURE 5.5: ANNUAL MEAN FOR PM₁₀ CONCENTRATION IN BEIJING, 2000-2006



The official figures of concentration levels appear to show that from 2000 to 2006 the percentages of SO₂, CO and NO₂ in the atmosphere have predominantly declined.

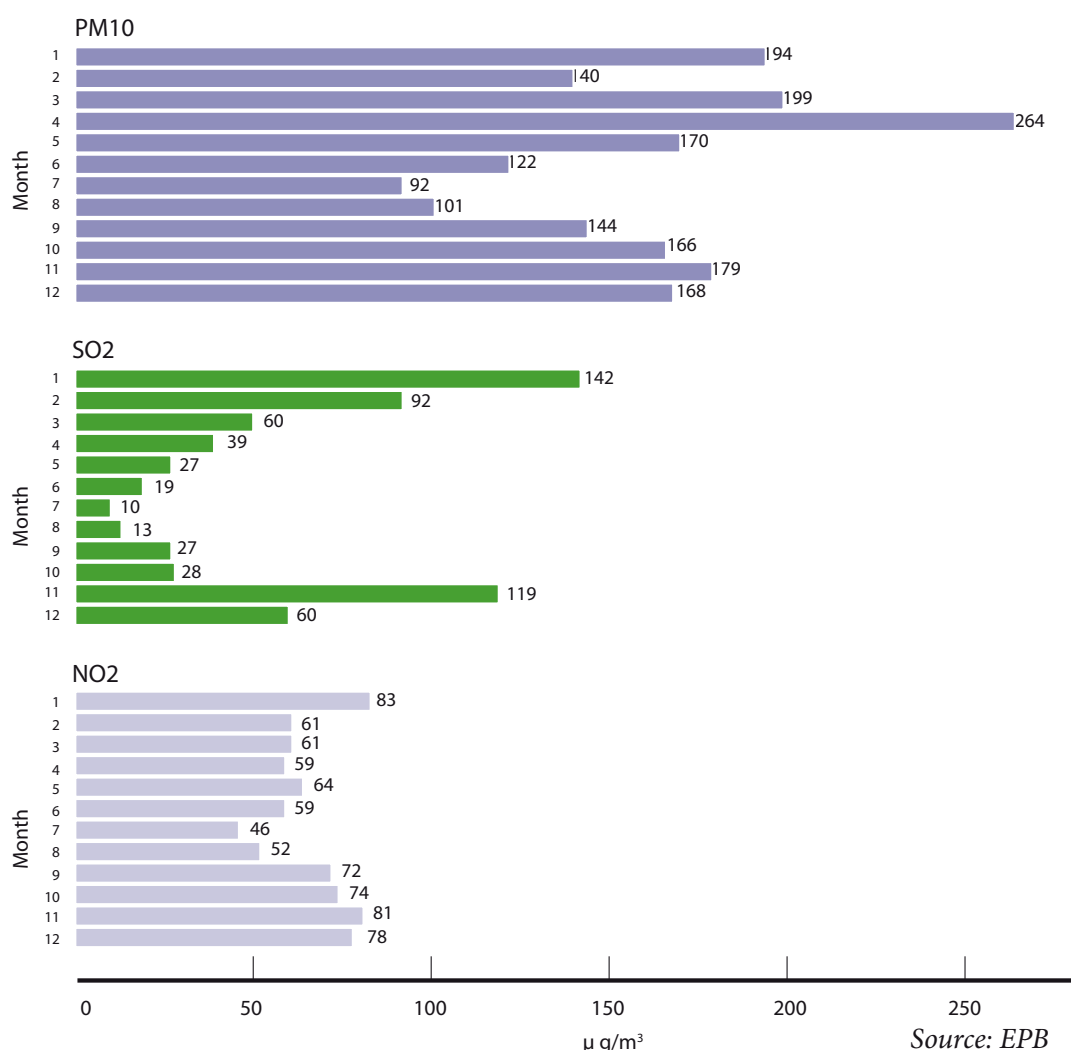
However, the concentration of PM₁₀ has not decreased. The reasons for this include dust generated by the huge number of construction sites, emissions from the coal burning boilers in Beijing and dust storms. For example, in the spring of 2006, the city was hit with 18 sandstorms.

According to the Beijing Municipal Government, the increase in airborne dust and sand is the most likely reason for the raise in the levels of PM₁₀ for 2006. However, this appears to be contradicted by the SO₂ and PM₁₀ data for August 2006. As they correlate closely it would appear that emissions from coal burning are largely responsible.

It is also significant that after three years of downward trend, levels of all the measured airborne pollutants in the graphs (SO₂, CO and NO₂, as well as PM₁₀) rose or ceased to decline in 2006.

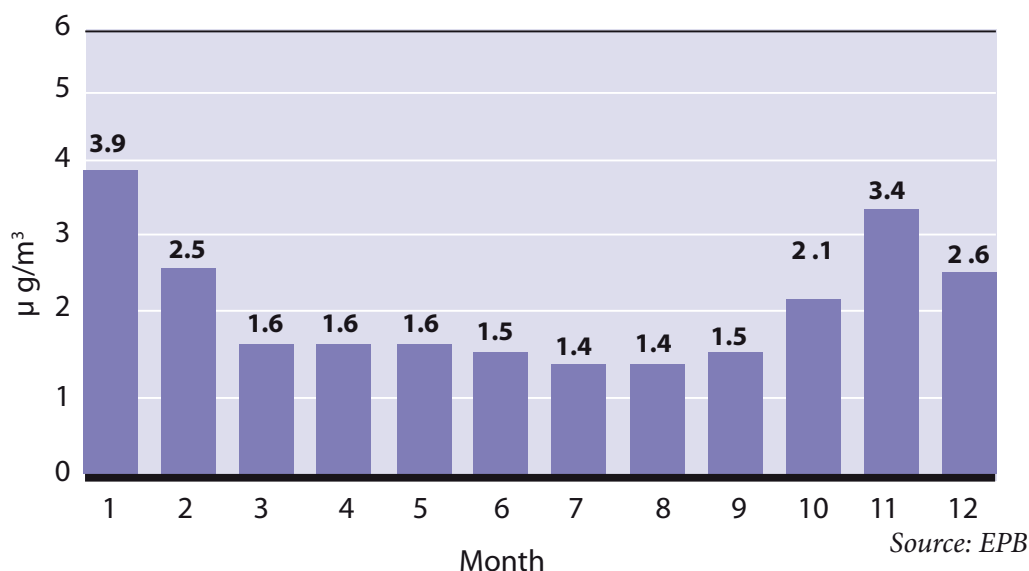
The tables below show the level of pollutants from January to December 2006 for the same parameters, which indicate that air quality is better in the summer months.

FIGURE 5.6: LEVEL OF POLLUTANTS, BEIJING, JAN. TO DEC. 2006



However, ozone (O₃), which is generated through a photochemical reaction that takes place when nitrogen dioxide and volatile organic compounds are exposed in the sun (UV) radiation, is not among the parameters currently monitored by the city of Beijing. Ozone is produced in higher quantities during the summer months because of the reaction involving UV radiation and this is of particular concern because the Games will be staged in the month of August 2008. Further investigation into ozone levels is necessary.

FIGURE 5.7: LEVEL OF CO CONCENTRATION (MILLIGRAMS), BEIJING, JAN. TO DEC. 2006



5.2.1 WHO AIR QUALITY GUIDELINES

The World Health Organization (WHO) develops globally recognized standards for air quality. WHO sets concentration guidelines for major pollutants on the basis of the health hazards they can cause to human beings.

In 2006, WHO published the 'Air Quality Guidelines: Global Update 2005', superseding the previous edition completed in 1997 (published by WHO in 2000). The limits for some major pollutants were revised and below are the values currently in force:

SO₂

20 µg/m³ 24-hour mean

500 µg/m³ 10-minute mean

NO₂

40 µg/m³ annual mean

200 µg/m³ 1-hour mean

CO

30 mg/ m³ 1-hour mean

10 mg/ m³ 1-hour mean

PM₁₀

20 µg/m³ annual mean

50 µg/m³ 24-hour mean

O₃

100 µg/m³ daily maximum 8-hours mean

The limits for NO₂ and CO remained unchanged in the new Guidelines, but those for SO₂, PM₁₀ and O₃ were significantly lowered.

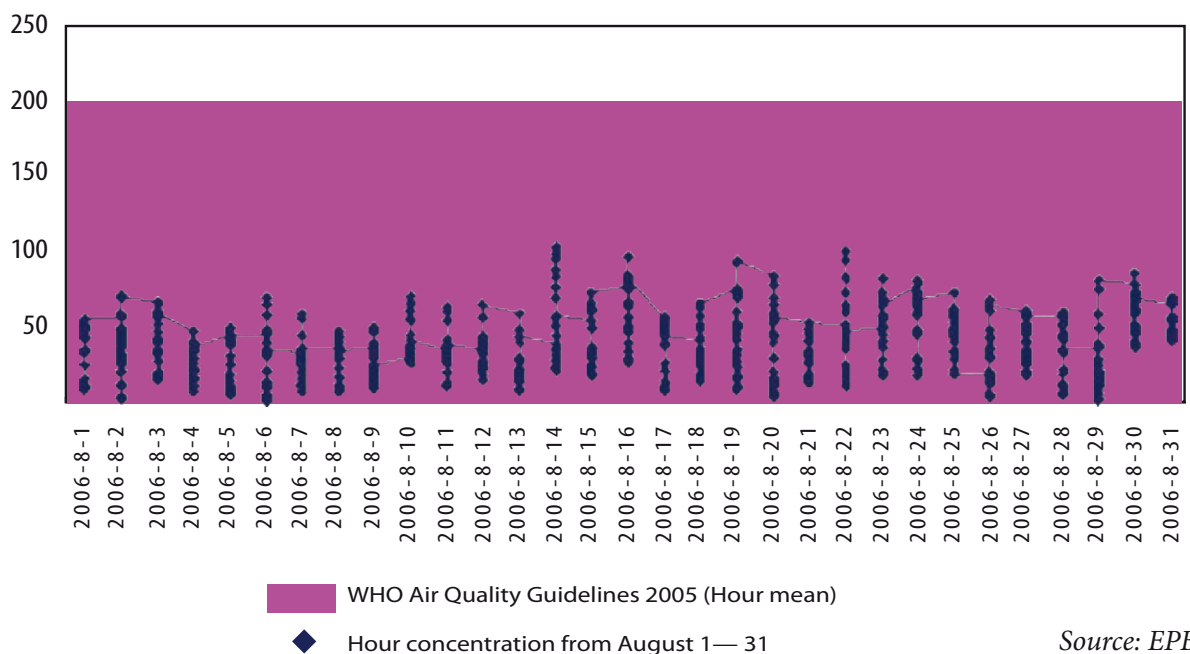
5.3 AIR QUALITY IN BEIJING IN THE MONTH OF AUGUST 2006

The tables below show air quality data released by the Beijing EPB for the month of August 2006, compared to the 2005 WHO Air Quality Guidelines recommendations.

The data refer to the daily SO_2 concentration, the NO_2 hour concentration and the daily PM_{10} concentration. They are particularly relevant for the Olympic Games, which will be staged from August 8 to 24 2008.

While NO_2 concentrations are consistently and significantly below the WHO threshold, and SO_2 levels are predominantly within safe limits, levels of PM_{10} are well above recommended safe levels, often by as much as 200 per cent and sometimes more.

FIGURE 5.8: NO_2 CONCENTRATION IN AUGUST, 2006 COMPARED TO WHO GUIDELINES ($\mu\text{g}/\text{m}^3$)



Source: EPB

FIGURE 5.9: SO₂ CONCENTRATION IN AUGUST 2006, COMPARED WITH WHO GUIDELINES (µg/m³)

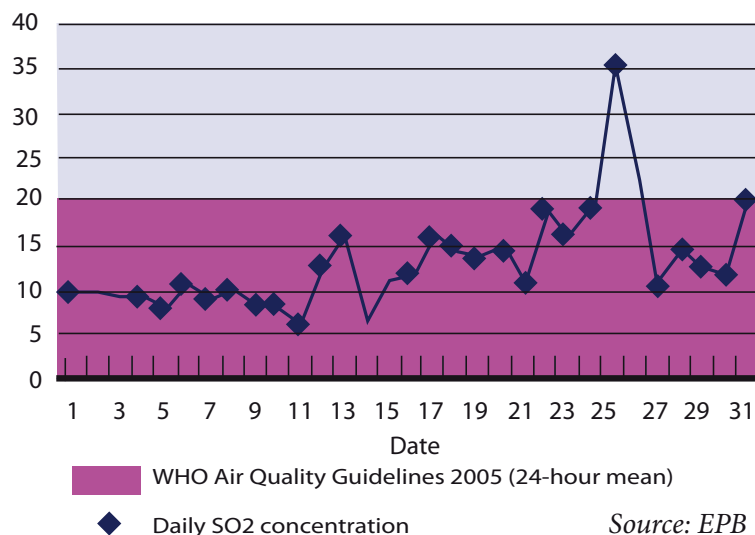
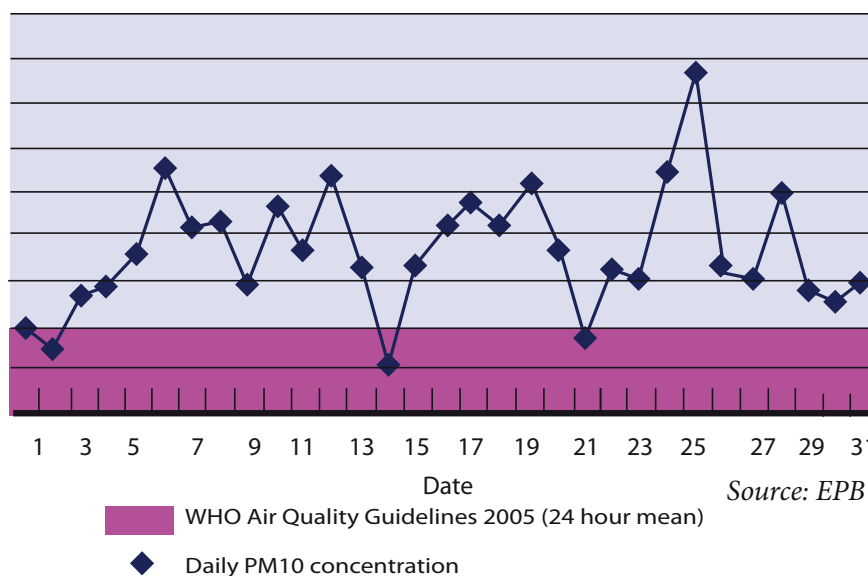


FIGURE 5.10: DAILY PM₁₀ CONCENTRATION AUGUST, 2006 COMPARED WITH WHO GUIDELINES (µg/m³)¹⁰



COMMENT

Beijing has implemented a number of initiatives to improve its air quality and reduce its air pollution. From the relocation and refitting of major polluting industries, to the conversion of coal burning boilers, to cleaner fuels and the implementation of vehicle emission standards, the city can boast significant achievements. Most of these initiatives will benefit the citizens of Beijing long after the Games have closed, provided that the impetus brought about by hosting the Olympics is continued, with Games-related measures being adopted and implemented on a long-term basis by the authorities.

Chapter 6: Transport

With about 16 million inhabitants, and nearly 1,000 new vehicles registered every day, the city of Beijing must carefully consider transportation issues in order to guarantee sustainable and efficient transportation services. Air pollution, a consequence of heavy, high-emission traffic, also must also be addressed.

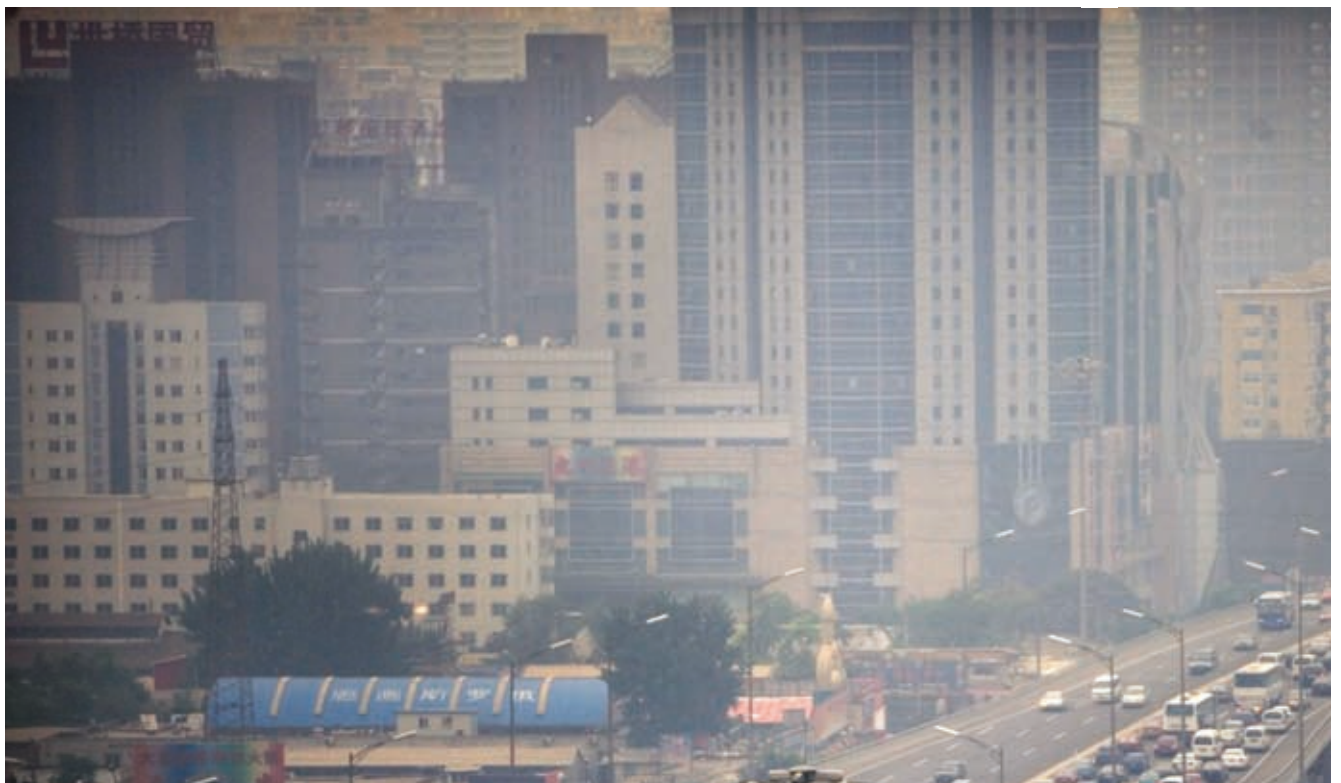
By October 2006, 2.8 million vehicles were estimated to be operating in Beijing. The following table gives a breakdown of vehicles by type. It is understood that the figure now well exceeds 3 million.

TABLE 6.1: NUMBER OF VEHICLES IN BEIJING BY TYPE

Vehicles	Total number
Private cars	2,000,000
Governmental cars	800,000
Buses	18,000
Taxis	65,000
Bicycles	8,000,000

Source: BOCOG

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The estimated breakdown of different transportation methods, also assessed in October 2006, was:

» Cycling, walking	39%
» Bus	28%
» Taxi and Rail network	10%
» Car	23%

To create a transportation system that is environmentally sound and can accommodate its many residents, Beijing has committed to improving its public transport system by increasing the transportation capacity of the metropolitan underground and of the ground lines. It has also committed to using clean fuels for taxis and buses, with a target of 90 per cent of public buses and 70 per cent of taxis, as well as implementing improved emission standards for light vehicles.

6.1 VEHICLE EMISSIONS

The number of new vehicles in Beijing is increasing dramatically month by month. It is estimated that there will be more than 3.3 million by the time the Olympic Games begin in August 2008.

TABLE 6.2: VEHICLES IN BEIJING: 2001-2006

Year	2001	2002	2003	2004	2005	2006 (October)
Number of vehicles in Beijing	1,534,000	1,734,000	2,124,000	2,132,000	2,600,000	2,800,000

Source: BOCOG

Motor vehicles are a major source of carbon monoxide and nitrogen oxide emissions. In order to tackle the increasing levels of pollution, the Municipal Government has developed new automobile emission standards, toughening the standards for public transportation, car emissions inspections, and systematic traffic management. The new regulations are now being enforced.

With the approval of State Department, Beijing implemented National First-Phase Emission Standards in 1999, National Second-Phase Emission Standards (equal to the Euro II Emission Standard) in January 2003, and National Third-Phase Emission Standard (equal to the Euro III Emission Standards) in December 2005. The implementation of the mentioned standards, took place two years ahead of other cities in China. National Fourth-Phase Emission Standards, equivalent to the Euro IV standards, will be launched in 2008.

TABLE 6.3: DATE OF IMPLEMENTATION OF EMISSION STANDARDS IN CHINA AND EUROPE

Standard	Year of implementation (China)	Year of implementation (Europe, passenger cars)
National First-Phase Emission Standard (Euro I)	1999	1992
National Second-Phase Emission Standard (Euro II)	2003	1996
National Third-Phase Emission Standard (Euro III)	2005	2000
National fourth-Phase Emission Standard (Euro IV)	Will be implemented in 2008	2005

Source: EPB

To parallel the introduction of new emissions standards, Beijing started to implement a Vehicle Environmental Labelling System in 2001. According to the label system, vehicles can circulate in Beijing only if marked with a yellow or green label, depending on the standard they comply with, and all those without a label are not allowed to enter the city area. The environmental labels are released by official inspecting centres where vehicle emissions are checked to verify their compliance with the standards. In October 2006, 218 test lines were in operation with an annual testing capacity up to 3 million vehicles. On-the-road inspections are carried out regularly at the main entrances of the city and around the city itself.

On 16 September 2007, China launched its first nationwide urban public transport week. The campaign, with the theme 'Green Transport and Health', covered 108 cities including Beijing, Shanghai and Tianjin and lasted through to 22 September. It encouraged people to walk, ride bicycles and take public transport facilities such as buses, subways and taxis rather than drive private cars.

Beijing is also experimenting with no-drive days for the Olympic period whereby cars with even or odd numbered plates are forbidden to drive on alternate days. While this is undoubtedly of benefit, it is doubtful if it will have any profound short-term effect on air quality.

TABLE 6.4: NUMBER OF VEHICLE INSPECTIONS, 2001-2004

Year	Vehicles inspected in the city (and percentage compliance)	Vehicles inspected at the main entrances to the city
2001	161,000 (90%)	490,000 non-local vehicles
2002	82,000 (91%)	510,000 non-local vehicles
2003	220,000	350,000 non-local vehicles
2004	570,000 total	

Source: BOCOG

In 1997, unleaded petrol was introduced in Beijing, to the undoubted benefit of public health in the municipal area. By 2000, 2003, and 2005 fuels (both gasoline and diesel) complied with the Euro I, Euro II and Euro III fuel standards respectively.

Through the implementation of emissions standards, vehicles exhaust inspections and fuel quality improvement, the annual average concentration of CO has not risen in Beijing despite the significant increase in traffic volume.

A vehicle emissions official inspecting centre

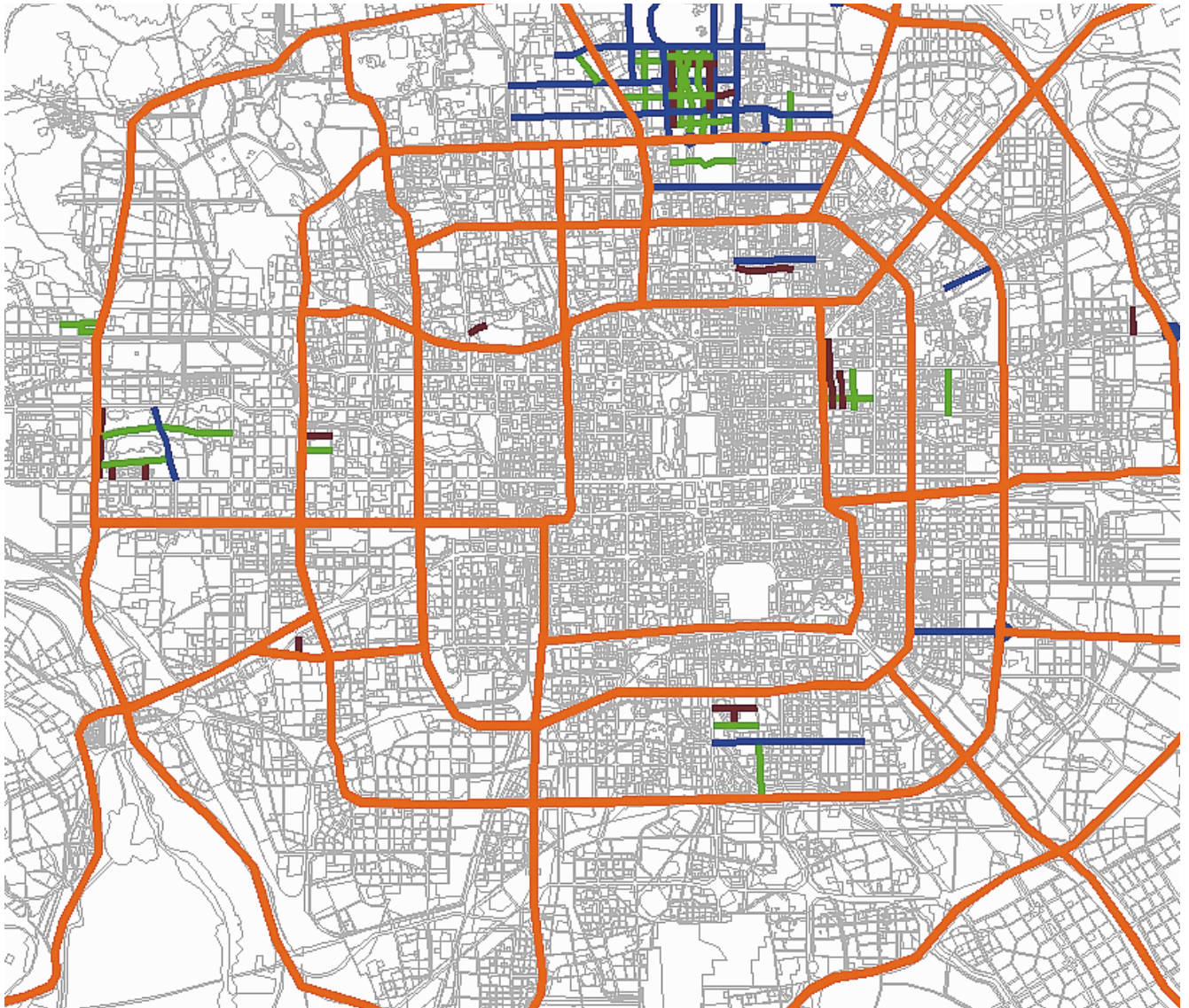


To reduce pollution from fuel storage and filling, the Municipal Government implemented the first-phase reconstruction for gas recirculation devices in urban filling stations in 2001. The city is installing sealing systems for fuel storage tanks and fuel unloading systems. The second-phase reconstruction is currently under execution. Measures are being taken to process pollution from petrol stations, oil storage centres, and oil carriers. Nearly 100 petrol stations in Beijing have installed recycling refuel nozzles. At the same time, oil storage centres and petroleum refineries have been requested to install gas recirculation systems.



FIGURE 6.1 NEW ROAD AND BRIDGE CONSTRUCTION, BEIJING

Source: Beijing
Transportation
Research Centre



6.2 ROAD INFRASTRUCTURE

In the last few years, the Municipal Government started the construction of 77 roads and bridges. The location of the roads is shown in blue and green in the table below. Construction has been completed on 36 of the 77 roads and bridges, 31 are currently under construction, and 10 are still in the design phase.

For the most part, the new roads and bridges are being developed in the northern part of the city around the Olympic Park, in order to serve the area during the Games. Other construction sites are also located close to Olympic venues in the municipal area.

Road building raises a number of environmental issues. First, there is the question of the environmental impact of road building itself. Then there is the issue of road use. While possibly addressing the issue of access to the Olympic sites, it is not clear if the construction of new roads will have environmental benefits or even relieve traffic congestion.

Evidence suggests that traffic volumes grow to fit the available space. It would be good to see more evidence of alternative innovative strategies to reduce congestion. Although car ownership is closely linked to upward social and economic mobility, and may therefore be realistically expected to rise, there are a number of available positive and negative inducements that can be used to reduce traffic load, such as congestion charges or improved public transport.

As the information below indicates, public transport use is currently well below capacity, and although the system is due to be expanded, there is no clear indication of how or whether increased uptake of the facility will be achieved. As an important legacy of hosting the Olympic Games it would be helpful to see this issue addressed.

6.3 PUBLIC TRANSPORT INFRASTRUCTURE

The Beijing Municipal Government has strengthened public transportation facilities, with special regard to transport hubs, new bus lines, above-ground railway lines, and the underground network.

Bus Rapid Transit Lines

The 16 km-long south-middle Bus Rapid Transit (BRT) line began operating at the end of 2006. The bus line has a total passenger capacity of 100,000 passengers per day. Two more BRT lines are under construction.

Transportation hubs

The city of Beijing recently built and put into operation three transportation hubs to shorten the distance required to transfer transportation lines. They are located at:

- » North Square of Beijing West Railway Station Passenger Hub
(5 passenger platforms, 15 bus routes, capacity of up to 70,000 passengers a day)
- » Zoo Passenger Hub (11 bus routes, capacity of more than 60,000 passengers a day)
- » Liu Liqiao Passenger Hub (3 bus routes, capacity of 1,500 passengers a day).

Urban railway network

The Municipality of Beijing has also worked to improve above-ground and underground urban railway networks. Four lines are currently operating and four more are under construction. According to official government data, by 2008 the eight lines will have a total operating capacity of 3.9 million passengers a day.

The current capacity of the rail network is 2.4 million passengers per day, but the average number of passengers using the service is only 1.7 million per day. A ninth line (Line 4, 28 km) is also under construction and is due to be opened in 2009.

FIGURE 6.2: BUS RAPID TRANSIT LINES, BEIJING

FIGURE 6.3: EXPECTED URBAN RAIL TRANSPORTATION NETWORK

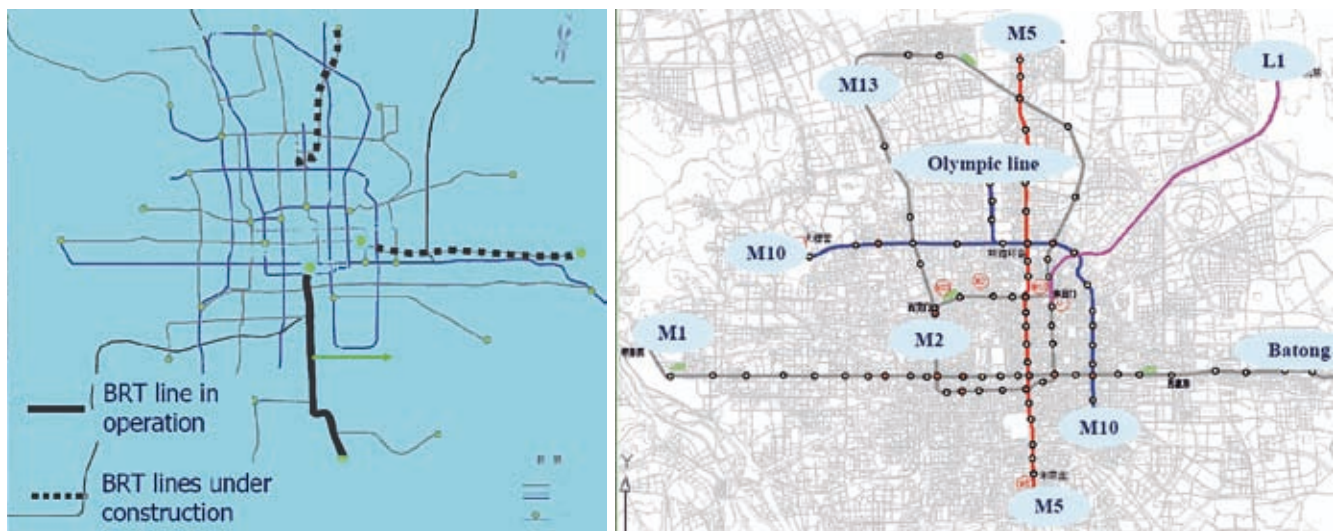


TABLE 6.5: RAIL LINES CURRENTLY IN OPERATION, BEIJING

Rail line	Length km	Note
M1	31	In operation
M2	23	In operation
Batong line	19	In operation
M13	41	In operation
M5	27.5	Under construction
M10 Part 1	24.6	Under construction
Olympic Line	4.3	Under construction
L1 airport	24.5	Under construction

6.4 PUBLIC GROUND TRANSPORTATION

The total capacity of Beijing's public ground transportation is 19 million passengers per day for a total passenger volume of 10.5 million persons per day. The Municipal government is working to further increase both the capacity and the number of users to relieve the city's air pollution.



UNEP

COMMENT

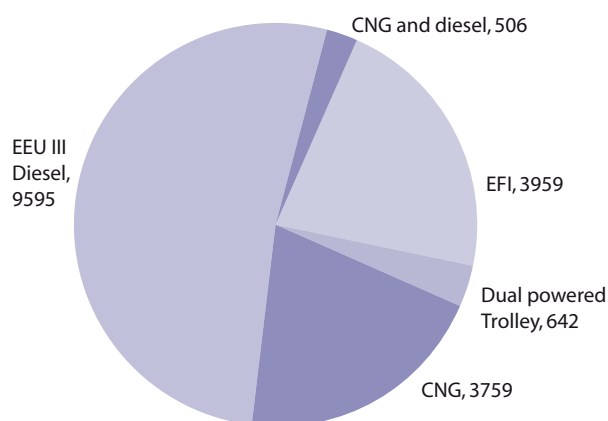
Beijing's statistics on total ground transport capacity, and the user figures for the urban rail network, beg the question of why the system is running well below capacity. Why are people preferring to use cars and sit in traffic congestion instead of using public transport? It is not just a question for Beijing, it is a common problem, especially in the developed world, but one that urgently needs answering to relieve the environmental impact of vehicle emissions.

As part of its anti-pollution effort, the Beijing Government formulated a policy to encourage renovation and scrapping of old taxis and buses. Out of a total operating fleet of 60,000 taxis and 19,000 buses, more than 47,000 old taxis and 7,000 old diesel buses were replaced or refitted by the end of 2006.

New buses powered by Compressed Natural Gas (CNG) were introduced to replace old buses: 3,795 CNG buses are now running in Beijing, one of the largest fleets of this kind operating in any city in the world.

In March 2007, the total number of buses increased to 20,138. Figure 6.4 shows the composition of the fleet, sorted by engine typology.

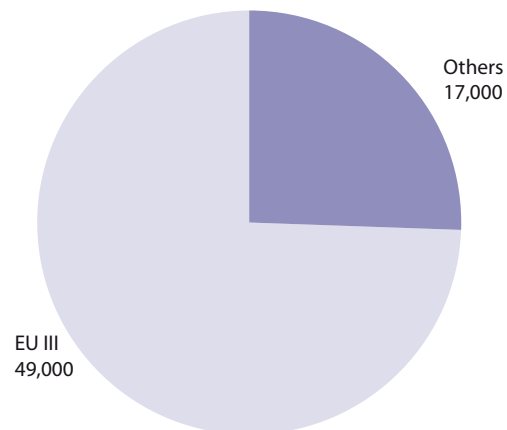
FIGURE 6.4: BEIJING BUS FLEET BY FUEL TYPE



Source: Beijing Transportation Research Centre

At the time of this study's field visit to Beijing in March 2007, there were an estimated 60,000 taxis in operation in Beijing. Of these 47,000 complied with the Euro III vehicle emission standard, as shown in figure 6.5.

FIGURE 6.5: TAXIS COMPLYING WITH EURO III VEHICLE EMISSIONS STANDARDS, 2007



Source: Beijing Transportation Research Centre

To enhance traffic management and improve the efficiency of public transportation, 430 buses were equipped with GPS tracking systems. The GPS systems provide vehicle arrival information to passengers and are equipped with real-time maps showing the current position of the buses. As of March 2007, 49,601 taxis were also equipped with GPS tracking devices.



The control room of a GPS tracking system for public transportation



*New Compressed
Natural Gas
(CNG) powered
buses*



*A CNG refilling
station*

6.5 FUEL CELL BUSES

In March 2003, the Global Environment Facility (GEF), UNDP and the Chinese Government launched a pilot project aimed at reducing greenhouse gas (GHG) emissions and air pollution through the introduction of fuel-cell busses (FCBs) in urban areas of China. The objective of this project was to demonstrate the operational viability of FCBs in a developing Country.

The project, structured in two different phases, catalyzed the cost-reduction of fuel-cell buses (FCBs) for public transit in Chinese cities. The project supported significant parallel demonstrations of FCBs and their fuelling infrastructure in Beijing and Shanghai.

In collaboration with the Chinese national government, the Beijing Municipal Government and the private sector, the GEF and UNDP assisted the public transit companies of Beijing to obtain and operate three FCBs. A formal handover ceremony for the three FCBs was held on November 23, 2005, and operation began on June 20, 2006.

TABLE 6.6: FCB PROJECT DATA UP TO APRIL 2007

Total distance covered	54,832 km
Total H2 consumption	9,027 kg
Average H2 consumption	18.64 kg/100 km
Number of passengers carried	21,046

Source: Beijing Science and Technology Commission

As part of the FCB project, the Beijing Hydrogen Refuelling Station was built within the Beijing Hydro Demo Park. The refuelling station, with external H2 sources, began service on 8 November 2006.

The knowledge and experience gained through this project will enable the technology suppliers to identify cost reduction opportunities and the host public transit operators to gain valuable experience to adopt larger fleets of FCBs in the future.

Additionally, some activities will help build capacity relating to FCBs, including strengthening policy and planning capabilities of the public transit companies; enhancing scientific, technical, and industrial capacity for commercializing FCBs; and increasing the understanding of FCBs among government, investors, the media and other key actors. Finally, a series of activities will also focus on defining a detailed strategy for large-scale FCB implementation in China, which is planned as a follow-up to this initial project.

During the Games the three buses will be used for transporting high-profile international and national athletes within the Olympic compound and around Beijing. This will also serve to raise public awareness about zero-emission solutions to public transport and China's commitment to the use of renewable energy technologies.

Chapter 7: Energy and Industry

While a great deal of attention has been focused on Beijing's traffic congestion and growing vehicle population, the data suggest that pollution from transport may just be the tip of the iceberg.

Until recently, Beijing was the city with the highest energy consumption in China (Shanghai is now ranked as the biggest energy user). The city's energy infrastructure is dominated by coal-fired power plants, which emit large quantities of sulphur dioxide and particulate matter air pollution.

In its pursuit of sustainable development, Beijing is attempting to diversify its energy system by reducing coal use and switching to cleaner energy technologies such as natural gas, geothermal energy, district heating networks, wind energy, and other forms of renewable energy. Motivated by the Olympic bid commitments, the Municipal Government has also developed several projects to increase energy efficiency and reduce energy consumption.

7.1 ENERGY CONSUMPTION IN THE INDUSTRIAL SECTOR

According to the Beijing Reform and Development Commission, during the Tenth Five Year Plan (2001-2005), Beijing's economic development increased at the rate of 12 per cent every year, while energy consumption only increased by 5.9 per cent.

Energy consumption per 10,000 yuan (US \$1,331) of GDP decreased by 38.9 per cent, from 1.31 TCE (tonnes of coal equivalent) in 2000 to 0.8 TCE in 2005. Energy consumption in Beijing per unit of GDP is about 35 per cent lower than the national average.

The energy structure in Beijing has changed with shifts in the city's economic structure. As a greater part of the economy moves from raw production (primary industries) to service industries (tertiary industries), pollution is decreasing in the city.

The ratio of primary, secondary and tertiary industries changed from 2.5:32.7:64.8 in 2000 to 1.4:29.5:69.1 in 2005 and the fast development of advanced technologies and modern manufacturing industries contributed to the reduction of energy consumption.

Communication and educational activities have been an integral part of a campaign to reduce energy consumption in the city. From the first to the third quarter in 2006, Beijing's total energy consumption was 43.15 million TCE, 4.5 per cent more than the energy consumption of the same period in 2005. The corresponding GDP was 55.132 billion yuan (US \$7.34), a 12.2 per cent increase from 2005. Energy consumption per 10,000 yuan of GDP in Beijing therefore decreased to 0.78 TCE (based on 2005 prices), 6.9 per cent less in 2006 than in 2005. During 2007-8, energy consumption per unit of GDP is predicted to decrease by more than 4 per cent.



© Ullstein Eckel /
Still Pictures

TABLE 7.1: PRIMARY/SECONDARY/TERTIARY INDUSTRY RATIO IN BEIJING (%)

Year	Primary industry	Secondary industry	Tertiary industry
2000	2.5%	32.7%	64.8%
2005	1.4%	29.5%	69.1%

Source: Beijing Development and Reform Commission

Optimizing the Industrial Structure

The growth of the service industry sector has contributed to the success of Beijing's comprehensive energy consumption reduction programme. From the first to the third quarter of 2006, the service industry sector grew by 1.3 per cent (compared with 2005 data), thus accounting for 70.4 per cent of Beijing's industrial sector. As for energy consumption, the service industry accounted for 0.4 TCE per 10,000 yuan of GDP for the first four months of 2006. This amount is equal to half of the mean energy consumption in Beijing overall, and is equal to less than one-third of industrial energy consumption.

The development of advanced technologies and modern manufacturing methods has also resulted in reduced industrial energy consumption. The manufacturing sector accounts for a large portion of Beijing's energy consumption, accounting for about 46.5 per cent of the total.

During the first to the third quarter of 2006, Beijing's large-scale industrial energy consumption per 10,000 yuan of GDP decreased by 13.8 per cent. Improved technologies in large-scale industries accounted for 65 per cent of the reduction in energy consumption in the first quarter of 2006.

During this period, some energy-intensive industries suspended their production, were relocated, and/or improved their technologies, which also contributed to the reduction in energy consumption. More details on the industrial structure of Beijing are available in Chapter 8: Industries.

Implementation of new laws and regulations

The Beijing Municipal Government has formulated and implemented laws and regulations on energy conservation, further defining energy policies and guiding principles. Some examples follow below:

- » Provision of Beijing Municipality Methods of Reinforcing Energy Conservation.
- » Provision of Beijing Municipality Methods of Energy Saving Supervision.
- » Provision of Beijing Municipality Guidelines on Implementation of Trial Methods on Clean Production Audit.
- » Beijing Programme of Circular Economy Development during 11th Five Year Plan.
- » Beijing Programme of Energy Development and Energy Saving during 11th Five Year Plan.
- » 2006 Speeding Circular Economy and Establishing Energy Saving Act.
- » Beijing Programme of Buildings Energy Saving During 11th Five Year Plan.
- » Guidelines of Heat Pump System Development.

To effectively promote and monitor declines in energy consumption, Beijing publicizes a quarterly civic energy and water consumption bulletin in an official gazette. National standards for energy-saving buildings are implemented on a mandatory basis for new buildings.

Standards for energy consumption for all new industrial development projects are in effect, including:

- » Suggestions for land and resource conservation in construction projects in the Beijing Industrial Development Area (Base).
- » Beijing Municipality Guidelines on industrial energy and water efficient utilization.

These guidelines establish levels of intensive energy utilization for development projects in the Industrial Development Area.

Promoting Energy Consumption Reduction in Selected Fields

Government offices took the lead in energy conservation: in 2005, 54 governmental departments reduced their consumption by a total of 11 per cent through energy-saving behaviour and building renovation. In 2006, ten government departments were selected for energy saving and technical renovation pilot projects.

New techniques and products are adopted in new buildings, such as heat preservation/insulation techniques for outer walls, new types of energy saving windows and doors, and combining the supply of heat, power and cooling utilities. Renewable energy such as heat pump and solar energy technology is much more prevalent in Beijing than before. Some large public buildings have also increased their commitment to energy conservation, investing in renovating air conditioners, elevators, power supply systems, and other equipment.

In 2006, in the framework of the 'Green Lighting Programme', 2,046 primary and middle schools in 18 counties and districts completed the replacement of normal lights with energy-efficient lights.

According to the Beijing Development and Reform Commission, during the past three years, since the kick-off of the Green Lighting Programme, 1.8 million energy-efficient lights have been put in use. The Commission estimates that 39 million kilowatt-hours of electricity, 28 million yuan (US \$3.72 million), 38,700 tons of NO₂, 1,164 tons of SO₂ and 1,700 tons of NO_x (Nitrogen Oxides) emissions can be saved per year.

7.2 NATURAL GAS CONSUMPTION

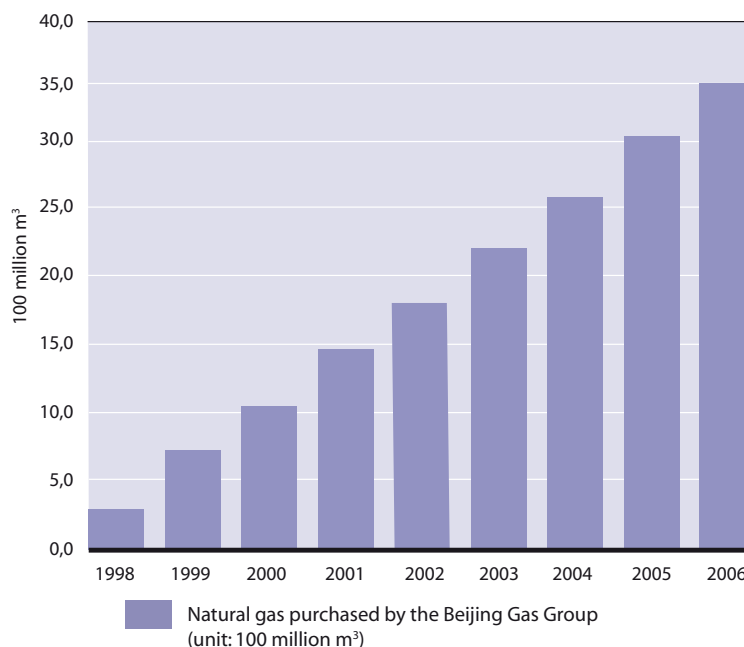
The Beijing Gas Group Ltd. is a state owned company responsible for supplying natural gas and liquefied petroleum gas (LPG) to the city of Beijing. Beijing Gas Group Ltd. is the largest company operating in the gas sector in China. Other smaller companies also supply natural gas to Beijing, but this portion of the chapter will only discuss Beijing Gas Group activities.

Since Beijing began importing natural gas from Shanxi, Gansu and Ningxia Provinces in 1997, natural gas consumption in Beijing has increased by 300-450 million m³ annually. The number of customers has increased by 250,000-300,000 households annually.

In 1997, the Beijing Gas Group purchased 180 million m³ of natural gas. By 2006, their purchase had increased to 3.53 billion m³ and the number of households benefiting from the service reached 3.22 million.

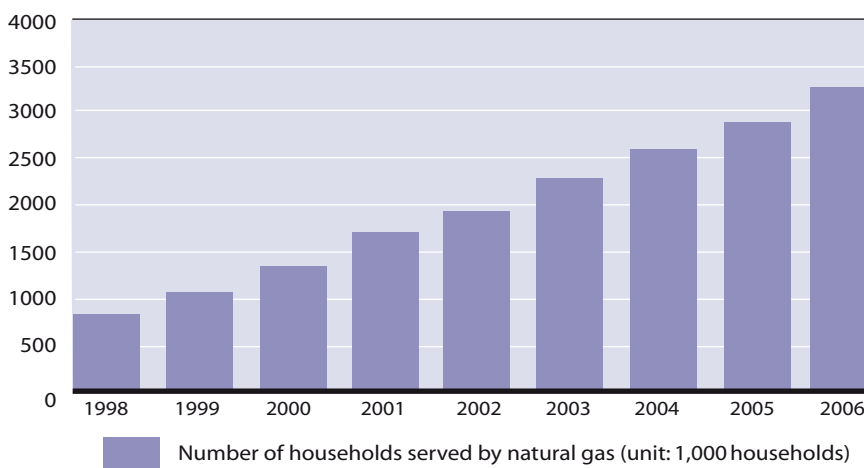
According to official data, the ratio of natural gas consumption to total energy consumption in Beijing increased from 0.5 per cent in 1997 to 6.4 per cent in 2004.

FIGURE 7.1: NATURAL GAS PURCHASED BY THE BEIJING GAS GROUP FOR DISTRIBUTION (1998-2006)



Source: Beijing Gas Group Company Ltd.

FIGURE 7.2: NUMBER OF HOUSEHOLDS SERVED BY NATURAL GAS (1998-2006)



Source: Beijing Gas Group Company Ltd.

At the end of 2006, the total purchasing volume of the Beijing Gas Group was 3.53 billion m³, while the overall sales volume was 3.47 billion m³. The total length of the company's transportation network was 7,295 km, including super-high pressure, high pressure, medium pressure and low pressure pipes 348 km, 466 km, 2,357 km and 4,125 km respectively. In 2006, a total of 646 natural gas pressure regulating stations were operating with a storage capacity of 700,000 m³, divided between four different storage facilities. Beijing relies on both national and Russian gas fields for its supply. It has been estimated that nearly 20 billion m³ of natural gas will be imported from Russia in 2015. The Russian gas fields are connected to the city by several long-distance transportation pipelines, such as the Shanjing Lines No. 1 (built in 1997 with a transportation capacity of 3.3 billion m³/year) and No. 2 (built in 2005 with a transportation capacity of 12 billion m³/year).

Natural gas use forecast

The Beijing Gas Group is currently working to:

- » Strengthen the development of high quality energy sources, such as natural gas.
- » Increase import levels of natural gas from international natural gas sources, to supplement extraction from national natural gas fields, such as Changqing and Huabei gas fields.
- » Preferentially satisfy the natural gas demand of residents.
- » Encourage, in cooperation with the Municipal Government, the replacement of polluting industries and electricity power plants.
- » Support the development of gas-powered co-generation plants.

The table below shows the forecast for natural gas demand in Beijing with a breakdown for different end-user sectors. While the conversion to natural gas is a positive trend, it is hard to currently gauge its significance as data has not been presented to relate it to other energy sectors, for example to calculate how much less coal is being used as a result of increased natural gas use.

TABLE 7.1: NATURAL GAS CONSUMPTION FORECAST, BEIJING, 2006-2020

Sector	2006	2008	2010	2020
Residents	7.9	8.6	9.1	14_17
Public Service	3.4	4.6	3.7	6_7
Industry	1.6	5.3	3.9	9.1
Heating	17.7	24.3	33	42
Cooling	0.6	1.0	2.3	3.3
Electricity Generation	2.8	6.6	14.5	32_38
Others	1.3	2.2	1.3	1.6

Source: Beijing Gas Group Ltd.

Although many of Beijing's environmental commitments are not specific to the Olympics, the Beijing Games has undoubtedly provided a catalyst for many environmental measures. Beijing's energy infrastructure is undergoing massive restructuring, with a gradual transition from heavy dependence on coal to cleaner energy sources.

Reducing dependence on coal will help Beijing to improve energy efficiency and air quality. In the meantime, though, the city remains heavily reliant on coal, with its associated environmental consequences, ranging from local air pollution to the long-range transport of toxic elements such as mercury.



COMMENT

7.3 COAL- FIRED BOILERS

Coal-fired boilers are among the major sources of air pollution in Beijing. They are classified on the basis of their power generation capacity:

- » Large-scale coal-fired boilers for power generation (above 14 MW of capacity)
- » Small-scale coal-fired boilers with a capacity below 14MW.

The Beijing Environmental Protection Bureau (EPB) is in charge of reducing air pollution generated by the boilers and has identified two different strategies to achieve the task: conversion to clean energy for the small-scale plants, and complete technical renovation of large-scale plants.

Conversion of small-scale coal-fired boilers to clean energy

At the end of 2006, 15,200 coal-fuelled boilers, out of the total 16,300 operating in Beijing, had been converted to clean energy, such as natural gas (the majority) or LPG or solar and geothermal energy. According to the Beijing EPB, the remaining 1,105 boilers (weighing below 20 tons) will be converted before the end of 2007.

In addition, the Beijing EPB launched a project to convert to electricity the small coal fired stoves operated by restaurants, commercial activities, small businesses and households for heating or cooking. From 2003 to 2006, the 'Coal to Electricity' demonstration project involved 11,421 families in the areas stretching from Dings SanTiao to BaTiao and from Xisi TouTiao to BaTiao.

A total of 288 million yuan (US \$38.37 million) was invested in the project. About 10,000 families are expected to complete the conversion process by the end of 2007. While this relatively insignificant in terms of Beijing's population of 16 million it is, nevertheless, an important step in the right direction.

Large-scale coal-fired boilers

To deal with large-scale boilers, the EPB adopted a different strategy, focusing on three different measures to reduce pollution:

- » Adopting high efficient dust removal technologies
- » Controlling dust in the coal storage facilities
- » Adopting end-of-pipe desulphurization systems



Beijing Municipal Government experts at the entrance of the Beiyuan Geothermal well in Beijing and a detail of the heat pump system.

7.4 GEOTHERMAL ENERGY

To improve air quality and achieve its energy saving goals, the Beijing Municipal Government has accelerated the development of clean energy sources, such as geothermal resources (including superficial geothermal resources). Since 1999, the Beijing Municipal Government has been investing in establishing demonstration projects for geothermal heating.

According to official data released by the Beijing Municipal Bureau of State Land and Resources, 174 new geothermal wells were constructed between 1999 and 2006, in addition to 118 plants already in operation by end of 1998. The total investment was worth 35.4 million yuan.

Of the 174 new wells, 141 provide heating to the city. At the end of 2006, a surface area of 6.6 million m² had been connected to the municipal geothermal well system, among which 1.2 million m² was used for household heating purposes. It has been estimated that the heat energy provided by geothermal resources will be the equivalent of burning 180,000 tons of coal each year.

7.5 INDUSTRIAL ENVIRONMENTAL POLICIES

Industrial production is economically important for Beijing and industrial gross product accounts for more than one-third of the city's total GDP. The Municipal Bureau for Industrial Development is the main organization responsible for implementing industrial policies in Beijing. Its duties include closing highly polluting enterprises, relocating factories outside the urban perimeter, and adjusting industrial regulations, with a particular focus on new industrial development zones.

With the rapid growth of Beijing's modern manufacturing sector, industrial development zones have become one of the key sources of economic growth and job creation. Most industries are located in the suburbs of Beijing, with 60 per cent of industrial businesses located in industrial development areas.

The current industrial layout of the city is the result of a process that began in the late 1980s. The urban planning tactic was designed to provide a solution to environmental pollution issues and disturbance to citizens living near to industrial centres. In recent years there has been a dramatic increase in company relocations: from 1998 to 2006 a total of 209 industries relocated, 197 of these firms moved between 2000 and 2006.

The industrial structure of Beijing is under continuous readjustment as new factories are built and improved environmental technologies are implemented. According to the Industrial Development Bureau, enterprises in the industrial development zones, either relocated or newly built, follow the '3R' approach (Reduce, Reuse and Recycle). Partly because of the focus on recycling and environmental compliance, industrial development areas are attracting new sustainable industrial projects.

In order to achieve sustainable development targets set during the Beijing candidacy phase, the Industrial Development Bureau supports the development of factories equipped with low consumption of natural resources and eco-friendly technologies.

The Beijing Southeastern Suburbs Industrial Area

In the last few years, 17 major industrial enterprises have been closed or relocated, including the Beijing Second Pharmaceutical Factory, the Beijing Dye Factory and the Beijing Coke Plant. Others, like the Organic Chemical Plant and the Chemical Second Joint Stock Company will be closed and relocated in the first half of 2008.

According to the Beijing Environmental Protection Bureau, the closure of the Beijing Coke Plant has resulted in a reduction of 3 million tons of coal consumption a year. Sulphur dioxide (SO₂) and soot emissions have also been reduced by 7,500 and 7,300 tons respectively. The Beijing Huaneng Thermal Power Plant has completed the construction of a high-efficiency desulphurization system. The plant is also working on a project for the removal of nitrogen oxides from flue gas.

The Beijing Shijingshan Industrial Area

The thermal power plants of Gaojing and Jingneng have completed and began operating a flue gas desulphurization system that filters sulphur and nitrogen oxides from flue gas. The removal process for nitrogen oxides from flue gas is planned to be completed by the end of 2007.

To further reduce soot pollution, the Gaojing Thermal Power Plant is converting from an electronic dust removal system to cloth bag dust removal system. The Modern Construction Materials Company has scrapped vertical kilns for cement production and the Yanshan Cement Plant has adopted high-efficiency cloth bag dust removal.

Industrial Pollution Control

The Beijing Environmental Protection Bureau (EPB) is responsible for regulating levels of industrial pollution and for releasing industrial environmental licenses. It is also responsible for Beijing's pollution registration, monitoring and reporting system.

In 2006, 9,509 polluting enterprises were registered in the Beijing primary pollution sources database, including industrial enterprises, tertiary industry, sewage treatment plants, waste processing plants, and large poultry or livestock farms. Of the polluting enterprises, 2,699 were industrial enterprises. These were listed in a database, and 323 enterprises were targeted as key sources of pollution.

To control the total amount of pollution emitted, the Beijing Municipal Government launched the 'Beijing Municipal Plan For Control of Main Pollutant Emissions During the 11th 5-Year Plan'. The plan sets stringent environmental regulations for Beijing. For example, regulations aimed at cutting 40 per cent of SO₂ emissions and 16 per cent of the amount of COD (Chemical Oxygen Demand) released in the waterways exceed national requirements. Data regarding the achievement of the goals are not yet available.

The management and monitoring systems for pollution sources have also been reinforced and additional standards are being enforced, including:

- » Comprehensive Standards for Boiler Pollutant Emissions.
- » Standards for Air Pollutant Emissions from Construction Materials and Metallurgy Industries.
- » Standards for Air Pollutant Emissions from Petroleum Refineries and the Petroleum Chemical Industry.
- » Beijing Municipal Standards for Water Pollutant Emissions.

7.1.1 The Beijing Capital Iron and Steel Group

The Beijing Capital Iron and Steel Group, a historic industrial plant built in 1919 just 17 km west of Tiananmen Square in the Shijingshan area, is widely accused of being one of Beijing's biggest polluters. In 2005, the Group decided to relocate some of its facilities to Caofeidian, an island in Hebei Province 80 km south of the coastal city of Tangshan and 220 km east of Beijing.

Part of the facilities in Beijing will remain in operation during the Games. However, the Beijing factory aims to cut its production by 4 million tons by the end of 2007 and by another 4 million tons in 2008. The Beijing Environment Protection Bureau estimates that with the relocation, Beijing residents will inhale 18,000 tons less particulate matter each year.

The Beijing plant will maintain a production capacity of four million tons during the 2008 Olympics, but, according to the company, its operations will conform to strict government guidelines.

The construction of the new facilities in Caofeidian, a project costing 67.7-billion-yuan (US\$8.68 billion), began in March 2007. It has a projected production capacity of 8.98 million tons of iron, 9.7 million tons of steel and 9.13 million tons of rolled steel per year. Advanced environmental technologies will be adopted at the new facilities.

In 2008, half of the designed capacity of the new plant is expected to be in operation and the steel company will move all its Beijing-based production facilities to Caofeidian by 2010, although the headquarters, research and development, sales and logistical operations will remain in Beijing. According to official data, the plan involves the resettlement of some 120,000 employees.

*Iron and steel
plant in Beijing*

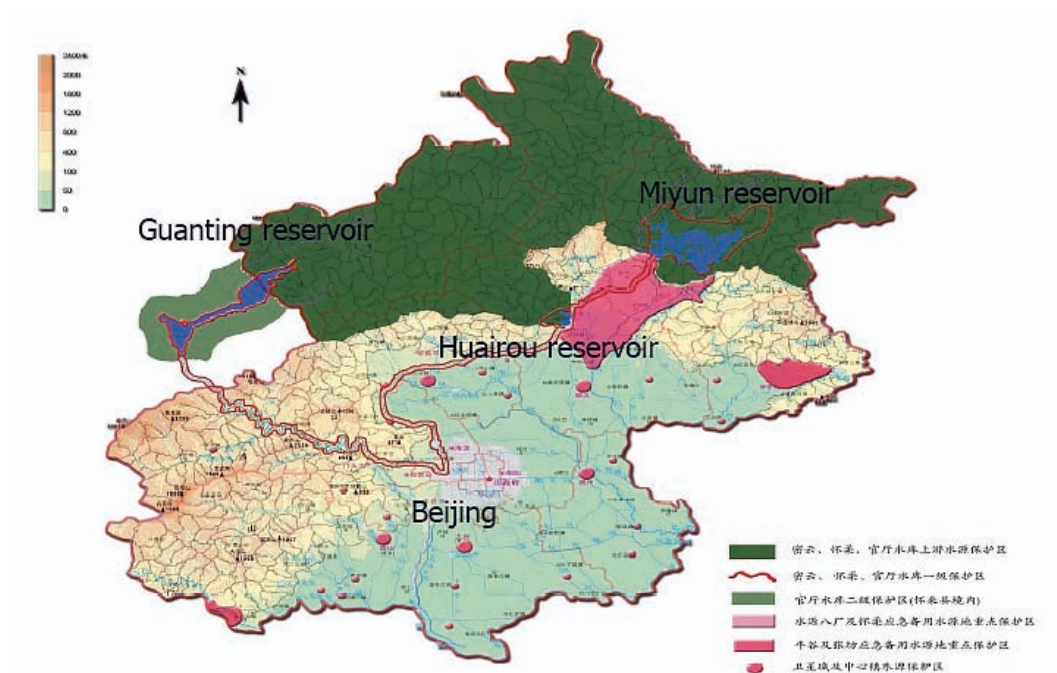


Chapter 8: Water

In recent years, Beijing has experienced severe water shortages. From 1999 to 2006, the city has endured a period of continuous drought, which has aggravated an already serious shortfall of water available for the city. In order to cope with the gap between water supply and demand, Beijing Municipality has instituted measures to protect water resources, to save water, collect rainwater, and to collect, treat and recycle wastewater.

As part of its bid commitments, Beijing undertook to improve water quality at Miyun and Huairou reservoirs, the principal sources of drinking water for the city, and to implement a silt elimination and water clarification project in Guanting Reservoir. It also stated it would renovate the Jingmi canal to improve its water quality and flow.

FIGURE 8.1: BEIJING WATER RESERVOIRS



Source: Beijing Water Authority

Other water related measures included promoting the development of high quality, high efficiency and water saving agriculture, and strengthening efforts to reduce airborne dust created by the agricultural sector. Beijing also committed to improving the city sewerage network and wastewater treatment system, including the achievement of a 2.8 million m³/day total wastewater treatment capacity by 2007.

To strengthen water management capacity, the Beijing Water Authority was established in May 2004. The main tasks of the water authority include water legislation, water supply regulation, waterworks construction and management, wastewater treatment and water environmental management. Previously, the Beijing Environmental Protection Bureau was charged with protecting and managing water sources. Now, working together, the two agencies are responsible for guaranteeing water sources and supply.

8.1 WATER SOURCES

Surface Water: Miyun Reservoir

Due to the rapid development of the city of Beijing, demand for domestic and industrial water has dramatically increased. The Miyun and Huairou reservoirs and the Jingmi water canal are the main surface water sources, with the Miyun Reservoir being the largest reservoir in Beijing.

The Chinese authorities have been working for several years to protect water resources at Miyun Reservoir. Originally created for flood control and water supply for irrigation, it was switched to supplying drinking water in 1985.

Fences around the Miyun Reservoir to avoid water pollution



The reservoir currently stores 1 billion m³ of water, with a total designed capacity of 4.3 billion m³. The discrepancy between reserves and capacity is due to the prolonged period of drought and withdrawal rates being greater than replenishment. The annual water inflow to the reservoir is around 200 million m³ while the outflow is close to 300 million m³.

To restrict impact on the reservoir from local inhabitants and tourists, fences have been in place around the reservoir since 1997. Notice boards exist at the main junctions and along important roads to the reservoir and around the fence enclosing the protected area to raise awareness about the danger of polluting the reservoir.

A first-class protection zone and non-construction zone were established according to specifications in the regulations established by the Municipal Government in, 'Beijing Municipal Management Measures for Miyun Reservoir, Huairou Reservoir and Jingmi Canal'.

To mitigate domestic pollution in the protected zone, Beijing Municipal Government invested 250 million yuan to relocate 15,000 residents from the first-class protection zone over a three year period.

In addition, the following measures have been taken:

- » Regular boat patrols are carried out in Miyun and Huairou reservoirs.
- » 13,330 hectares of surrounding farmland have switched to biological pest prevention and treatment to reduce pesticide use.
- » To prevent eutrophication of the water body, non-phosphorus detergent and balanced fertilizers are applied extensively.
- » A large-scale watershed forest (2,067 hectares) was built to replenish the reservoir and reduce and control soil erosion.
- » Since the Ninth Five Year Plan, more than 400 mines were closed and about 40,000 tons of accumulated mercuric waste was safely treated.

To guarantee the secure supply of drinking water and reduce the organic burden, the government banned fish farming in the Miyun reservoir in 2003. The buildings used for fish farm management and administration were demolished during the same period.

Beijing has also worked to protect drinking water resources through controlling agricultural pollution. Since 2005, pesticide and chemical fertilizer use was initially reduced by 30 per cent and then reduced by another 28.5 per cent by using ecological techniques such as solar insecticidal lamps, normal temperature aerosols, pest attracting yellow board or nets, and sex hormone traps. Use of biogenic pesticides and/or highly effective low-poison and less-residual pesticides have been encouraged instead of standard pesticides.

Regional cooperation with the areas around the upper reaches of Miyun reservoir has also been reinforced. A cooperative team was organized in 2005 to coordinate water resource management and environmental protection in Beijing, Chengde and Zhangjiakou Districts. The team is responsible for managing the special fund for projects in upper reaches of Miyun reservoir including sewage treatment, waste treatment, water conservation and the comprehensive treatment of waterways.

Surface Water: Jinmi Canal

With a total length of 105 km, the Jinmi Canal was built in the early 1960s to transfer water from the Miyun reservoir to Beijing. At the time, the canal's water transfer capacity to the city could meet demand, but after more than 30 years in operation, some of the canal's

banks had become unstable due to winter freezing and spring thaw. To restore its function, the Government implemented the Jinmi Canal Renovation Project. Some of the canal banks have been stabilized and strengthened and water transfer capacity improved.

Surface Water: Guanting Reservoir

The Guanting Reservoir is located in the northwest of Beijing city. Constructed in 1954, Guanting is the second largest reservoir in Beijing with a storage capacity of 4.16 billion m³ and a catchment area of 43,400 km². Its main functions are flood control, electrical power generating, water supply and agricultural irrigation.

In recent years, the reservoir has experienced an acute shortage of water and a rise in the pollution level of the catchment area. As result, its function had to be changed to industrial use in 1997.

In order to solve the problem of water resources in Beijing, the State Council drafted, 'The Master Plan of Sustainable Use of Water Resources in Beijing in the Early 21st Century', aimed at renewing Guanting reservoir's function as a drinking water source. The plan had two main goals:

- » Sediment dredging.
- » Pollution control in the upstream area and the improvement of water quality.

The amount of sediments carried into the reservoir by the inflow stream and the decrease in water quantity caused the basin to be divided in two separate parts, negatively affecting water supply. The project to dredge and relocate 1.03 million m³ of sediment and create a 15 metre-wide canal through the sediment deposit was completed in November 2001. A water 'corridor' was formed, rejoining the two separated water bodies, and the water in the reservoir can now be used, but still only for industrial purposes and not as a source of drinking water.

The Central Government has also invested 1.28 billion yuan (US \$170,547,108) to:

- » Close down heavily polluting enterprises in the catchment area close to the reservoir.
- » Build up to 25 wastewater treatment plants (WWTP) with a total treatment capacity of 670,000 t/d in the catchment area (To date, six have been completed with a capacity of 250,000 t/d, 19 are under construction).
- » Treat on-site wastewater at 53 pollution sources.
- » Carry out water and soil erosion protection project in a 381,900 ha area;
- » Carry out a water saving irrigation project in an area of 110,000 ha
- » Promote clean production and reduce the use of pesticides and fertilizers;
- » Construct a river mouth wetland system to control water pollution in Guanting reservoir by reducing pollutants entering from upstream.
- » To treat influent water to the reservoir.

As a result, water quality in Guanting Reservoir changed from class V in 2000 to class IV in 2006, while water quality at Sanjiadian Lake, from where water is supplied to users, has been class III since 2006 (see Box 8.1 for an explanation of the classes).

Groundwater

Drinking water in Beijing is also obtained from groundwater. Existing laws and regulations place emphasis on the comprehensive environmental management of the protection zone for groundwater drinking sources and on reconstructing the urban sewage pipeline network

In 1997 the Beijing Municipal and Borough Governments began limiting construction projects in the protected zone to preserve groundwater drinking sources. The Beijing Government has also put in place a number of other programmes to protect groundwater:

- » A sewerage network was built in the protection zone and will be improved gradually to prevent sewage seepage.
- » Existing pollution sources will be removed and treated in batches.
- » Road construction adjustment, especially in Third and Fourth Ring Roads, and improvement of a city sewerage collection system covering 100 km was completed in the protection zone of third and fourth water-source area near Yuanda road, Minzhuang road and Xingshikou road.
- » Nearly 100 oil storage centres and petrol stations have been shut down or successfully upgraded.
- » 53 petrol stations in the municipal protection zone for groundwater drinking sources formulated Emergency Measures, and 43 of them have set up monitoring and observation wells.
- » More than 400 graves near the protection zone of the 8th water-source area were relocated.
- » 150 polluting enterprises in the water source protection zone were relocated and are more strictly regulated.

8.1.1 ENVIRONMENTAL QUALITY STANDARDS FOR SURFACE WATERS GB 3838-2002 (Issued on 28 April, 2002. Effective as of 1 June, 2002)

The standards specify the items and standard values for water environment quality control, water quality evaluation and analysis methods. They apply to water bodies, such as rivers, lakes, canals and reservoirs. According to the different functions and protection purposes, surface water bodies are classified into 5 categories:

- | | |
|----------------------|---|
| Category I: | Mainly applicable to Headstream water, National Nature Protection Zones |
| Category II: | Mainly applicable to First-class Protection Zone of Surface Water Resources for Concentrative Drinking Water, Rare Aquatic Organism Habitat, Spawning Grounds for Fish and Shrimp, Feeding Grounds for Young Fish, etc. |
| Category III: | Mainly applicable to Second-class Protection Zone of Surface Water Resources for Concentrative Drinking Water, Wintering Grounds, Migration Channels and Aquacultural Grounds of Fish and Shrimp, Swimming Areas |
| Category IV: | Mainly applicable to Water Resources for General Industry, Water Resources for Entertainment without Direct Touch of Human Skin |
| Category V: | Mainly applicable to Water Resources for Agriculture and General Landscape |

The quality limits for higher grade water bodies are stricter than the lower grade ones. That means that a water body classified as Category I, has better water quality than one classified in Category II.

In 2006, some projects received financial support, including a project for safe processing of domestic waste from surrounding villages in Luanping county, the upper reaches of Miyun reservoir, and conversion of paddy fields to dry land in Heihe river and Baihe river areas. To monitor the water quality in the reservoir, an information communication system was established to improve communication with upstream areas. Information about water quality, water volume, and pollutant emission in the upstream area is now regularly updated.

Additionally, all sand and gravel quarries in the city have been closed and the greening of these areas is being gradually completed. Regulations on waste burial in sand pits or kilns have been formulated. Landfill sites and petrol stations are requested to take measures to prevent seepage. Around the Fifth Ring Road, 37 scattered waste dumps were disposed of and the safe processing of urban and suburban waste has been implemented. In the urban area, a sewage pipe network will be established to prevent the pollution of groundwater.



Beijing has made considerable efforts to improve the quality and availability of drinking water, placing the protection of drinking water reservoirs and improving water quality high on the agenda. Nonetheless, there remains considerable room for improvement in the drinking water distribution network and in water quality at the user-end. At the source, water is in compliance with quality standards set by the World Health Organization (WHO) but, because of the antiquated distribution network, by the time the water arrives at the consumer's tap it is not the same quality as when it left the treatment plant.

8.2 WATER QUALITY

The drinking water supply in the city is organized in two different areas managed by two different companies: the Beijing Waterworks Group Company Limited is responsible for the water supply in the central Districts of the urban area of the city, with a distribution capacity of 265 t/d; local water companies or water plants are responsible for water supply in satellite cities and towns. The Beijing Government and the involved companies have implemented several projects to improve the waterworks network and drinking water quality.

The improvement of waterworks has been carried out through:

- » Coating and treating pipes and renovating pipelines to guarantee water quality
- » On-line and off-line monitoring of water quality
- » Developing drinking water quality standards, such as
 - Standards for drinking water quality GB5749-85
 - Water quality standard for city water supply CJ/T-2005

TABLE 8.1: DRINKING WATER QUALITY

Item	CJ/T-2005	GB5749-85	WHO Guidelines	Monitored data
Total bacteria	≤80 CFU/ml	≤100	--	0
E.Coli	N 100 CFU/ml	≤3 per litre	N 100 CFU/ml	0
Colour	15	15	15	<5
Turbidity	1 NTU	3 NTU	5 NTU	0.17
Chloride	250	250	250	19
Aluminium	0.2	0.2	0.2	0.005
Copper	1	1	1	<0.002
Hardness	450	450	--	192
Iron	0.3	0.3	0.3	0.06
Manganese	0.1	0.1	0.1	<0.002
Sulphate	205	250	250	50.7
Total dissolved solids	1000	1000	1000	280
Zinc	1.0	1.0	3	<0.05
Arsenic	0.01	0.05	0.01	<0.001
Cadmium	0.003	0.01	0.003	<0.001
Chromium	0.05	0.05	0.05	<0.004
Cyanide	0.05	0.05	0.07	<0.002
Fluoride	1.0	1.0	1.5	0.39
Lead	0.01	0.05	0.01	<0.0005
Mercury	0.001	0.001	0.006	<0.0005
Nitrate	10	20	50	1.1
Selenium	0.01	0.01	0.01	<0.001
DDT	0.001	0.001	0.001	<0.000064
Ammonia	0.5	--	1.5	0.07

8.2.1 NO. 9 WATERWORKS DRINKING WATER TREATMENT PLANT

With a design capacity of 1.5 million m³/day, the Beijing No. 9 Waterworks is one of the largest drinking water treatment plants in Asia and the largest surface waterworks plant in Beijing.

The plant supplies half the daily water needs of Beijing and plays an important role in the city's economic and urban development. Its construction has helped to relieve the tension over water supply and water shortages in the city of Beijing.

*Wastewater
Treatment process
at the Qinghe
Reclaimed Water
Plant*

The construction of the No. 9 Waterworks Plant began in 1986 and lasted for thirteen years. The plant was built in three phases, each increasing the capacity by 0.5 million cubic metres a day, at a cost of yuan 6 billion (US \$800,000000).

The complete project consists of four parts: intake, transfer, purification and water distribution. The water for No. 9 Waterworks is drawn from Miyun and Huairou reservoirs where intake works were constructed. Water is transferred to the treatment plant via pipeline.

The process of conventional treatment and advanced treatment, which consists of chemical feed, coagulation, flocculation, sedimentation, rapid gravity filtration and activated carbon adsorption, produces clear water whose quality exceeds the Chinese National Standards for Drinking Water.



8.3 WASTEWATER MANAGEMENT

In line with its bid commitments, the city of Beijing has developed several projects to improve the sewerage network, wastewater treatment capacity, and wastewater reuse in the city. From 2000 to 2006, the city of Beijing built 600 km of new sewage pipes, for a total network length of 2,500 km. Of these 700 km are also used to collect rain water.

Wastewater Treatment

The total treatment capacity in 1999 was about 1.08 million t/d. During the Olympic bid phase Beijing pledged to reach a total capacity of 2.8 million t/d by 2008. To achieve the result the city has planned and built a considerable number wastewater treatment plants in various areas of the city and its surrounds.

From 2000 to 2006, 17 new wastewater treatment plants were built in the city taking total treatment capacity to 2 million t/d. The plants and daily capacities are:

Daxin Huangcun	WWTP (80,000 t/d,2000)
Miyun Tanzhou	WWTP (45,000 t/d,2001)
Jiuxianqiao	WWTP (200,000 t/d,2001)
Yizhuang	WWTP (50,000 t/d,2001)
Yanqing Xiadujingyang	WWTP (30,000 t/d,2001)
Shunyi	WWTP (80,000 t/d, 2002)
WuJiacun	WWTP (80,000 t/d,2003)
XiaoJiahe	WWTP (20,000 t/d,2003)
Fangshan	WWTP (40,000 t/d, 2003)
Huairou	WWTP (50,000 t/d, second phase 2003)
Changping	WWTP (50,000 t/d, 2003)
Qinghe	WWTP (400,000 t/d,2004)
Lugouqiao	WWTP (100,000 t/d,2004)
Memcheng	WWTP (40,000 t/d, 2004)
Pinggu Ruhe	WWTP (40,000 t/d, 2005)
Tongzhuo Bishui	WWTP (100,000 t/d, 2005)
Xiaohongmen	WWTP (600,000 t/d,2005)

By the end 2006, nine of the new wastewater treatment plants were in operation in the urban area of Beijing (the eight central urban Districts) to reach a total capacity of 2.5 million m³/d.

According to official data, the rate of wastewater treatment in Beijing city was 22 per cent in 1998, 42 per cent in the year 2000 and rose to 58 per cent and 70 per cent in 2004 and 2005 respectively. In 2006 the rate of wastewater treatment in the Beijing urban area reached 90 per cent (the above-mentioned percentages do not include the Beijing suburban area).

Samples of
wastewater after
treatment in the
Qinghe reclaimed
water plant



**TABLE 8.2: SEWAGE TREATMENT CAPACITY, BEIJING
(EIGHT CENTRAL URBAN DISTRICTS), 2001-2005**

Year		2001	2002	2003	2004	2005
Total daily capacity for sewage treatment	10 000 ton/day	128	148	156	188	248
Rate of wastewater treated annually	%	42	45	56	58	70

Source: BOCOG

Wastewater Reuse

In order to solve the severe water shortage that has been affecting Beijing, and according to the bid commitments, the Municipal Government decided to improve reuse of treated wastewater.

Reclaimed water plants were built or planned beside the main wastewater treatment plants. The rationale for the development of wastewater recycle plants was:

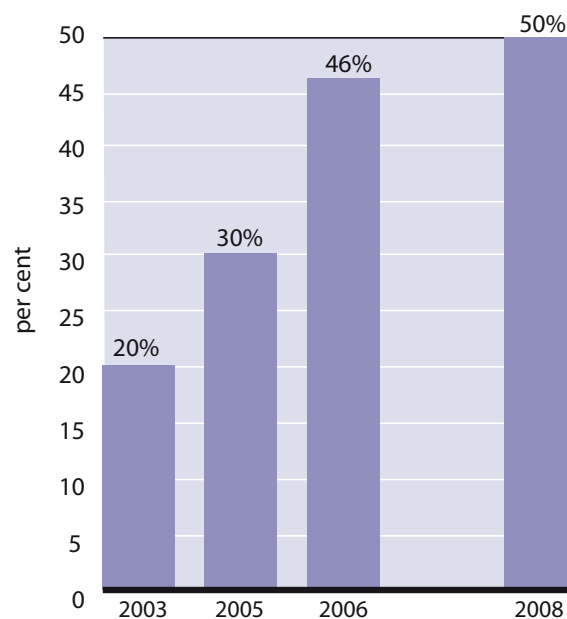
- » to increase use of reclaimed water in the industry sector;
- » to increase use of reclaimed water for agriculture irrigation;
- » to promote use of reclaimed water for public civil utilities (i.e. road washing, filling ornamental lakes etc.)

According to the Beijing Water Authority, by 2008, nine deep treatment plants will be built, and 50 per cent of secondary treated water will be recycled:

- » Wujiacun Reclaimed water plant 40,000 t/d
- » Jiuxianqiao Reclaimed water plant 60,000 t/d
- » Qinghe Reclaimed water plant 80,000 t/d
- » Fangzhuang Reclaimed water plant 10,000 t/d
- » No.6 water plant (Reclaimed water plant)
- » Xiaohongment pumping station 300,000 t/d
- » Gaobeidian pumping station 470,000 t/d

FIGURE 8.2: RATE OF WASTEWATER REUSE IN URBAN AREAS

In 2006, through the enhancement of wastewater recycling, and a low price policy to encourage the public use of reclaimed water, the amount of reclaimed water use surpassed 10 per cent of total water use in the city for the first time.



Source: Beijing Water Authority

8.3.1 QINGHE WASTEWATER TREATMENT PLANT

The Qinghe Wastewater Treatment Plant is located on the north bank of the Qinghe River near Mafang village, where it occupies an area of 30.1 hectares. It has a capacity of 400,000 m³ per day and currently serves a total area of 15,942 ha and a population of about 814,000 people.

Qinghe was built in two phases: the construction of the first series, more commonly referred to as lane or train, began in 2000 and took two years to complete. One year after it was completed, in 2003, the expansion of the plant began by building a second series. By December 2004, both series could finally be run together.

The treatment process consists of mechanical and biological treatment as well as sludge processing. The mechanical treatment is the same for all incoming water and includes bar screens and an aerated grit chamber. There are no primary clarifiers in the plant, so the wastewater is directly divided into the two different series. Series 2 is designed as an A2/O process, i.e. an anaerobic tank followed by, in order, an anoxic and aerobic tank. Series 1 is similar to an A2/O process, but the order of the anaerobic and anoxic basin has been inverted, i.e. the anoxic tank comes first. This is the result of the lack of nitrate recirculation in this series, whereas the second series utilizes nitrate recirculation, which results in the A2/O order. The difference in design of the two series has nothing to do with any divergence of the influent quality, as they share a common source.

Both processes have the function of nitrogen and phosphorus removal. After the biological stage, the water passes through secondary clarifiers before it is discharged into the Qing He River.

The plant will help to reduce pollution in Zhongguancun high-tech zone, to improve the water quality of Qinghe river and the living conditions of the residents, and to increase the rate of wastewater treatment.

The total investment for the plant was 717 million yuan: 442 million yuan for the first stage of the project and 275 million yuan for the second one.

Qinghe Reclaimed Water Plant

A water reclamation plant with a membrane treatment scale of 80,000 m³ per day has been built close to the Qinghe WWTP. The Qinghe Reclaimed Water Project is an important project for wastewater treatment and reuse and for the 2008 Olympic Games in Beijing. From the total capacity of 80,000 m³/day, 60,000 m³/day will be used as water supply for landscaping the Olympic Park (a park that has been specially designed for the Beijing 2008 Olympic Games), and the remaining 20,000 will be supplied to the Municipality for road washing, toilet flushing and other purposes.



*Wastewater
Treatment
process at
the Qinghe
Reclaimed Water
Plant*

CHAPTER 9: SOLID WASTE

9.1 URBAN WASTE MANAGEMENT

The Beijing bid committed to the implementation of a safe of urban domestic waste disposal system by 2007 and the establishment of processing facilities for non-hazardous urban waste in the Beijing suburban area. It also committed to construct disposal facilities for hazardous waste to a total capacity of approximately 10,000 tons a year (including processing and disposal of medical and radioactive waste).

In December 2003, the city of Beijing introduced a White Paper on Domestic Garbage Disposal to further revise the city's domestic waste management system. The White Paper lays out a plan to construct an 'ecological city' by reducing domestic garbage, especially hazardous waste. Key strategies for Strategies for waste reduction include creating a comprehensive process for waste disposal using new technologies for hygienically processing waste.

Following the release of the White Paper, the Municipal Government decided to develop new facilities for domestic waste processing. At the end of 2006, Beijing had 23 domestic waste disposal facilities with a capacity for processing 16,210 tons of waste a day.



*Operations at
the Beishenshu
Landfill*

TABLE 9.1: URBAN WASTE FACILITIES IN BEIJING

		Name of the facility	Description	Plant capacity tons/day
1	Domestic Garbage Transfer Station	Datun Domestic Garbage Transfer Station	Waste volume reduction and transfer	1,500
2		Xiaowuji Domestic Garbage Transfer Station	Waste sorting, volume reduction and transfer	980
3		Majialou Domestic Garbage Transfer Station	Waste sorting, volume reduction and transfer	980
4		Wuluju Domestic Garbage Transfer Station	Waste volume reduction and transfer	1,500
5		Yamenkou Domestic Garbage Transfer Station	Waste volume reduction and transfer	500
6		Putaozui Domestic Garbage Transfer Station	Waste volume reduction and transfer	400
7	Domestic Garbage Processing Plants Beishenshu Sanitary Landfill sites	Beishenshu Sanitary Landfill	Landfill	980
8		Anding Sanitary Landfill	Landfill	700
9		Asuwei Sanitary Landfill	Landfill	2,000
10		Gao’antun Sanitary Landfill	Landfill	1,000
11		Liulitun Sanitary Landfill	Landfill	1,500
12		Jiaojipo Sanitary Landfill	Landfill	600
13		Miyun Sanitary Landfill	Landfill	200
14		Pinggu Sanitary Landfill	Landfill	100
15		Tongzhou Sanitary Landfill	Landfill	300
16		Yonghezhuang Sanitary Landfill	Landfill	1,500
17		Fangshan Sanitary Landfill	Landfill	100
18		Fangshan Sanitary Landfill	Landfill	200
19		Nangong Compost Plant	Composting	400
20		Shunyi Comprehensive Processing Plant	Incineration & ’compost	300
21		Changping Comprehensive Processing Plant	Incineration	120
22		Huairou Comprehensive Processing Plant	Sorting and composting	200
23		Yanqing Sanitary Landfill	Landfill	150
Total				16,210

TABLE 9.2: URBAN DOMESTIC GARBAGE PROCESSING IN EIGHT CENTRAL DISTRICTS

2004	Production (million tons)	3.56
	Processing capacity (million tons)	3.34
	Processing ratio (%)	93.79
2005	Production (million tons)	3.83
	Processing capacity (million tons)	3.64
	Processing ratio (%)	95.14
2006	Production (million tons)	4.13
	Processing capacity (million tons)	3.98
	Processing ratio (%)	96.50

Of the 23 existing facilities, six are domestic waste transfer stations, 13 are landfills, and four are comprehensive processing plants. The scope of the facilities' work includes increasing processing rates for non-hazardous domestic garbage, encouraging proper urban domestic garbage disposal, and improving urban waste management using a circular economy approach.

In 2006, the total annual production of domestic waste in the city was 5.85 million tons, and daily production was 16,000 tons. According to official data, 4.13 million tons were produced in the eight central districts, where the overall processing capacity was close to 3.989 million tons (processing rate: 96.5 per cent). The waste processing rate in the city suburbs was much lower—close to 1.72 million tons, a processing rate of 57 per cent.

The city of Beijing is currently working to improve its domestic garbage processing facilities and its waste management administration. Towards that end, the Municipal Government has set the following goals:

- » To process 98 per cent of domestic waste in the Beijing central area and 80 per cent in the suburbs by 2008,
- » To process 99 per cent of waste in the city area and 90 per cent in the suburbs by 2010,
- » To construct seven new waste processing and transfer stations by 2010.

3Rs in Solid Waste Management

To fulfil the bid commitments to improve the urban waste management, in accordance with the principles of waste reduction, reuse, and recycling, the government has formulated and introduced new standards for waste policy. The government also introduced new regulations related to separate garbage collection, in which compostable waste and recyclables are separated from garbage that cannot be recycled or composted.

As part of a large-scale training and public information campaign, the Municipal Government trained more than 140 sub-district offices and over 1,000 real estate management companies in the entire city, distributed approximately 300,000 copies of brochures, printed more than

100,000 posters to raise awareness on separate garbage collection, and distributed more than 1 million copies of various publicity materials for residents.

Nearly 1,800 residential communities (private houses and industrial zones) are currently carrying out separate waste collection, involving a population of 3 million people.

To further improve composting rates, the Beijing Municipality is encouraging communities, units, districts and farms to build on-site composting facilities to process food and kitchen waste. Organic domestic waste not treated on-site is sent to compost processing facilities where it is converted into organic fertilizer. At the time of writing, there were two compost processing plants operating in Beijing with a gross processing capacity of 600 tons a day.

Recyclable domestic garbage (paper, cardboard, plastic, etc) is separated by residential communities or by sorting and transfer stations, and is directly sent to enterprises for recycling. Currently there are six recycling plants in Beijing city, mainly for paper and plastic waste.

In 2006, 270 thousand tons of waste was composted and 1.43 million tons were recycled in the above mentioned plants. Partly due to the expansion of recycling, the rate of resource re-utilization increased to 30.6 per cent.

Beijing has made considerable progress in the field of solid waste management. Using the general '3-R' circular economy principles of 'reduce, reuse, and recycle', Beijing is close to achieving its goals for waste management set during the candidature phase.



COMMENT

TABLE 9.3: RECYCLING STATIONS IN BEIJING

	Name of the enterprise	Recycled waste
Waste paper recycle enterprises	Beijing Seventh Papermaking Plant	Cardboard paper, business waste paper, and various kinds of waste paper (better for separation)
	Beijing Zhongchuan Paper Industry Co., Ltd	Waste and old paper board
	Beijing Xinhongpeng Paper Industry Co., Ltd	Waste milk box and Kraft paper
Waste plastics recycle enterprises	Beijing Detong Chemical Fiber Co., Ltd	PET°¢PP°¢PE°¢PS°¢PVC°¢ABS and etc. waste plastics
	Yingchuang Recycle Resources Co., Ltd	Waste vinegar bottles
	Yuegukai (Beijing) Renewable Resources Technology Co., Ltd	PET, PP, PS, PA, ABS, PC, PE, PVC and other waste plastics

9.1.1 THE BEISHENSHU LANDFILL

The Beishenshu landfill site, located in the Yizhuang economic development area in the southeastern part of Beijing, is one of the biggest solid waste treatment facilities in the city. The site extends over an area of 32.5 hectares while the landfill itself occupies 25 hectares.

The first phase of the landfill was completed in early 1997, and the second phase began in September 1999. Currently, the waste treatment capacity of the landfill is 980 tons per day and the expected service period is 13 years.

Due to the local soil conditions, the Beishenshu waste disposal facility was built above ground level, and is designed to reach an overall height of 54 metres, with an effective capacity of nearly 4.63 million cubic metres.

The project, jointly funded by the Chinese and German governments, was designed using advanced German technology and equipment.

To prevent the landfill percolate from seeping into the soil, anti-seepage layers (e.g. HDPE, bentonite, and clay) line the bottom of the landfill and a system for percolate collection has been put in place. The collected percolate is then transferred via a pipe system to a storage reservoir, where it is treated and discharged. After treatment, the water satisfies the Class I requirements of the National Standards on Waste Water Discharge. Biogas is also collected at the plant. The gas is transferred via pipes to the landfill's electricity generation plant, where the gas is converted into electricity.

The Beishenshu landfill is the first in China to feature a Water-Biogas Associated Treatment System. This technology makes use of biogas produced at the landfill to produce electricity that then powers the percolate treatment plant. Based on the 'treat waste with waste' and 'eco-landfilling' concepts, the Water-Biogas Associated Treatment System uses internal recycling of energy and resources, consequentially reducing operating costs.

9.2 HAZARDOUS WASTE MANAGEMENT

The solid waste management system in Beijing places special emphasis on the prevention and processing of industrial and hazardous wastes. The Municipal Government has recently accelerated general planning and construction processes at solid waste processing facilities, focusing on establishing hazardous waste disposal and processing facilities and monitoring hazardous waste production (official data concerning the total production of industrial and hazardous waste in the city of Beijing are not available at this time).

In 2004 and 2005, two medical waste processing plants were developed in Beijing with a total daily processing capacity of 60 tons, which can satisfy the actual demand of the city (the total production of medical waste in Beijing being close to 41 tons a day).

The first facility, which began operation in 2004, is situated in the Daxing District of Beijing

city and has a daily processing capacity of 30 tons. The second, in operation since 2005, is located in the Chaoyang District and has daily processing capacity of 30 tons.

The Beijing Cement Plant is used to process other hazardous wastes such as dye residues, organic resin waste, organic solvents, acids, alkali waste, and mineral oil waste. The Beijing Cement Plant, which uses the cement furnace for hazardous waste processing, increased its capacity from 1,600 tons per year in 2001 to more than 10,000 tons per year in 2005. The disposal facility has been recently further improved and the processing rate is now 30,000 tons per year.

A new hazardous waste processing plant is currently under construction. The new facility, located in the Fangshan district, will have a capacity of 57,000 tons per year.

The Beijing Environmental Protection Bureau has strengthened the monitoring of hazardous waste production and processing, carrying out inspections of local industries and requiring them to implement waste management and safe storage.

*Hazardous
waste storage
facility*



9.2.1 BEIJING GOLDEN STATE WASTE DISPOSAL CO. LTD.

In August, 2004 the Beijing Golden State Waste Disposal Co. Ltd. was established with the special purpose of investing in, building, and operating the Beijing Golden State Anjie Medical Waste Centralized Incineration Plant.

The company invested a total of yuan 80 million in the project, which adopted rotary kiln incineration technology combined with a stoker incineration process that uses a secondary combustion chamber. The plant is designed to have a daily treatment capacity of 30 tons of medical waste with a total annual operation capacity of over 8,000 hours.

The combined incineration process used at the plant is well suited for the combustion of medical waste. The incineration process is air-tight, preventing leaks of harmful substances. Furthermore, the special stoker design ensures that the flue gas remains at over 850°C and guarantees a high burnout rate that destroys medical waste completely. The system includes a two-second buffer time in order to completely burn out harmful substances.

The plant adopted a flue gas cleaning process that uses quencher, semi-dry spray absorber, activated carbon injection, and baghouse filters. The process was designed to remove acidic gases, heavy metals, dioxins, dusts as well as other harmful substances from the flue gas. The plant also has a wastewater treatment station.

A group of experts from the Beijing Environmental Protection Bureau inspecting the Beijing Golden State medical waste incineration plant.



CHAPTER 10: GREEN COVERAGE AND PROTECTED AREAS IN BEIJING

Beijing's land area is characterized by a clear division of mountains, plains and urban districts. According to the authorities, in the last 50 years the city has worked on reforestation projects aimed at protecting water resources and conserving soil and water in the mountains, preventing desertification in the plains, and improving green landscapes through a green belt system in the urban area.

In 2000, the Municipal Government proposed to build three green ecological zones (mountain, plain, and urban green belts), to create a network of protected areas in and around Beijing. At the end of 2006, the three ecological zones were fairly well established.

According to the Municipal Government, the ecological zones play a role in making urban development more environmentally friendly. They also help to increase rural standards of living, to coordinate developments in urban and rural areas, and to enhance urban quality of life.

Official data indicate that, as a result of 50 years of urban forestry activities, Beijing had a forested area of 930,000 ha, for a forest coverage ratio of 41.9 per cent, at the end of 2000. Since winning the bid to host the Olympic Games, there has been an expansion of green areas in the city. During the 10th Five Year Plan period (2001-2005) Beijing increased its green area by 130,000 ha.

At the end of 2005, the green area in the city had reached 1,054,000 ha., bringing the coverage rate to 50.5 per cent. An additional 12,000 hectares in 2006 increased the coverage to 51 per cent and another increase of 11,500 ha. planned by the end of 2007 will bring the total coverage figure to 51.6 per cent.

TABLE 10.1: TOTAL AREA COVERED BY THE CITY OF BEIJING

Area	Surface (km ²)
Mountain	10,400
Plain	4,000
Urban districts	2,000
Total	16,400

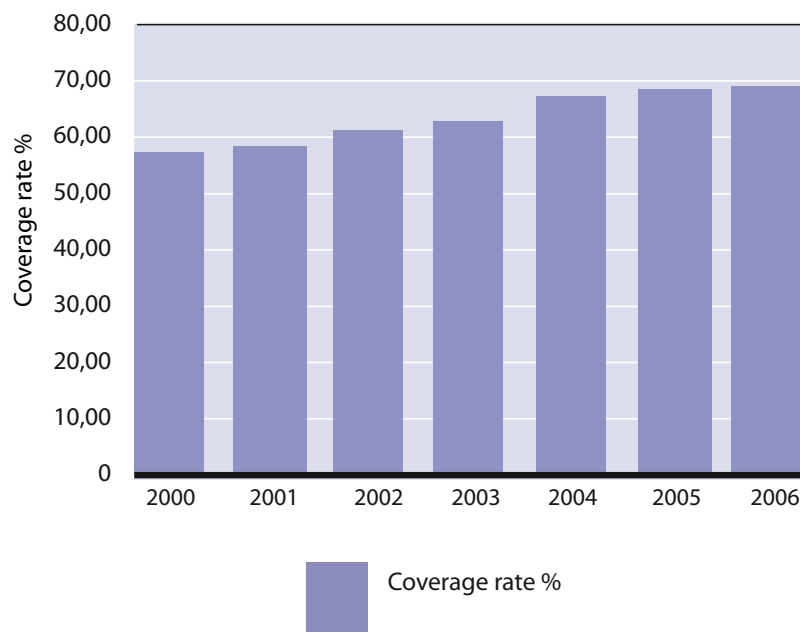
Source: Beijing Municipal Administration Commission and Beijing Municipal Bureau of Parks and Forestry

10.1 MOUNTAINS

The mountain region around Beijing covers 10,400 km², approximately 62 per cent of the total administrative area of 16,400 km². Through years of forestation efforts, forest coverage has increased in Beijing, especially during the 10th Five Year Plan period. Forests are now an integral part of Beijing's ecosystems.

According to the municipal official inventory of 2000, forest coverage in the mountain region reached a rate of 57.23 per cent. By the end of 2004, the investigation on 'secondary resources' reported that 67.85 per cent of Beijing's land area was forested. Increases in forestation activities in 2005 and 2006 increased the forest cover ratio to 68.52 per cent and 69.52 per cent respectively. The 2007 plan is expected to increase the total coverage to 70.49 per cent.

FIGURE 10.1: DEVELOPMENT OF FOREST COVERAGE RATE IN THE MOUNTAIN REGION AROUND BEIJING



10.2 THE 'FIVE RIVERS AND TEN ROADS' PROJECT (THE PLAIN AREA)

In 2000 the Beijing Government listed as a priority the 'Five Rivers and Ten Roads Project' in order to improve the ecosystems and the overall environmental quality of the suburban and plain areas of Beijing. The project was launched in 2001 and completed in 2004. A second phase, rehabilitating the Beijing-Chengde Highway, is scheduled for completion in 2007.

As part of this project, green belts are created along roads and rivers. The belts are 200 metres wide and have an inner permanent green zone of 20-50 metres where arboreal and herbaceous plants are cultivated. The remaining area is reserved for intensive cultivation, including projects that feature intensively managed plantations, forests and nurseries.

At the completion of the project's first phase in September 2004, the Municipal Government had established green belts with a total length of 937.24 km and a total forested area of 24,810 ha. The second stage, creating a green belt along the Beijing-Chengde Highway, will increase these numbers by 60.55 km and 346.65 hectares, reaching 997.79 km and 25,157 ha. respectively.



A green area in the urban districts of Beijing

TABLE 10.2: 'FIVE RIVERS AND TEN ROADS PROJECT' (2001-2007)

Year	Green belt length (km)	Green belt area (ha)	Total area (ha)
2001	240	7,006.67	7,006.67
2002	398	9,706.67	16,713.34
2003	238.46	6,689.40	23,402.74
2004	60.78	1,407.68	24,810.42
2007 forecast	60.55	346.65	25,157.07
Total	997.79	25,157.07	

TABLE 10.3: 'FIVE RIVERS AND TEN ROADS' BREAKDOWN BY PROJECTS (2001-forecast 2007)

Rivers and Roads	Green belt length (km)	Green belt area (ha)
Beiyun River	42	1977.47
Beijing-Shenyang Road	44.16	1613.87
Chaobai River	110.3	3100.47
Beijing-Chengde Road	85.65	954.82
Dasha River	16.47	172.46
Beijing-Zhangjiakou Road	58.04	1375.69
Wenyu River	110.1	2126.37
Shunyi-PingGu Road	53.4	918.91
Yongding River	60.9	1951.21
Beijing-Jiujiang Railway	44.6	1078.33
Beijing-Shijiazhuang Road	45.5	1152.01
Datong-Qinhuangdao Railway	90.88	2429.25
Beijing-Kaifeng Road	40.9	1100.47
Sixth Ring Road	143.49	3642.47
Beijing-Tianjin-Tanggu Road	51.4	1764.63
Total	997.79	25157.07

Source: Beijing Municipal Bureau of Parks and Forestry

10.3 THE URBAN AREA

The Municipality of Beijing has implemented various landscape projects for the renovation of urban environment, such as the establishment of green belts and the landscaping of water bodies, roads, railways and residential areas. The rapid development of landscaping and urban forestry projects has increased vegetation coverage in downtown Beijing to 42.5 per cent of a total surface of nearly 93,000 ha at the end of 2006 (representing Beijing's central highly inhabited urbanized area; the whole urban area of Beijing is nearly 2,000 km²).

According to the Beijing Municipal Bureau of Parks and Forestry, green coverage has been evaluated on the basis of the area covered by lawns and the shadow of trees and bushes.

FIGURE 10.2: DEVELOPMENT OF VEGETATION COVERAGE IN BEIJING'S URBAN DISTRICTS FROM 2001-2006



Source: Beijing Municipal Bureau of Parks and Forestry

Central urban area

A system of green belt areas has been established in the central areas of Beijing in an effort to improve both the ecosystem and the landscape. By the end of 2006, more than 100 green belt sectors had been established in the city, increasing the city's landscaped areas by nearly 700 ha, which will provide the residents with more leisure and recreational zones.

Urban roads border landscaping

In order to improve the urban landscape, recently built roads have been landscaped with trees and green borders, while some existing roads have been renovated. The main roads, such as the Second, Third and Fourth Ring Roads, have been improved by adding green coverage to their borders.

Residential areas

The rapid development of residential areas, combined with rising standards of living in Beijing, implies that more effort must be made to create and protect green areas. To this end, some established compounds have been renovated in order to improve the residential environment and to create recreation areas for citizens.

Greening the Fourth Ring Road

The Fourth Ring Road is one of the major orbital expressways in Beijing and will also serve as an Olympic Boulevard in 2008. With a total length of 65.48 km, the Fourth Ring Road goes through the districts of Chaoyang, Haidian and Fengtai, through the high-tech park of Zhongguancun and the Beijing Central Business District, and is directly linked with the main stadiums of the 2008 Olympic Games.

The government of Beijing has reassigned an area of 13,300 ha for additional landscaping to green the Fourth Ring Road.

10.4 PROTECTED AREAS

In the early 1980s, the Municipality of Beijing established its first two nature reserves at Songshan and Baihuashan. In 1986 the Songshan Nature Reserve was declared a National Nature Reserve.

By late 2006, Beijing was home to 20 nature reserves, covering an area of 134,200 hectares and accounting for 8.18 per cent of its total land area. The reserves include the following: 12 nature reserves created to protect forests, wild plants and animals, covering an area of 107,400 hectares; six nature reserves for the protection of wetlands, covering an area of 21,100 hectares; and two nature reserves established to protect geological formations, covering an area of 5,700 hectares. Seven of the reserves were created after 2000.

The table overleaf shows the categorization and purpose of the 20 protected areas established within the city of Beijing as of late 2006.

TABLE 10.2: PROTECTED AREAS IN BEIJING, 2006

Administrative area (County/District)	Area (ha)	Year established	Main reasons for protection	Protected species
Yanqing	4.660	1986	Forests and wild animals	Panthera pardus, Orchidaceae, and natural forest of Pinus Tabulaeformis
Mentougou	21.743	1985	Forests and wild animals	Crossoptilon mantchuricum, Orchidaceae, and Larix
Huairou	18.480	1999	Forests and wild animals	Natural secondary forest
Yanqing	9.000	1999	Wetlands	Wetland and migratory birds
Miyun	3.900	1999	Forests and wild animals	Natural succession of secondary forest
Miyun	2.230	2000	Forests and wild animals	Natural forest of Pinus Tabulaeformis
Miyun	4.150	2000	Forests and wild animals	Rare plants and animals (including Panthera pardus)
Pingu	20.000	2002	Forests and wild animals	Natural secondary forest
Yanqing	9.820	1999	Forests and wild animals	Wild plants and animals
Yanqing	1.470	1999	Forests and wild animals	Wild plants and animals
Yanqing	12.130	1999	Forests and wild animals	Wild plants and animals
Yanqing	1.000	1999	Wetlands	Wetland and rivers
Yanqing	8.260	1999	Wetlands	Wetland and migratory birds
Yanqing	3.470	1999	Forests and wild animals	Wild plants and animals
Fangshan	5.400	2005	Forests and wild animals	Crossoptilon mantchuricum, China bee
Shunyi	1.600	2005	Wetlands	Wetland and migratory birds
Fangshan	1.125	1996	Wetlands	Wetland and aquatic animals
Huairou	111	1996	Wetlands	Wetland and aquatic animals
Fangshan	3.650	2000	Geological formations	Caves
Yanqing	2.050	2000	Geological formations	Fossil wood
	134.249			

Source: Beijing Municipal Bureau of Parks and Forestry



A woman with dark hair tied back, wearing a light-colored sweater and dark pants, sits on a rocky ledge. She is looking out over a vast, hazy landscape. The foreground is filled with dense green trees and foliage. In the distance, there are rolling hills and mountains under a clear sky. The overall scene is peaceful and scenic.

PART THREE: THE NGO PERSPECTIVE

CHAPTER 11: THE ENVIRONMENTAL NGO PERSPECTIVE



UNEP

COMMENT

UNEP very much encourages involvement with non-governmental organizations, and has strongly advocated for their inclusion in the environmental monitoring of events such as the Olympic Games, from the bidding and planning phase onwards.

UNEP notes with pleasure the cooperation between BOCOG and a significant number of NGOs. The NGOs, which included the Chinese Society for Environmental Sciences (CSES), Conservation International, the Chinese Environmental Protection Association, the World Wide Fund for Nature (WWF), Friends of Nature and Greenpeace, have shared their knowledge in areas such as environmental education, promoting grassroots activities, protecting biodiversity, and spreading the “Green Olympics” message.

The articles that follow have been provided directly by the named NGOs, and reflect their own opinion and not that of UNEP. UNEP is, however, pleased to be able to offer them a platform to discuss their work and concerns in the relation to the 2008 Olympic and Paralympic Games.

11.1 GREENPEACE CHINA

Introduction: Greenpeace and the Olympics

Greenpeace’s involvement in the Olympics dates back to Sydney, when the organization saw the need to make the environment an active agenda of the Olympic Games. While Greenpeace wanted to prevent future Olympic Games from harming the environment as they had done previously, it also saw a unique opportunity in the Olympics to highlight environmental problems and solutions to a worldwide audience. Committed to making environmental protection a major topic in future Olympic Games, Greenpeace worked with Sydney officials to make the environment one of the key stand out factors for the city’s 2000 Olympics bid. After Sydney’s successful bid, Greenpeace continued to be heavily involved in Sydney’s Olympic preparations in the form of assessing and monitoring the Sydney Olympic committee’s environmental initiatives, targeting environmentally-unfriendly sponsors, and showcasing environmentally-friendly technology. While the 2000 Games’ environmental record was far from perfect, the Sydney Games ultimately succeeded in leaving behind a positive legacy by raising the bar on environmental protection for future Olympic Games.

Since then, Greenpeace has continuously been involved in Olympics in an effort to make environmentalism—one of the three pillars of the Olympics—a priority. From the preparatory years of the Olympics to its aftermath, Greenpeace has monitored and commented on the host cities' environmental initiatives while advocating environmental solutions.

Greenpeace is working to carry out this tradition during the Beijing Olympics. While it will continue to serve as a watchdog for Beijing's environmental performance, Greenpeace's ultimate goal is to use the occasion of the Olympics to promote environmental awareness and leave behind a long-lasting environmental legacy.

Greenpeace's Work for the 2008 Beijing Olympics

Evaluate BOCOG's environmental work

Since the Sydney Olympic Games, Greenpeace has used a set of environmental guidelines called The Greenpeace Olympic Environmental Guidelines—A Guide to Sustainable Events, to independently measure the sustainability of all Olympic Games. Greenpeace will continue to use these set of environmental guidelines, in addition to the environmental promises BOCOG made during its Olympics bid, to determine the environmental wins and losses of the 2008 Games. Greenpeace has provided BOCOG with its guidelines to increase BOCOG's understanding of Greenpeace's environmental standards. BOCOG recognizes the need for third party stakeholders such as Greenpeace to independently assess and comment on BOCOG's work and is supportive of its work.

Suggest areas for improvement and alert BOCOG on important environmental issues

BOCOG has asked Greenpeace and several other NGOs to provide suggestions that can strengthen BOCOG's own environmental guidelines and regulations. Greenpeace has provided BOCOG with a set of suggestions, and BOCOG has incorporated many of these suggestions into its environmental guidelines.

Greenpeace has also worked to alert BOCOG on various environmental issues within Greenpeace China's speciality. Greenpeace has been active on forest protection and food safety, amongst others areas, since the opening of its Mainland China office in 2002, and it has provided BOCOG with various updates and reports on these two issues.

Forest Protection:

Greenpeace believes that it is crucial that all Olympic construction sites avoid the use of illegally logged timber. In order to help BOCOG better identify and track sources of illegally logged timber, Greenpeace provided BOCOG with the 2007 report, *Merbau's Last Stand: How Industrial Logging is Driving Destruction of the Paradise Forests of Asia Pacific*, which highlights the role that China plays in driving unsustainable logging practices in South East Asian forests. Greenpeace also submitted Greenpeace's Suggestion on Wood Stock for the Olympics as well as the UNEP-WCMC Species in Trade to help BOCOG identify the best timber procurement practices.

Greenpeace will continue to transfer its forests expertise to BOCOG, Olympics sponsors, and Olympics contractors. Future plans include distributing a guideline that can help sponsors avoid illegal timber as well as providing information workshops for BOCOG staff responsible for timber procurement.

Food Safety:

Greenpeace believes that it is important for the Olympics to provide only the highest quality of food to all athletes and visitors to the Beijing Olympics. To help achieve this objective, Greenpeace China's sustainable

agriculture team will monitor the use of illegal pesticides in fruits and vegetables in Beijing and its surrounding areas. Greenpeace has already submitted the first set of pesticide testing results to BOCOG.

Influence Olympics sponsors to improve their environmental commitments for the Olympics

Greenpeace believes that Olympic sponsors, who provide large numbers of products and services during the Olympics, also have the responsibility to ensure that the third pillar of the Olympics—the environment—are upheld. Greenpeace has been in communications with various corporate sponsors of the 2008 Olympics to investigate whether (1) sponsors plan to use products and technologies that do not harm the environment for the Olympics (2) sponsors plan to promote environmental protection as part of their Olympics messaging.

During the Sydney Games, Greenpeace ran a high-profile campaign against Coca Cola's use of refrigerators containing climate changing hydrofluorocarbons (HFCs). This campaign subsequently resulted in Coca Cola's commitment to start phasing-out the use of refrigeration containing HFCs in Olympic venues. Coca Cola also later played a role in forming Refrigerants, Naturally!, an industry alliance committed to developing commercially viable HFC-free refrigeration technology. During the Beijing Olympics, Greenpeace will continue to work with industry leaders while criticizing laggards to raise awareness on HFCs as well as the availability of natural refrigeration technology that does not harm the environment. Greenpeace believes that such solutions-based work is crucial to extend the positive legacy of the Olympics and promote the phase-out of HFCs throughout the world. While promoting natural refrigeration will be the main focus of Greenpeace's work with sponsors during the 2008 Olympics, Greenpeace also will also assess the overall environmental footprint of sponsors during the Olympics, from toxics phase-out in products to sustainable timber purchasing policies.

Strengthen dialogue between the BOCOG, NGOs and the media.

Greenpeace believes that the exchange of ideas between Olympic organizers and third-party stakeholders are essential to the greening efforts for the Games. Thus, Greenpeace is working to create platforms in which BOCOG and NGOs can discuss various environmental issues and identify opportunities for mutual cooperation. Whenever appropriate, the media will be invited to these events to foster transparency and ensure distribution of information to the worldwide audience.

As a first attempt at this effort, in July 2007, Greenpeace and Conservation International co-hosted an environmental workshop with the support of UNEP. At this half-day workshop, BOCOG, various international and local NGOs, experts and journalists together discussed environmental issues related to the 2008 Olympics. Discussion topics ranged from the impact that air pollution and water scarcity in Beijing can have on the Olympics to the use of renewable energy and toxic materials in Olympic venues.

Raising Public Environmental Awareness for the Olympics and beyond

Greenpeace believes that it is vital that the theme of 'Green Olympics' is promoted among the Chinese public, with the objective of increasing the Chinese public's level of environmental awareness. With the support of BOCOG, Greenpeace plans to launch several public education initiatives that expose various environmental problems while at the same time highlights the solutions to these problems. Projects under consideration include a solar cafe that showcases the state-of-the-art climate-friendly refrigeration and cooling technology, an energy-saving light bulbs project, and a non-disposable chopsticks promotion project.

Conclusions and Suggestions: Beyond 2008

Greenpeace will work to increase the environmental accountability of all parties involved in the 2008 Olympics, including BOCOG, Olympic sponsors, and contractors, as it believes that this only will ensure the reduction of the Olympic environmental footprint. However, in order for this to happen the foundation of accountability must first be established.

Greenpeace suggests:

- » The IOC to make stringent environmental standards a requirement rather than an option. Environmental protection must be systematically incorporated into all aspects of the Olympics;
- » The IOC and host cities to together punish violators who do not meet the required environmental standards, whether it involves the host cities themselves, contractors, or sponsors;
- » The IOC and host cities to reward sponsors and contractors who have the best environmental practices;
- » The IOC and host cities to make all environmental data publicly available. Information disclosure is essential to help independent third parties accurately determine the environmental wins and losses of all Olympic Games^a
- » Host cities to consult third-party stakeholders while developing environmental guidelines.

While institutionalizing accountability will be the first step to making an Olympics systematically green, the ultimate success of an Olympic Games will lie in whether the event can bring forth a long-term legacy beyond the Olympics. In the case of the Beijing Olympics, this will be (1) whether the Chinese government can take the environmental lessons learned from the Olympics to better integrate environmental concerns into China's overall development policy (2) whether there is an increased sense of environmental awareness and willingness to engage in environmental protection among the Chinese public. Greenpeace urges BOCOG to use this opportunity given by the Olympics to spark a new era for sustainable development and to demonstrate environmental leadership globally.

11.2 WORLD WIDE FUND FOR NATURE

Happy steps towards a more harmonious future – WWF China and BOCOG

With environment initiatives more frequently being taken across the sporting arena, WWF has been working in partnership with numerous sporting events and organizations across the globe.

This increasing area of activity sees us giving advice as both experts and third-party commentators about both the footprint of a sporting event and the opportunities for positive environmental legacies long after the cheers have faded and the stadiums have emptied.

In terms of the Beijing Olympics, WWF China is working on a number of small but important precedent projects, some with BOCOG and some with other organizations, sports organizing bodies or individual athletes.

Initiatives of interest include using the Olympics to highlight a campaign to reduce energy use and become more energy efficient, protecting forests, building an eco-friendly kindergarten and encouraging athletes and Games attendees to reduce their carbon footprint when travelling to and from the Games.

20 ways to 20 per cent energy efficiency

This nationwide two-year public awareness campaign complements China's goal to reduce energy consumption by 20 per cent. 'Saving energy is as simple as child's play' is the message directed through 20 tips widely advertised

from billboards to bus shelters to online interactions and even puzzles. The two phase campaign runs until 2008 Olympic Games and helps urban dwellers understand their individual energy use and offers a number of solutions and prizes to 'energy saving heroes'. www.20to20.org

Forest Stewardship and the sustainable kindergarten

A demonstration building project aims to boost the concept of eco-labelling and forest certification of sustainable timber. Sourced from the member companies of the China Forest and Trade Network (CFTN), a network founded by WWF, Forest Stewardship Council (FSC) certified timbers are to be used for flooring and doors. After the Games, the building will be tested for its durability by some smaller and more demanding examiners as the building turns into a green kindergarten.

Healthy athletes for a healthy planet

All athletes aiming to compete in the 2008 Beijing Olympics can win gold by investing carbon emissions from their plane flights into a Gold Standard climate-change offset project. Long-distance flights are responsible for 2 per cent of the world's carbon emissions per year. On average each athlete will cause the release of around four tonnes of CO₂ into the atmosphere in his or her bid to win an Olympic medal. The Beijing Olympics is expected to bring nearly 10,000 athletes to China by air from more than 200 countries and regions and, together with supporters, the event will cause the injection of hundreds of thousands of tonnes of carbon into the atmosphere. WWF is working with the wholesale and retail offset business to develop an opportunity for athletes, supporters, the media, and anyone else planning to travel to the Games so they can easily enter their journey details, calculate the relevant CO₂ emission through the carbon calculator and donate to a Gold Standard project such as a wind farm, solar power station or other energy efficiency projects.

Heading towards a positive result

BOCOG has shown itself to be increasingly interested in reducing the environmental impact of the Games and further, using the Games as a way to start to tackle some difficult environmental issues which are important from a symbolic, precedent-setting and sustainable development perspective.

In this regard, since 2006, WWF China and BOCOG have worked together to 'retrofit' several example environmental projects into the Olympic Games. Despite considerable other challenges to do with planning for and building the biggest show on earth, WWF has been pleased to see BOCOG's willingness to make the space for showcasing strategic environmental projects.

During the next year, WWF look forward to seeing ideas on energy efficiency taken up as a result of the 20 ways campaign, to seeing an increase in use of timber from sustainable forests boosting a market for certified timber, and to athletes winning gold for offsetting their carbon footprint. We also look forward to seeing children playing in an eco-friendly kindergarten and showing how we can all take small steps towards treading more lightly on the earth. For WWF, that is really what the future is all about.

11.3 CONSERVATION INTERNATIONAL

CHINA PROGRAMME

For Our Natural Splendor A Parallel Campaign to the Green Olympics

Background

In 2008, China will welcome the world through the Beijing Olympics and has made a commitment to host an environmentally-friendly “green” event. This goal is reflected in the three core concepts of the 2008 Olympics—Green Olympics, High-tech Olympics and People’s Olympics. Chinese Government and Beijing Municipality leaders are paying great attention to and providing strong support for this event, as it will attract attention within China and internationally. The Beijing Organizing Committee for the Games of the XXIX Olympiad’s (BOCOG) green commitment is focused on ensuring the event leaves a minimal impact on the ecological surroundings, and that Beijing’s environment is improved through the process. The BOCOG also views the Games as an opportunity for environmental communication and education activities to raise public awareness and leave a rich environmental heritage for both China and the world.

Conservation International’s China program is working with the Beijing Olympic Committee to suggest ways to include national and international conservation messages and actions in the strategies and objectives developed for the Games. CI has provided specific recommendations how the five Olympic doll mascots (Friendlies or Fuwa) can be messengers for nature conservation by representing China’s unique habitat types and natural resources. CI was asked by the committee to calculate how much carbon the 2008 Games will emit. CI is also advocating for environmental messages to be integrated into the torch relay that will cross through some of China’s magnificent wilderness in the west and for the dissemination of pamphlets and materials to educate tourists about China’s natural areas – to influence diner consumption choices at restaurants in Beijing and other affluent large cities, and to share ways they can protect the environment.

At Conservation International, our expertise is to protect our natural heritage around the globe and demonstrate that human and nature can co-exist harmoniously. China is home to some of the biologically richest areas on Earth. China harbors more than 30,000 plant species (over half of them endemic) and some 6,300 species of vertebrate animals (10 percent of the world total). With the world’s largest population and fastest-growing economy, China’s development successes and failures have global implications for the environment and conservation.

However, the current “green” activities carried out by the BOCOG are focused on the ‘brown’ issues such as pollution, and not linked to the green or nature side. They also tend to be restricted in geographic scale and influence, primarily occurring in Beijing on venue construction, pollution control and city beautification. Similarly educational activities are being focused in schools and some residential communities, with few take home messages for the wider Chinese audience and Olympian travelers. When Olympics come, people who come through Beijing will look at its air quality as the indicator for China’s environment, but will have little chance to access and appreciate the natural beauty, rich and unique wildlife of China. Such key public messages on nature conservation, such as not to consume wildlife, travel in a nature-friendly way, and living a climate-friendly lifestyle, are not yet part of the green commitments or education.

CI sees the Olympics as a key momentum for China’s nature conservation. The entire world will be looking at China in 2008; the Olympian travelers will tour beyond Beijing and all over China. To best use this

opportunity for nature education, CI initiated a campaign, parallel to the Olympics, to celebrate China's nature and to promote for nature-friendly lifestyle. The Campaign is named "For Our Natural Splendor", and is a form of civil society support to the 2008 green commitment to the Olympics Games.

China: For Our Natural Splendor

As a result of China's three decades of explosive growth, the cost to the natural environment is becoming too great to ignore. However, conservation is still marginalized—little more than simple slogans and usually irrelevant to people's daily lives. The CI China program has developed an "Olympics" campaign – "For Our Natural Splendor" in partnership with the China Environment Culture Promotion Association (CECPA), the leading government NGO for environment affiliated with the State Environmental Protection Association (SEPA).

CI's campaign was formally launched on November 15, 2006 at an event in Beijing, China. More than 200 guests including BOCOG, media representatives, government officials, corporate partners, NGOs attended the event. The campaign aims to instill pride among the Chinese public of its natural heritage and China's global leadership in protecting natural resources. CI will use positive and creative messages focused on people's connection with nature, dependence on biodiversity resources, and how everyone can live a nature-friendly lifestyle. Primary audiences to be targeted include urban-dwelling Chinese citizens in Beijing, Shanghai and urban centers, as well as Olympian travelers to the 2008 Games. By involving tens of millions, the campaign hopes to leave a lasting legacy of conservation benefits. The campaign goals include:

- Showcasing China's natural splendor and its conservation achievement, creating visually memorable nature images and conservation values for the 2008 Olympics;
- Significantly reducing harmful wildlife trade and consumption in large Chinese urban centers, such as Beijing, Shanghai and Guangzhou, by making unsustainable wildlife consumption unfashionable;
- Promoting for a carbon neutral Olympics, and raising individual awareness of global climate change, its connection with nature, and promoting a climate-friendly lifestyle

These goals will be realized by carrying out a suite of well-planned activities and executed through a broad, inclusive network of public and private sector partners, to have immediate impact leading up to and during the Olympics. CI will play a facilitator and catalyst role to ensure success by complementing the strengths of the partner network.

Campaign Update As Of September, 2007

Launching Event - Nov. 15, 2006, Beijing

Over 200 guests attended the launching event, held in Peking University's Centennial Hall. Celebrities, corporations, government, NGOs, Beijing Olympics Organizing Committee and prestigious figures as Prof. Xu Zhihong, President of Peking University, spoke about their enthusiasm and support of the pride campaign to uplift public awareness of a green lifestyle. Attendants signed a pledge and offered to help when the two-year campaign unfolds with the upcoming 2008 Beijing Olympics. The event was widely covered by Chinese media, and posted prominently on the 2008 Olympics committee official website.

In addition, the campaign website was launched www.HiNature.cn. This Chinese website has animated contents, targeting a general audience, with campaign activities, games and competitions, videos, stories from frontline nature conservation projects, and features a monthly Hi Nature! newsletter.

Working with BOCOG - The Beijing Organizing Committee for the Games of the XXIX Olympiad (BOCOG)

CI has maintained a collaborative relationship with the Olympics Committee – BOCOG. CI is seen as a credible, resourceful partner by BOCOG.

In May 2006, CI was invited by the committee to design environment messages for the five Olympics mascots, the Friendlies or Fuwa. Four out of the five mascots use content provided by CI and other NGOs, for an exhibition ‘Hand in Hand with Olympics: Friendlies to Protect Nature’, that showcases water conservation, forest protection, grasslands, and caring and conserving biodiversity. In our design, the mascots deliver not only general message on environment, but also very specific action items on how people can be more nature-friendly to protect the wildlife represented by the mascots. An English translation of such messages can be found at www.chinagreentravel.com/Explore_China's_Natural_Wonders/2008_Olympic_mascots.Shtml. Unfortunately, such information is not available on the official Green Olympics website.

In September 2006, CI was invited to participate in an Ecotourism Standard Workshop in Beijing, hosted by BOCOG. CI China Conservation Director, Sun Shan, spoke at the event and formally introduced CI's campaign to BOCOG.

On January 31, 2007, CI was invited, along with a dozen other environment groups, to attend a Green Olympics and Public Participation workshop in Beijing. After the round table discussion, CI was interviewed by the BOCOG reporter, and was featured on BOCOG website with an article ‘Using Olympics to Protect Nature's Splendor, Promoting for a Green Lifestyle’.

In March, 2007, CI was invited by BOCOG, for consultative discussion on 2008 Beijing Games and climate change, and was consulted on carbon calculation, reforestation and offset options. See below for details in the Carbon section.

On July 6, 2007, CI, Green Peace and UNEP co-hosted a workshop ‘Olympics and Environment’, and invited BOCOG Vice Director for Environment Department Mr. Yu Xiaoxuan. The three-hour long workshop was well received, and saw participation from such important international media as Newsweek, The Wall Street Journal, Time and The Guardian. The workshop was aimed at enhancing communication and understanding between the government, NGOs and media, and bridging the gap of understanding environment issues of Beijing and concerns of international community about how Green the 2008 Games will be.

Carbon/Tree Calculator and Climate Change Campaign – from January, 2007

Launched in January, 2007, this carbon calculator soon became No. 1 hit on Google.cn. The calculation was calibrated to fit China's situation, and has a function to convert carbon to trees. It offers a quick climate change education flash, introduces ways of cutting carbon emission, and gives information on planting trees for carbon offsetting. The flash was widely used by educators, government and companies.

Several environment groups and corporations used it during March 5 National Tree Plantation Day. Car Clubs calculated their footprint, before heading out for major trips during the May Travel Week (see Travel Green). State Environment Protection Administration, adopted the calculator for their June 5 Environment Day exhibition. CCTV has had at least three programs featuring it.

In March 2006, Conservation International was invited by the Construction and Environment Department

at BOCOG, to help calculate the carbon emission for the 2008 Games. CI has provided expertise in doing such calculation, and BOCOG has provided logistical details to make such calculation accurate and sensible. However, we understand that there is no decision how Beijing links climate change and the 2008 Games.

The Summer Concert Series in Beijing Forbidden City Concert Hall will become the first Carbon Neutral Event in China (see Green Concerts). The carbon calculator was made into real game machines to attract children during the 45-day series.

L'Oreal China has adopted the carbon calculator in their September 2007 group trip to Northern Sichuan, and opted to offset their carbon footprint through tree plantation, becoming one of the first companies in China to adopt carbon-neutral travel.

Visit <http://www.hinature.cn/Product/Calc.ASP> for Chinese version or visit <http://www.chinagreentravel.com/> for English version.

Travel Green Campaign – launched on April 23, 2007, Beijing & Chengdu

In 2006, 125 million people traveled from abroad into China, and 1.39 billion traveled domestically within China. The 2008 Beijing Olympic Games is expecting an additional 2.5 million people descending upon the capital. Tourism has become a burden for the fragile ecosystems and culture integrity of many remote areas.

Travel Green Campaign was launched on April 23, 2007, in Beijing and Chengdu, before the May 1 national weeklong holiday, promoting responsible nature-friendly travel, has gradually gained popularity in China. Working with most popular websites as People.com, Sina.com and QQ.com, CI promotes key messages as calculating carbon, say no to wildlife, buy local when traveling and zero waste trips. The campaign features a pledge Greening China Map and a photo contest. China Youth Travel Agency, several travel clubs and private enterprises adopted Travel Green, during their own events. Some even made their Travel Green Map for such destinations as the Tibetan Plateau.

Huaxia Geographic, China's local partner for the National Geographic Magazine, worked with CI to put out a national competition for best ecotourism sites. Started from April, 2007, the result is expected to come out in September, 2007. For more information, visit Green China Map and more campaign information

<http://www.hinature.cn/Map/> (Chinese)

http://www.hinature.cn/Event/Qing_Zhang/program/index0.asp (English)

A Green Traveler's Map to Tibetan Plateau designed by CI is available in hardcopies and online in Chinese and English:

www.chinagreentravel.com/Travel_Green_in_China/Travel_Green_in_China_3.Shtml

www.chinagreentravel.com/Explore_China's_Natural_Wonders/Green_Map_to_Tibet.Shtml

English report on Green travel campaign launched for May Day Holiday on CCTV and

English Radio Program from China Radio International

Green Dining Table Campaign – launched on May 22, 2007, Beijing, Kunming and Guangzhou

In May 2007, two consecutive confiscations in Yangjiang County, Guangdong Province, have turned up at least 5,400 monitor lizards, 30 pangolins, 21 bear palms, 1,130 red-eared sliders and over 3,000 Malayan box turtle, keeled box turtle and a Burmese Cyclemys (an endangered turtle), in hundreds of crates. This is just tip of an iceberg for the grim picture of wildlife consumption in Guangdong.

Air China, an Olympics sponsor, advertises for giant salamander restaurants in every issue of its flight magazine. This is an Appendix II National Protected amphibian species, also the largest amphibian in the world. Shark fin soup, widely considered harmful to the marine shark population, is served in almost every high-end restaurant in Beijing and other cities in China. In many urban centers, wildlife consumption may not seem obvious; however, popular dishes as shark fin soup, wild turtles, snakes and birds are still being sold openly and advertised widely.

Agreeing in principle that people should not have wildlife on their dining table, average people may have difficulty ascertaining the source of many wildlife dishes served in China. The dining table card and the accompanying guide, both free for download in PDF format on CI's HiNature.cn website, explains in detail environment, health and legal risks associated with consumption of these dishes. One particularly noteworthy species is sharks, used mostly for shark fin soup, as most species are not protected; it is one of the marine predators in dramatic decline due mostly to human consumption. Health risks are also described, involving high concentration of heavy metal and contaminant, as well as SARS-like viruses that arise from close human-animal interaction.

The electronic card and guide can be downloaded from www.chinagreentravel.com (English) and www.HiNature.cn (Chinese). Our Olympic travel website chinagreentrave.com provides green tourism information for English speakers, including recommendation of wildlife-free delicious dishes in China.

Working with the Wildlife Trade Program, the dining table card came out in time to stem the tide, through communicating the right messages to the consumers. In some areas of China, such as Guangdong, where wildlife consumption is a tradition, CI elected to work with young students, by distributing small wildlife protection grants to college and high school student groups showing interest and capacity of carrying out awareness building activities inside and outside of campus. The first batch of grants went to five groups to support projects ranging from market survey to education in communities.

Another tier of the strategy aims at enforcement agencies as the target audience. At the launching event in Kunming – where CI has worked for years – the customs office, the forestry and agriculture departments, the CITES office that manages cross-border wildlife legal trade, and the commerce department in charge of market came together to sign an agreement to work together in combating illegal wildlife trafficking. They have also pledged not to serve any wildlife on their dining table and official banquets, following detailed instruction from the dining table card.

Time Out magazine was among the first to show interest in featuring the dining table card in their monthly issues, after attending the Beijing launching event in June, 2007.

CI plans to evaluate usefulness of the information and to work with media to make the dining table choices more popular. As a strong endorsement of this the Beijing 2008 Olympics has designated 120 restaurants, one of the criterion is no serving wildlife. We also plan to promote the content of this card during the Olympics.

In addition, JWT has provided pro bono service to CI in designing a test advertisement for shark and marine conservation. Some of the designs were shown in 80 bus station advertisement lightboxes in Beijing. Additionally, a bus advertisement company also provided pro bono support by painting one Beijing bus into a shark conservation mobile station. See below for a photo taken in Beijing.

Websites in Chinese and English gaining popularity

Our campaign website comes in Chinese at www.HiNature.cn and in English at www.chinagreentravel.com. The Hi Nature website was launched at the same time of the campaign launch, and has become one of the most popular environmental websites in China, with about 20,000 daily visits and 3.5 million total visits since November 2006.

Our Olympics China Green Travel website www.chinagreentravel.com (English) was launched on June 28, 2007 in Beijing, and targets at visitors to China as well as expatriates living in China. With just less than a month since it went live, the website is already being introduced by British Chamber of Commerce, China Environment News, travel agents and fashion magazines.

Green Summer Concerts to be Carbon Neutral, and much more - July 13-August 26, Beijing Forbidden City Concert Hall

For Our Natural Splendor, Gateway to Music 2007 is a series of 60 events hosted by Forbidden City Concert Hall, from July 13 to August 26. The music event is in its 12th season, and it features diverse forms of music, dance, and opera, with an audience primarily made up of children. Youth are given an opportunity to touch instruments, interact with performers and learn to play a little themselves. Each of the 60 concert hosts about 1,400 people.

This year's event was enriched with Conservation International's participation, by adding environment and green living as a main theme to this widely applauded classic. For CI, this is an opportunity bring environmental education and the Olympics campaign to a wider audience in a lively format!

The music series will be carbon neutral one, making it the first in China, by incorporating climate change mitigation and public awareness in a large event. Sixty events' electricity, car transportation of audiences as well as performing group travel from overseas, add up to 126 tons of carbon dioxide, which is to be offset through planting trees in the Mountains of SW China. CI has helped evaluating energy consumption in the music hall, and has connected its long-term collaborator 3M Company, which offered to put on a UV screen on the south-facing glass wall of the music hall to help reduce air conditioning use.

An exhibition with the carbon calculator, a man-size Ms. carbon neutral mascot (pika), will be meeting children daily at the Music Hall entrance, to interact with the audience, esp. young audience, for climate change and green living education.

A Nature Sound Cinema, and nature image exhibition, provided by National Geographic Society, will be shown daily during the music series, in the downstairs surround sound cinema. Over 100 images from NGS will decorate the hallway and cinema into a beautiful natural landscape. The audience can get free admission to the cinema, before each show starts. August 5th marks the Night of Nature Sound presentation by NGS and NPR staff involved in making the Radio Expedition shows.

Dr. George Schaller, the renowned wildlife biologist and conservationist, has written a series of eco-stories on pika – a tailless mouse-like rabbit living on high Tibetan plateau. Dr. Schaller used his years of wildlife research stories to illustrate how the cute animal interacts with its many neighbors co-existing on the beautiful yet fragile highland. The stories are re-edited into a children's percussion show featuring the Leon Percussion Group, and narrated by a famous children's show host, on the night of August 23.

Media on both entertainment side and environment have responded enthusiastically. Radio stations have scheduled a series of programs reporting at different stages of the show. Dr. Lu Zhi, director of CI China, said “collaborating with a music event is one of the steps to bring environmental issues and awareness closer to the urban center’s lifestyle. We hope the beauty of nature sound and being part of the climate change solution will inspire people to look more into a nature-friendly lifestyle.”

For a collection of news, stories and playbill, visit <http://www.hinature.cn/theme/music> and the Forbidden City website www.fcchbj.com

China and World’s Nature Photographer Promotes Natural Splendor

International Photography Festival, signed a China Green Photographer Pledge. In September 2006, CI China, Wild China (www.wildchina.cn) and the International League for Conservation Photographers (www.naturephotography.org) presented an international nature photography exhibition at Pingyao Festival, the largest photographer gathering in China. This event gave CI access to some of the China’s best photographers, who are interested in conservation and willing to help.

Public Service Announcement design and broadcast

Since June 2007, CI has signed contracts with five major LCD advertisement companies covering airline, airports, clinics, railways and buses. They have so far provided CI with hundreds of hours of free broadcasting time on their screen all over China. A total of 13 video/PSAs were made on Travel Green (4), no-wildlife dining table (1), Climate Change (2), general campaign messaging (2), China’s natural splendor (2). All can be found on <http://www.hinature.cn/Video/>.

Future Plans

To date, CI has already finished design of the key messages for the campaign. The next stage, prior to the 2008 Games, will focus on spreading these messages, and organize events for collective efforts in achieving campaign goals, such as carbon-neutral Olympians and even Olympic Games.

Our specific plan includes

Producing Publications for Olympics

As the Olympics approaches, people’s enthusiasm is picking up for volunteering and contributing to beautify the city. We plan to develop publications that have practical information, fun to read and fashionable in design, carrying our campaign messages.

Green Travel

Successfully launched on April 23, 2007, before the May 1 national weeklong holiday, Green Travel is gradually spreading in China. With 1.39 billion travelers in 2006, it is expected an all-time high during the 2008 year of Olympics. Travel responsibly, climate-friendly, wildlife-free, will be CI’s message at it continues its Green Olympian Travel work.

Green Dining Table

A wallet-size dining table card was published in Chinese and English by June 2007 and launched in Beijing, Kunming and Guangzhou. Targeted at reducing wildlife consumption and raising awareness on dining table choices, for health and environment reasons, these dining table cards are accompanied by downloadable PDF files of recommended Chinese dishes and menu, for travelers and residents in China. Next, we plan to work with the 120 certified Olympics restaurants in Beijing, to promote use of dining table cards, to find resources to publish the cards, as detachable inserts or stories, in popular and fashionable journals, and encourage corporations to adopt our dining table cards and pledge to be wildlife-free (shark-fin free) on their banquets.

Carbon Neutral Olympian, companies, travelers – the Climate Change education

China launched its government-led National Strategy on Climate Change in June 2007. Civil society just started to recognize the magnitude of the problem. With its online carbon calculator, CI has successfully launched the first Carbon-Neutral event in Beijing, together with the Forbidden City Concert Hall, to offset carbon emission during the 45-day summer series. Many government agencies, private enterprises, magazines and popular websites have linked to CI's carbon calculator and education messages on reducing carbon footprints, and planting trees to offset emissions. We plan to continue for promote for carbon neutral individual Olympian travelers, Olympic Games and events around Olympics. We will work with prominent artists, musicians, cell phone companies (for carbon calculation service), airline companies for travelers, and launch a fund in Yunnan to connect voluntary carbon offsets to planting trees in SW China;

Producing high-end PSAs on Nature, Sports and Olympics

We have signed contracts with five major LCD advertisement companies covering airline, airports, clinics, railways and buses. They have so far provided hundreds of hours free broadcasting time on their screens all over China. Before Olympics, our plan is to work with PR companies and Olympics sponsors to make a series of high quality PSAs and Flash videos, featuring “Natural athletes” - connecting athletes and their favorite animals/plants, linking sports and nature.

One Large Green Event

We are exploring in working with top advertising experts to design an event to showcase China's natural beauty, ethnic diversity and connection of urban lifestyle with nature. We would like to feature “The China you don't see”, raising awareness on China's wildlife and nature, engaging nature reserves and wildlife conservation community, to showcase China's natural splendor.

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