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## Executive Summary

Beijing is a city of 16.33 million and China overall boasts 1.3 billion people – 20% of the world's population. As a rapidly developing nation with growing energy and resource needs, no nation has a more important role to play than China in making the urgent transition to sustainable development.



This report aims to provide an independent assessment of the environmental initiatives of Beijing's 2008 Olympic Games. In 2006 Beijing's population was 16.33 million and China overall boasts 1.3 billion people – 20% of the world's population. As a rapidly developing nation with growing energy and resource needs, fewer nations have a more important role to play than China in making the urgent transition to sustainable development.

The Olympics "Green" theme has been the force driving both short-term projects and long-term infrastructure initiatives in Beijing. Planning for this international mega event has presented unique environmental challenges and opportunities for Beijing as it has for all Olympic hosts.

### **Beijing's original bid and additional environmental commitments include the following:**

- While air quality during the period of the Games in 2008 will be of a high quality, and meet Chinese and World Health Organization (WHO) standards, Beijing municipal government is nonetheless committed to achieve a high standard for the whole year.
- Cleaner energy will be supplied to the urban area for domestic usage and natural gas consumption will be increased by a factor of five by 2007.
- By 2007 exhaust from new vehicles will be reduced by 60%.

A full list of commitments is provided throughout this report.<sup>1</sup>

### **Greenpeace's rating of Beijing should be taken in the context of a number of factors:**

- As a developing country, China faces serious environmental challenges associated with its rapid growth, population and limited experience in environmental solutions. Yet, the environmental Olympic initiatives and investment made by Beijing in some cases far exceed those of many developed and developing countries with vast experience in managing environmental issues such as Sydney and Athens.
- A number of Beijing's achievements represent the world's best environmental practice — a huge leap from the existing polluting or destructive technologies and systems currently in use throughout the developing world. In this, Beijing has been able to show that making the transition to more sustainable approaches is possible when a concerted effort is made.
- Despite Greenpeace's earlier on-going engagement with the Beijing Organizing Committee for the Games of the XXIX Olympiad (BOCOG) in the form of regular consultations, during the drafting of the report, Greenpeace did not have sufficient access to important information regarding Beijing's environmental progress. This has made it difficult for Greenpeace to accurately gauge how successful Beijing's environmental initiatives have been.

In our analysis from the information available, Greenpeace found that Beijing achieved and in some cases surpassed original environmental goals but also missed some opportunities that could have ensured a better short- and long-term environmental Olympic legacy for the city.

1. For a full list of Beijing's bid commitments, please see Beijing 2008 Olympic Games Bidding Committee (BOBICO) Candidacy File, "Section Four: Environmental Protection and Meteorology" <http://www.beijing2008.cn/spirit/beijing2008/candidacy/files> as well as Beijing's Green Olympics Action Plan, <http://www.beijing2008.cn/bocog/environment/guidelines/n214067229.shtml> (in Chinese)

## Beijing's key achievements include:

- The introduction of state-of-the-art energy saving technology in Olympic venues — for example the Olympic Village will showcase various technologies such as solar hot water, geothermal, and solar photovoltaic (PV) systems. These represent a welcome shift away from a reliance on polluting fossil fuels.
- Beijing has increased its new vehicle emissions standards to EURO IV ahead of schedule for the Games in an attempt to improve air quality. This is amongst the most stringent emissions standards in the world.
- Beijing has added four new rail lines for the city, as well as a direct line within the Olympic Green to encourage public transportation.
- 20% of the Olympic venue electricity used during the Games will be purchased from clean wind sources supplied by the Guanting wind power station, Beijing's first wind power generation station capable of generating 100 million kWh of electricity a year, which is enough to meet the demands of 100 000 families.
- Beijing has dramatically improved its sewage and wastewater treatment plants and water reuse systems.
- Along with other low energy vehicles, there will be a fleet of 3 759 buses running on Compressed Natural Gas at the time of the Games. This is one of the largest fleets of this kind operating in any city in the world.
- At the end of 2007, 16 000 boilers under 20 tonnes and 44 000 boilers under one tonne had been upgraded.
- By the end of 2007, 32 000 household heating systems had been converted from household coal heating to electricity.

- BOCOG's dialogue and consulting with NGOs during the Games represent a positive step towards the increased collaboration between government and civil society in China.
- Sponsors have delivered specific environmental commitments. 100% of Coca-Cola's 5 658 units of Olympic coolers and vending machines will feature HFC-free natural refrigerants. Haier will use solar powered HFC-free air-conditioners in the Olympic Village, tennis center and other venues. Samsung has committed to making one of the official Olympics consumer phones, SGH-F268, 100% polyvinylchloride (PVC) and brominated flame retardants (BFR) -free.

## Missed opportunities include:

- Limited transparency and a lack of independently verified data and certification of Olympic venues represented the biggest challenge to comprehensively evaluating Beijing's green efforts for the Games.
- Although BOCOG has introduced environmental guidelines for Olympic timber purchasing, they missed a chance to introduce an internationally recognizable timber procurement policy, such as Forest Stewardship Council (FSC) standards for construction material used during the Games.
- The development of more landfill and incineration to deal with waste represents a failure to use the Games as an opportunity to move towards a zero-waste policy for Beijing.
- Although Beijing adopted a number of long-term measures to improve air quality in the city, they nevertheless had to introduce temporary measures, such as drastically

Overall, Greenpeace believes that the environmental efforts of BOCOG and the Beijing municipal government have created a positive legacy for the city of Beijing. Beijing did more than Athens and should be commended for its efforts in using the Games as an opportunity to upgrade and improve city infrastructure as well as to integrate leading energy saving technologies in Games venues. Many of Beijing's environmental initiatives have set a good example for other Chinese cities to follow. However, in part due to inadequate transparency and engagement with third party stakeholders, Beijing's green Games efforts do not meet the comprehensive approach of the Sydney Government before and during the 2000 Games. In addition, the International Olympic Committee (IOC) has an important role to play in ensuring that all Olympic host cities meet some minimal environmental standards and should require the use of independent verifiers for large-scale Games venues to encourage the best environmental legacies for all Olympic Games.



reducing vehicle numbers and shutting down industrial production in order to ensure that air quality meets standards during the Games. Beijing could have adopted clean production measures more widely across the municipality to speed up the improvement of air quality and to ensure that standards are met for the whole year.

- Although some water saving technologies were installed at the Shunyi Olympic Rowing and Canoeing Park, these technologies could have been more widely applied to all venues as well as across the rest of the city to alleviate the continued reliance of the Games on much needed water resources in Beijing.
- While the 2008 Games were in large part ozone-friendly, facilities nevertheless continue to rely on climate-damaging hydrofluorocarbons (HFC) technology, thereby missing an opportunity to leap directly from ozone-depleting to climate-friendly natural refrigeration.
- Although BOCOG has introduced a number of guidelines that include positive environmentally friendly policies for the Games in the areas of procurement and construction for example, the non-binding nature of these guidelines may have weakened their implementation.
- Refrigeration-using sponsors McDonald's and Yili, missed the opportunity to showcase significant numbers of climate-friendly refrigeration equipments free of HFCs. Electronic sponsors Lenovo and Panasonic missed the opportunity to provide electronic products free of toxic substances PVC and BFRs.

### Greenpeace and the Olympic Games

Greenpeace became actively involved in campaigning for the inclusion of environmental solutions through the Olympic Games in 1992 when the organization commissioned an architect to design a green Olympic Athlete's Village, which was submitted to an anonymous competition initiated by Sydney organizers. Greenpeace's design was one of the winners and the concept of a Green Olympics was hatched to extend to all of Sydney's Olympic development.

In 2000, Sydney, Australia hosted the very first Green Games, as defined by the city's pre-commitment to a set of far-thinking environmental guidelines across the spectrum of relevant issues. The Sydney bid stood out because of the decision by

the Sydney Organizing Committee to use the Olympics as a vehicle for best practice solutions to address the growing environmental challenges of climate change, ozone depletion, the production and disposal of toxic waste, and diminished natural resources. Greenpeace assisted in drafting these guidelines and joined Sydney in presenting them to the IOC as part of the city's bid. Greenpeace remained involved in both monitoring and working with Sydney to ensure the best environmental outcomes. In addition, the organization developed a relationship with the IOC and its Sport and Environment Committee to help ensure the environment continued to play a key role in the Olympic Games. The IOC released its own Agenda 21 to connect sustainable development goals to the Olympics in 1999.

Greenpeace produced its first complete Olympics environmental assessment report<sup>2</sup> on Sydney's efforts just before the Games in 2000 to provide an independent, third party assessment of how effective the city was in achieving its goals. After the Games, Greenpeace released a new set of guidelines — The Greenpeace Olympic Environmental Guidelines<sup>3</sup> — to assist the IOC, future Olympic host cities and the organizers of any large event to learn from and surpass Sydney's efforts. In 2004, a second assessment<sup>4</sup> by Greenpeace was carried out in Athens to test whether the lessons learnt at Sydney had been taken up to further fulfill the guidelines and commitments made in the name of a Green Olympics.

The Sydney Games were able to set an example in the areas of non-incineration remediation technology for toxic contamination on site and to introduce various energy saving and water saving technologies for Olympic facilities. More importantly, the Sydney Games were able to set an example of how sustainable technological solutions could be introduced into Olympics design and planning. The success stories in Athens, compared with Sydney, were mostly in the area of public transportation development — the extension of the metro and the construction of a new tramway and suburban rail — while fewer initiatives were taken by the Athens government and the Athens Olympics organizing committee for the Olympic Games itself.

The attempt to host a Green Games, for the fast developing city of Beijing, represented a much bigger opportunity. The Beijing municipal government and BOCOG have seized the opportunity both to experiment with state-of-the-art renewable energy

2. The report is available for download at: <http://www.greenpeace.org/australia/resources/reports/general/how-green-the-games-greenpeace>

3. Please see <http://www.greenpeace.org/china/zh/press/reports/olympics>.

4. Please see <http://www.greenpeace.org/china/zh/press/reports/olympics>.

technology— such as wind, solar and geothermal energy — and to spur the development of city infrastructure — such as new subway lines and new wastewater treatment facilities. These achievements, if they are applied more widely throughout Beijing and other cities in China, could represent a huge leap in remedying the environmental problems caused by China's rapid development.

## Research Methodology

This report is based on the information currently available. While Greenpeace attempted to carry out some independent investigation and research, overall this report relies heavily on official data provided by the Beijing municipal government and United Nations Environmental Programme (UNEP). Greenpeace has used two major sources of information regarding Beijing's environmental Olympics deliverables — the UNEP “Beijing 2008 Olympic Games – An Environmental Review” report and BOCOG's information, particularly its “Beijing 2008: Environmental Protection, Innovation and Improvement 2001-2006 Update” report. In addition, Greenpeace met with officials from BOCOG and Beijing's Municipal Environmental Protection Bureau to verify information, facts and figures on Beijing Olympic venues and city initiatives.

In this evaluation, Greenpeace focuses on six key environmental areas that are of importance for the city of Beijing: air quality, energy use/climate change and refrigerants, transportation, water, forestry, and toxics and waste. We have used the city's initial bid commitments as stated in the official candidacy file<sup>5</sup> and Beijing's Green Olympics Action Plan<sup>6</sup> as well as Greenpeace's recommendations for Olympic host cities drafted in 2000 after the Sydney Games, to compare this to Beijing's achievements and missed opportunities delivered for the Games.<sup>7</sup> Greenpeace also includes some recommendations for the city of Beijing and the IOC that extend beyond the Games. Greenpeace believes that all future host cities should make efforts to deliver the best environmental solutions through the Games. This report also examines the role of the IOC, corporate sponsors and non-government organizations (NGOs) in improving the environment of the Olympic Games.

There were major challenges to Greenpeace's efforts to assess the environmental achievements of the Beijing Games. Greenpeace's ability to conduct its own comprehensive independent evaluation was constrained by limited access

to Olympic venues and comprehensive data. The limited number of comprehensive Olympic assessments from independent research agencies and think tanks from which Greenpeace could obtain assessment information also affected the range of information available on Beijing's environmental achievements.<sup>8</sup> Moreover, despite many requests, Greenpeace could mostly only obtain access to information that was already publicly available from BOCOG and relevant governmental departments. Therefore, some crucial data needed to comprehensively assess the Olympics were unavailable. For instance, Greenpeace has learned that the Olympic Village may be Leadership in Energy and Environmental Design (LEED) certified, but to date the results of this assessment has not been made publicly available. The combination of these factors proved to be a major challenge in verifying the official information provided.

The IOC should provide leadership in ensuring that future host cities are more forthcoming in offering relevant environmental information. All information related to the Olympics should be made publicly available to third party stakeholders. The IOC should also set a minimum benchmark from which the environmental achievements of cities could be measured and rendered comparable. Greenpeace also recommends that future Olympics adopt more internationally credited environmental certification systems, such as LEED and FSC, which require professional third party independent verification.

## Greenpeace recommendations - Beijing and Beyond

### Beijing beyond 2008

Beijing should continue to implement successful environmental policies, and to introduce projects and state-of-the-art technologies used for Games venues more broadly across the city.

#### The city should:

- Continue to tackle air pollution through strictly regulating vehicle emissions standards and to set an example for other Chinese cities.
- Continue to upgrade industrial technology and to push them towards clean production.
- Widely promote the use of renewable energy technology used at Games venues across the city, such as solar

5. Beijing 2008 Olympic Games Bidding Committee (BOBICO), “Section Four: Environmental Protection and Meteorology.”

6. Beijing's Green Olympic Action Plan was originally formulated in 2000. Please see the full list of commitments (in Chinese) <http://www.beijing2008.cn/bocog/environment/guidelines/n214067229.shtml>

7. Xinhua. “China to host an Olympics with its own characteristics.” [http://news.xinhuanet.com/english/2002-12/12/content\\_658154.htm](http://news.xinhuanet.com/english/2002-12/12/content_658154.htm).

8. There were a number of environmental impact assessments that have been conducted by various major Chinese universities on behalf of BOCOG. For a complete list of these studies please see BOCOG “Beijing 2008: Environmental Protection, Innovation and Improvement” p.101.



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lighting, geothermal heating, and solar PV systems.

- Devise building standards to require new buildings to use smart design and energy efficient technologies.
- Continue to move away from coal as the dominant energy source and to promote the development of renewable energy such as wind power.
- Widely implement water reuse and rainwater collection features across the city to maximize water efficiency.
- Re-evaluate the long-term water strategies in the region to ensure that attempts to supply China's urban centers, such as through long-distance water diversion projects, will not affect access to water for rural areas, agricultural water, water safety, and security for future generations.
- Move towards reducing waste production, to promote zero-waste policies, and to move away from a reliance on incineration and landfills as common methods of waste treatment.

### China beyond 2008

Successful environmental achievements of the Olympic Games should continue to be extended not only in Beijing but throughout China after the Games. Although Beijing's current efforts to develop mass transportation and to implement various environmental regulations and policies are encouraging signs that environmental understanding is growing within government, it is imperative that other Chinese cities which will undergo similar types of transformation as Beijing over the next twenty years learn from Beijing's achievements and mistakes. Greenpeace urges that all Chinese cities consider environmental protection when devising economic development policies. Given the serious environmental challenges China faces as one of the fastest growing economies in the world, the environmental achievements of the Beijing Games, especially long-term infrastructural improvements, need to be broadly applied to other cities in China beyond 2008.

### Other Chinese cities need to:

- Learn from Beijing and to avoid the development model of “xianwuran, houzhili” which prioritizes development goals ahead of environmental considerations.
- Widely apply the methods that have been successful in

Beijing to their own development models as listed above.

### Future Olympic Games - Recommendations to the IOC

Greenpeace urges that future host cities and organizers of major sporting events take on board the lessons learned during the 2008 Games.

#### Specifically, the IOC should:

- Make a number of specific base-line environmental commitments mandatory for host cities and devise and set up a comparable set of environmental evaluation criteria so that green achievements are more easily evaluated and measured.
- Ensure that all public environmental data is made available for public scrutiny.
- Ensure that future Olympics adopt more internationally recognized environmental certification systems, such as LEED and FSC, which are not only credible but also require independent verification.



## Lessons learnt in Sydney and reality check for Beijing

Below are some lessons that Greenpeace took away from the Sydney Games and the realities for the Beijing Games. Greenpeace believes that these lessons should be incorporated into the planning of every major sporting event in order to ensure sustainable outcomes.

Table 1

LESSONS LEARNT IN SYDNEY	REALITY CHECK FOR BEIJING
<b>1</b> Make specific environmental commitments as part of your development plans well before design plans are finalized and construction begins. Make these commitments public.	Beijing issued environmental commitments in its candidacy file as well as a list of major environmental initiatives. These documents are publicly listed on the BOCOG website. <sup>9</sup>
<b>2</b> Environmental guidelines must be clear with specific benchmarks that are non-negotiable, measurable and backed up by law. These benchmarks must be included in all of the tenders offered for Olympic developments and made public.	As for all host cities, Beijing's environmental commitments, although an important part of their bidding process, were not binding.
<b>3</b> Olympic organizers and developers must be required to collect and report information on all environmental aspects of their project and make this information publicly available.	Although BOCOG has issued a set of guidelines about purchasing, these guidelines were not made mandatory. Due to a lack of transparency, it has been hard to verify whether these guidelines have been honored.
<b>4</b> Independent auditing of all environmental information is essential to ensure credibility.	Various Chinese universities have undertaken environmental assessments of specific venues. In 2007 the UNEP released its own environmental review of the Beijing 2008 Olympic Games, which relied on site visits and government figures. To date, this is the only comprehensive, publicly accessible assessment of the Beijing Games.
<b>5</b> No matter how Olympic construction is managed—with one project manager or as independent projects and contracts—Olympic organizers must ensure that the best and most cost-effective environmental systems and materials are used project-wide.	Although the Beijing organizing committee has issued a set of guidelines about purchasing, they were however not mandatory. Due to a lack of transparency, it has been hard to verify whether these guidelines have been honored.
<b>6</b> Great enthusiasm for and expertise in environmental building and event management exists at all levels internationally. Seek out and engage those innovative and creative experts and companies interested in the environmental success of your event.	Beijing has partnered with various international governmental institutions such as the Italian Cooperation Program for Environmental Protection and various leading international companies in Olympic venue design.
<b>7</b> High-level and consistent consultation with the community, environmental and social groups is essential and must be part of the project from the beginning. A clear process for conflict resolution should be established as part of the city's Environmental Guidelines.	Environmental NGO representatives from Friends of the Earth and Global Village of Beijing were invited to act as environmental advisors for the Games. World Wide Fund for Nature (WWF), Conservation International (CI) and Greenpeace were also consulted on environmental issues. The Games represented a good opportunity to open the channels of communication between government and NGOs in China. However, channels of communication need to be more frequent and systematic for public participation.
<b>8</b> Education about environmental initiatives undertaken and the benefits gained is essential at all levels, from the public to athletes, sponsors, the media and the commercial sector.	A number of environmental and public education campaigns were undertaken by BOCOG and partner NGOs with support from sponsors and media. However more transparent information about what BOCOG achieved would create more understanding on environmental initiatives at all levels of society.

9. Please see BOBICO's "Section Four: Environmental Protection and Meteorology" <http://www.beijing2008.cn/spirit/beijing2008/candidacy/files/and> Beijing's Green Olympic Action Plan commitments <http://www.beijing2008.cn/bocog/environment/guidelines/n214067229.shtml> (in Chinese)

# The Environment, Beijing and the 2008 Olympic Games

"1/4 of the population in China drink polluted water and 1/3 of the population breath severely polluted air. About 70 % of cancer in China is related to environmental pollution."

*Pan Yue - Vice-Minister of the State Environmental Protection Administration*

China faces some of the world's greatest environmental challenges. Some 300 cities in China face severe water shortages.<sup>10</sup> Seventy percent of China's rivers are polluted and 385 Chinese species are listed as endangered.<sup>11</sup> Of greatest concern are China's rapidly increasing greenhouse gas (GHG) emissions levels over the past ten years. China is one of the world's largest GHG emitters, with an estimated 6 200 million tonnes of carbon dioxide (CO<sub>2</sub>) released in 2006 from burning fossil fuels and cement production.<sup>12</sup> This represents a 9% increase in emissions for the same year and is primarily due to the country's reliance on coal as its main energy source.<sup>13</sup>

In 2007, only 44% of cities met Chinese National level II air quality standards. Pollutant levels in Chinese cities often pose an enormous health risk to citizens.<sup>14</sup>

However, China produces only about one quarter of the emissions per person as the US and has set ambitious goals for energy saving and emissions reduction. In addition, despite the increasing numbers of cars in China, there were eight billion bicycles in Beijing by the end of 2006. Beijing's bicycles will compete for road space with the estimated 3.35 million cars by the time the Games begin in 2008.<sup>15</sup>

China's economy is one of the fastest growing in the world. Official Chinese government figures indicate that the China's economy grew at an 11.9% annual rate in 2007, the fastest rate of growth in more than a decade. The explosive growth was fueled by a huge trade surplus, booming retail sales and immense investments in new factories, roads, bridges, and real estate projects.



10. Worldwatch Institute research, "State of the World" report, February 2006, <http://www.worldwatch.org/node/3881>.

11. Worldwatch Institute research, "State of the World" report, February 2006, <http://www.worldwatch.org/node/3881>.

12. Worldwatch Institute, "State of the World" report, February 2006, citing research by a Chinese research institute, <http://www.worldwatch.org/node/3881>.

13. Netherlands Environmental Assessment Agency, <http://www.mnp.nl/en/dossiers/Climatechange/moreinfo/Chinanowno1inCO2emissionsUSAinsecondposition.html>

14. Xinhua, "2007 China environmental report released," [http://news.xinhuanet.com/newscenter/2008-06/05/content\\_8317525.htm](http://news.xinhuanet.com/newscenter/2008-06/05/content_8317525.htm)

15. Xinhua, "Vehicles in Beijing to reach 3.35 million during Olympics," March 27, 2008. [http://www.chinadaily.com.cn/olympics/2008-03/27/content\\_6571379.htm](http://www.chinadaily.com.cn/olympics/2008-03/27/content_6571379.htm)

The environment figured prominently in Beijing's original bid, planning, and preparation for the 2008 Olympics. The "Green Olympics" theme was one of three main themes of the 2008 Games. In the Green Olympics Program (GOP) formulated during Beijing's bid for the Games, Beijing's action plan set aside a total investment of 101.02 billion RMB (12.2 billion USD) for green initiatives: 46.37 billion RMB (5.6 billion USD) for the period of 1998-2002 and 54.65 billion RMB (6.6 billion USD)<sup>16</sup> for the period of 2003-2007.<sup>17</sup> From 1998-2007, Beijing spent a total of 120 billion RMB (15.7 billion USD) on environmental initiatives.<sup>18</sup>

To host an Olympic Games requires an enormous investment in infrastructure. For events themselves, some 31 venues are needed inside the city of Beijing along with six venues in other cities, namely a sailing venue in Qingdao, an equestrian venue in Hong Kong and four venues for football preliminary matches in Tianjin, Shanghai, Shenyang and Qinhuangdao. Moreover, there are 76 training venues in use prior to and during the Games.

Of the 31 Olympic competition venues, 12 are newly constructed venues, 11 are renovated or expanded/upgraded venues and eight are temporary venues.<sup>19</sup> Key venues include the National Stadium (known as the Bird's Nest), the National Aquatics Centre (known as the Cube), the Shunyi Olympic Rowing and Canoeing Park, The National Indoor Stadium, and the Workers' Stadium.

The main Olympic venue development is the Olympic Green, which is situated at the northern end of Beijing's central axis, spanning a total area of 1 135 hectares. The Green is divided into three areas. The northern area is the Olympic Forest Park, which spans 680 hectares. The 291 hectares central area is where major Olympic venues and facilities are located. The southern park is 114 hectares and will also be home to Olympic venues. The Olympic Village (Athlete's Village) is located at the northwest side of the Olympic Green, south of the Olympic Forest Park.<sup>20</sup>

During the Games, 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.

Post Olympics, the ownership of these venues will return to various municipal governmental agencies with the largest venues to be owned by the Beijing municipal government. Others renovated venues will return to the State Sport General Administration, and various district government administrations and universities such as the Fengtai District Government, the Haidian District Government, Beijing University, and Beijing University of Technology.<sup>21</sup>

When evaluating physical venues, this report does not consider Olympic venues outside of Beijing.

San Francisco-based Sasaki Associates, Inc., in conjunction with a local firm, Tianjin Huahui Architectural Design & Engineering Co., secured the winning bid for the Olympic Green.<sup>22</sup> The largest stadiums and venues at the Olympics site were designed by international architects and executed with local partners. The consortium of Arup, PTW architects, the CSCEC (China State Construction and Engineering Corporation) and the CSCEC Shenzhen Design Institute (CSCEC+DESIGN) won the international design competition for the Cube, the Olympic swimming venue.<sup>23</sup> The National Stadium or Bird's Nest was designed by the Swiss firm Herzog & DeMeuron and the China Architecture Design Institute. The Olympic Village is located to the northwest of the Olympic Green and will accommodate 16 800 athletes and officials during the Games. It will be converted to 6 000 apartments after the Games.<sup>24</sup>

16. The above investment figures was provided in USD. The conversion to RMB is based on the exchange rate on January 07, 2001 when Beijing 2008 Olympic Games Bidding Committee (BOBICO) submitted their bid for the Games.

17. Beijing 2008 Olympic Games Bidding Committee (BOBICO), "Section Four: Environmental Protection and Meteorology," p.53.

18. The official website of the Beijing 2008 Olympic Games. "Beijing puts in Big Money to improve the Environment." <http://en.beijing2008.cn/26/44/article214084426.shtml> Both figures in RMB and USD are provided by BOCOG.

19. "Preparation for Olympic Games Moving Forward as Planned" <http://www.en8848.com.cn/EnglishSquare/200703/2007-03-28/41632.html>

20. "2008 The Hi-Tech Olympics" exhibition." Put on by the leading group for the "Hi-Tech Olympic Games (2008) Action Plan." May 21-25th, Beijing International Exhibition Center.

21. UNEP, "Beijing 2008 Olympic Games: An Environmental Review," p.45-53.

22. "Bidding on Beijing 2008." <http://www.chinabusinessreview.com/public/0301/teoh.html>.

23. "Watercube-National Swimming Center Beijing," Design Build Network. <http://www.designbuild-network.com/projects/watercube/>.

24. UNEP, "Beijing 2008 Olympic Games: An Environmental Review," p 65.

### “Green Olympics: Key Official Documents and Implementation Bodies”

- China's national economic development has been guided by a series of Five-Year Plans since 1953. These plans map the strategies of economic development as well as set growth targets and launch reforms. The current 11<sup>th</sup> Five-Year Plan from 2006-2010 sets a series of energy reduction and environmental conservation targets.<sup>25</sup> The 11<sup>th</sup> Five-Year Plan specifically commits China to an ambitious target of a mandatory 20% reduction in energy consumption per unit of GDP by 2010.
- In order to diversify energy sources and tackle climate change, the Chinese government introduced its Renewable Energy Law on January 1st 2006. The National Mid-to-long-term Development Plan<sup>26</sup> for Renewable Energy has set the goal of deriving 15% of China's national energy from renewable sources by 2020.
- Beijing's “Environmental Master Plan” (an environmental protection program developed by the Municipal Government for the period 1997-2015, funded by the World Bank) was integrated into the bid. Some targets had accelerated deadlines that were moved from 2010 to 2008 for the Games.
- On June 4th 2007, China became the first developing country to release a National Plan on Climate Change.<sup>27</sup>
- At the recent UN Climate Change Conference in Bali, China demonstrated a more constructive attitude towards emission targets and has shown encouraging signs towards acknowledging the need for emissions reduction.<sup>28</sup>
- Beijing Olympic commitments at the time of the city's bid in 2001 have guided environmental reforms in Beijing up to 2008.<sup>29</sup> We will examine some of Beijing's key commitments in the rest of this report.

### The key organizing bodies of the Beijing Olympic Games include:

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

BOCOG was set up on December 13, 2001, five months after Beijing won the right to host the 2008 Games.<sup>30</sup> BOCOG's executive board is composed of senior officials from the Beijing municipal government, the Chinese Olympic Committee and athletes.<sup>31</sup> Within BOCOG, the Construction and Environment Department is responsible for the coordination and supervision of the construction of the Olympic venues and relevant environmental protection issues.

The Environmental Management division is responsible for implementing the Environmental Management System of the Committee, for assessing whether bids commitments have been fulfilled as well as being in charge of environmental communication, risk management and cooperation with international organizations such as UNEP and the United Nations Development Programme (UNDP) and environmental NGOs.

The Environmental Engineering division is in charge of managing the environmental aspects of the design and construction of the venues as well as venue waste and cleaning program.<sup>32</sup>

### Other key Chinese agencies responsible for specific environmental initiatives include:

- Beijing's Municipal Environmental Protection Bureau (EPB)
- The Ministry of Environmental Protection of the People's Republic of China (formerly the State Environmental Protection Agency (SEPA))
- Beijing Municipal Development and Reform Commission
- Beijing Municipal Administration Commission (BMAC)
- Beijing Municipal Bureau of Industrial Development
- Beijing Water Authority
- Beijing Municipal Construction Committee
- Beijing Municipal Science and Technology Commission (BMSTC)
- Beijing Meteorological Bureau

25. “The National Eleventh Five-year Plan for Environmental Protection.” [http://english.sepa.gov.cn/Plans\\_Reports/11th\\_five\\_year\\_plan/200803/t20080305\\_119001\\_3.htm](http://english.sepa.gov.cn/Plans_Reports/11th_five_year_plan/200803/t20080305_119001_3.htm)

26. National Reform and Development Commission. [www.ndrc.gov.cn/zcfb/zcfbtz/2007tongzhi/t20070904\\_157352.htm](http://www.ndrc.gov.cn/zcfb/zcfbtz/2007tongzhi/t20070904_157352.htm)

27. National Reform and Development Commission. [http://www.ndrc.gov.cn/xwfb/t20070604\\_139486.htm](http://www.ndrc.gov.cn/xwfb/t20070604_139486.htm)

28. “UN officer: China's effort on pushing negotiation is encouraging” <http://www.climatemediapartnership.org/spip.php?article192>. (Chinese and English)

29. Beijing 2008 Candidacy File. <http://www.beijing2008.cn/spirit/beijing2008/candidacy/files/>. (in Chinese)

30. The official website of the Beijing 2008 Olympic Games. <http://en.beijing2008.cn/bocog/about/index.shtml>

31. “Bidding on Beijing 2008.” <http://www.chinabusinessreview.com/public/0301/teoh.html>

32. UNEP, “Beijing 2008 Olympic Games: An Environmental Review,” p.33.





## The Beijing 2008 Games Environmental Performance Evaluation

The following section evaluates Beijing's commitments, achievements, and failures in six different areas. As well, this section examines the initiatives and missed opportunities of sponsors and non-governmental organizations (NGOs) projects before and during the Games.



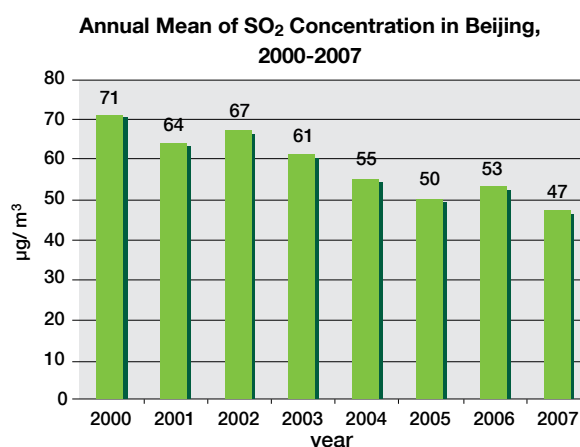
## Air Quality

The Beijing municipal government identified air quality as a major health and environmental issue long before the Olympic Games. From 1998 to 2008, the government has implemented various measures to reduce air pollution such as upgrading industrial technology and relocating factories, controlling vehicle emission standards, reforming energy structure by increasing natural gas use, and introducing renewable energy to the city.<sup>33</sup> Beijing is currently in the 14<sup>th</sup> Phase of the city's air pollution reduction measures. Air quality remains a major concern not only for residents but also for athletes and international visitors alike.

Beijing's air quality is subject to Standard II in the National Chinese Ambient Air Quality Standard (GB3095-1996).<sup>34</sup> The city's ambient air quality is monitored by Beijing's Environmental Monitoring Station, which includes a central monitoring station and 27 automatic substations including nine national stations.<sup>35</sup> The four main air pollutants related to human health impacts currently monitored daily by the Chinese government are sulphur dioxide (SO<sub>2</sub>), carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>), and particulate matter (PM<sub>10</sub>).<sup>36</sup> (For CO<sub>2</sub> emissions, see the Climate Change and Energy section).

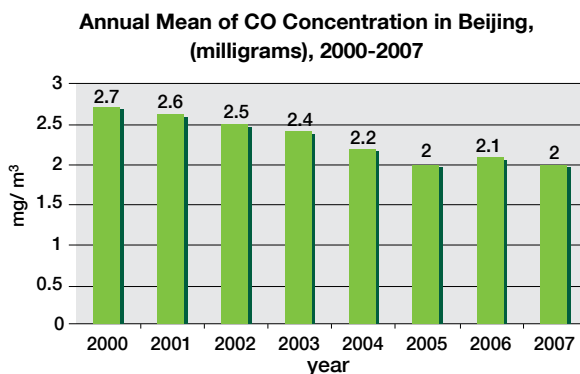
According to official figures collected by the monitoring stations, Beijing's annual air quality has shown a steady improvement since 1998. In most cases, most monitored pollutants have remained very similar from 2005 to 2007, however, the rate of air quality improvement was most evident from 2000 to 2004. The high annual mean level of PM<sub>10</sub>, the pollutant that stays consistently above Chinese National Air Quality Standard II and WHO Standard, remains a challenge for Beijing.

Figure 1



Source: UNEP and Beijing Municipal Environmental Protection Bureau

Figure 2



Source: UNEP and Beijing Municipal Environmental Protection Bureau

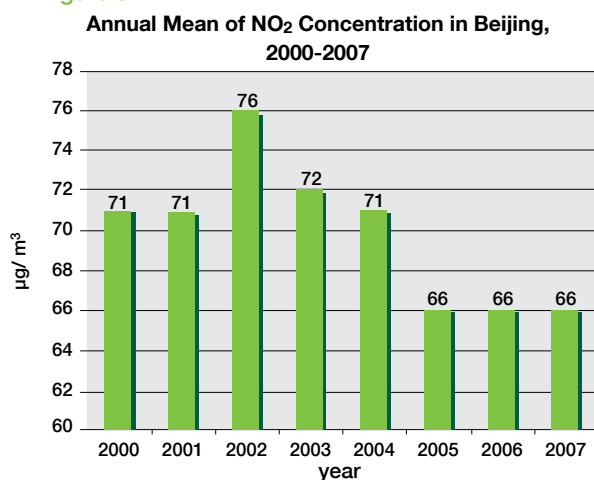
33. The Government of China Official website. "Beijing carries out its 14th phase project to improve air quality." [http://www.gov.cn/xwfb/2008-02/27/content\\_903668.htm](http://www.gov.cn/xwfb/2008-02/27/content_903668.htm) (in Chinese)

34. BOCOG, "Beijing 2008: Environmental Protection, Innovation and Improvement" p.21.

35. BOCOG, "Beijing 2008: Environmental Protection, Innovation and Improvement" p.22.

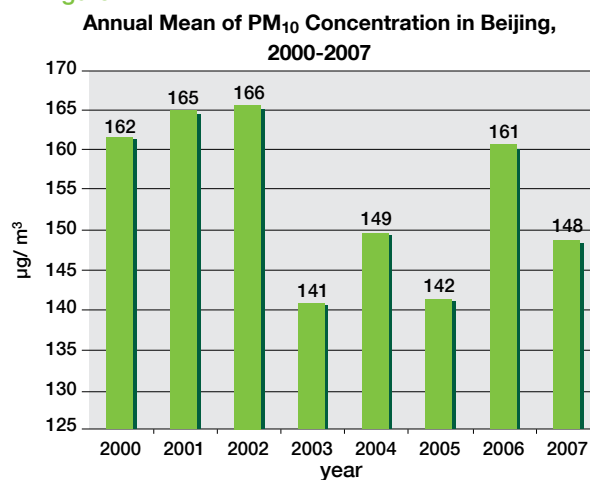
36. Particulate Matter, also known as particle pollution or PM, is a complex mixture of extremely small particles and liquid droplets. Once inhaled these particles can have adverse health effects on the heart and lung. For more on particulate matters please see <http://www.epa.gov/particles/> and also "WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide Global update 2005: Summary of risk assessment." WHO/SDE/PHE/OEH/06.02.

Figure 3



Source: UNEP and Beijing Municipal Environmental Protection Bureau

Figure 4



Source: UNEP and Beijing Municipal Environmental Protection Bureau

Table 2

## Chinese National and WHO Air Quality Standards (µg/m³)

		2005 WHO guideline standard <sup>37</sup>	Chinese National Standard II	Monthly average of 24-hour mean for the month of August 2006 <sup>38</sup>	Monthly average of 24-hour mean for the month of August 2007 <sup>39</sup>
SO <sub>2</sub>	Annual mean	None	60		
	24-hour mean	20 <sup>40</sup>	150	13	14
	hour mean	None	500		
	10 min mean		500		
NO <sub>2</sub>	annual mean		40	80	
	24-hour mean	None	120	52	58
	hour mean	200			
PM <sub>10</sub>	annual mean	20	100		
	24-hour mean	50 <sup>41</sup>	150	99	114
CO	24-hour mean	None	4000	1400	1500
	hour mean	None	10000		
O <sub>3</sub> <sup>42</sup> ozone	Daily max. 8 hour mean	100			

For August 2006 and August 2007, according to official data above, the monthly average of 24-hour mean concentration level of all four pollutants all meet Chinese National Standard II.

Compared with 2005 WHO guidelines,<sup>43</sup> SO<sub>2</sub> monthly average 24-hour mean concentration levels meet the WHO

guideline of 20µg/m³. However, PM<sub>10</sub> monthly average 24-hour mean concentration level, although it meets the WHO interim target-1(IT-1) of 150µg/m³, is still twice as high as the WHO guideline concentration of 50µg/m³. Comparisons for NO<sub>2</sub> and CO could not be made due to a lack of comparable data.

The Beijing Municipal Environmental Protection Bureau has announced a series of short-term temporary measures to address PM levels during the Olympic Games. These measures include halting all construction after July 20<sup>th</sup> 2008, temporary closure or partial closure of 19 of the heaviest polluting industries for the duration of the Games, and limiting motor vehicle use.<sup>44</sup>

## Beijing's Commitment:

1. Beijing municipal government has identified air quality as a major health and environmental issue. Sulphur dioxide, carbon monoxide, nitrogen dioxide, and particulate matter are monitored daily. While air quality during the period of the Games in 2008 will be of a

37. WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide Global update 2005: Summary of risk assessment. WHO/SDE/PHE/OEH/06.02.

38. Data provided by the Beijing Environmental Monitoring Center.

39. Data provided by the Beijing Environmental Monitoring Center.

40. For SO<sub>2</sub> WHO standards also sets Interim targets for pollutants. For SO<sub>2</sub> the 24-hour concentration interim target-1(IT-1) is 125µg/m³, interim target-2 (IT-2) is 50µg/m³.

41. For PM<sub>10</sub> WHO standards also sets Interim targets for pollutants. For SO<sub>2</sub> the 24-hour concentration interim target-1(IT-1) is 150µg/m³, interim target-2 (IT-2) is 100µg/m³.

42. For an explanation of Ozone, please see the PM<sub>2.5</sub> and Ozone section below.

43. At the time of Beijing's bid for the Games in 2001, the most current WHO Air Quality guideline was the 1999 WHO Guidelines. The 1999 and 2005 guidelines differ in that for SO<sub>2</sub>, the guideline value was decreased from the 1999 24-hour concentration of 125µg/m³ to 20µg/m³ in 2005. NO<sub>2</sub> concentration remains the same while the 1999 WHO guideline offers no clear guideline for PM concentration.

44. BOCOG press release. April 14<sup>th</sup>, <http://en.beijing2008.cn/news/dynamics/headlines/n214306896.shtml>.

high quality, and meet Chinese and World Health Organization (WHO) standards, Beijing municipal government is nonetheless committed to achieve a high standard for the whole year.<sup>45</sup>

2. To reduce and control industrial pollution, Beijing is committed to close down, relocate or upgrade heavy polluting, high energy consuming and resource wasteful enterprises, and to phase out old technologies.<sup>46</sup>

### Greenpeace Guidelines:

After Greenpeace's role in monitoring Sydney's environmental progress for the 2000 Olympics, Greenpeace drafted "Greenpeace's Olympic Environmental Guidelines: A Guide to Sustainable Events," as a set of benchmarks and challenges for sporting and non-sporting event organizers interested in a low impact environmental approach to hosting large events.

**Guideline 13** - There should be no pollutant emissions to the air, water and soil during construction or the eco-lifecycle of the building or venue. Long-term environmental and societal costs of producing building materials must be factored in to the sustainability goals of the project.

### Selected Achievements

Prior to Beijing's bid for the current Games in 1998, Beijing has begun to take comprehensive measures to improve air quality in the city. The 14 Phases of measures to reduce air pollution include upgrading and instituting strict emissions standards for industries, implementing strict vehicle emissions standards, reforming the energy structure in the city, and attempting to improve household heating systems. These projects all represent viable long-term solutions for reforming air quality and represent great policy achievements for Beijing. Furthermore, the "Beijing Municipal Plan for Control of Main Pollutant Emissions During the 11<sup>th</sup> Five-Year Plan," lays out clear guidelines to reduce pollutants. The plan sets stringent environmental regulations for Beijing such as cutting 40 % of SO<sub>2</sub> emissions.<sup>47</sup>

According to official data, in 2007, annual levels for three out of four monitored pollutants are currently below Chinese National Standard II. The pollutant that has consistently remained above the national standard is PM<sub>10</sub>.

Coal-fired power plants emit large quantities of SO<sub>2</sub> and PM air pollution, contributing greatly to Beijing's air quality

problems. According to official data, by the end of 2007, 16 000 large sized boilers (below 20 tonnes) and 44 000 smaller industrial boilers have been upgraded. Over 32 000 household heating systems have also been converted from coal to electrical heating systems in various neighborhoods throughout Beijing.<sup>48</sup>

Additional initiatives are analyzed in the Climate Change, Energy and Refrigerants, and Transportation sections of this report. Key initiatives taken by Beijing include the shift towards cleaner energy sources such as natural gas and the take up of clean energy initiatives such as the greater application of solar power and wind power technology. In terms of transportation, the city is adding four new subway lines in Beijing, as well as a direct line within the Olympic Green. Furthermore, the upgrade of vehicle emissions standards to EURO IV ranks Beijing's standards as amongst the most stringent in the world. These initiatives all represent the great efforts Beijing has taken to improve air quality in the city. (Please see the transport section for more information)

### Missed Opportunities and Mixed Results

Air quality overall remains a serious problem in Beijing, as it does for China generally and most large cities around the world. While Beijing has taken some real steps, Beijing's current air quality still faces major challenges presented by the country's booming economy and the rapid increase in car ownership. A comprehensive and long-term air quality strategy will be required to see lasting results and improvements after the Games.

Although Beijing has undertaken factory upgrades to improve air quality in the city, more could have been done to move the city towards clean production methods so as to avoid the need to use short-term measures to meet air quality targets.

### PM<sub>2.5</sub> and Ozone

A WHO 2005 special report stresses that aside from common pollutants, there are special risks associated with overexposure to PM<sub>2.5</sub> (smaller-sized particulate matter) and ozone<sup>49</sup> pollutants that are not currently being monitored by Beijing. Smaller particulate matters such as PM<sub>2.5</sub>, produced from vehicle emissions as well as the combustion of wood and other biomass fuels, tends to have severe adverse health impacts. Ozone is produced in especially large quantities in

45. BOBICO, "Section Four: Environmental Protection and Meteorology" p.55.

46. BOCOG, list of 20 commitments: <http://www.beijing2008.cn/bocog/environment/guidelines/n214067217.shtml>. (in Chinese)

47. UNEP, "Beijing 2008 Olympic Games: An Environmental Review," p.115.

48. BOCOG, "Supplement on Olympic Commitments," p.38.

49. WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide Global update 2005: Summary of risk assessment. WHO/SDE/PHE/OEH/06.02.

summer months due to a reaction involving UV radiation, NO<sub>2</sub> and volatile organic compounds in the air. As a summer phenomenon, this is of special concern to athletes attending the Olympics. Although Beijing has taken some measures to address ozone such as upgrading vehicle fuel standards, Beijing could have also used the Games as an opportunity to begin monitoring these pollutants.

## Greenpeace Recommendations – Beijing and Beyond

### Beijing beyond 2008

Preparation for the hosting of the Olympic Games has provided the Beijing municipal government with a great impetus for addressing air quality problems. Long-term solutions that target the root cause of air pollution such as the upgrading of coal-fired boiler technology, increasing energy efficiency and moving towards clean energy sources, investing in public transportation, constantly monitoring air quality and introducing more stringent emissions standards are all welcome first steps in tackling the complicated problem of air pollution. After the Games, Beijing needs to not only continue these efforts but also step up the move to clean technologies and energy efficiency as well as to encourage non-polluting transport options for the city. In order to tackle the problem of air pollution in the long term, the city should continue to set both short-term reduction targets as well as an end target for desired air quality standards.

### China beyond 2008

Short-term solutions such as temporary industry closures, halting construction and vehicle restrictions might help Beijing meet WHO standards during the period of the Games, but they are not long-term solutions. Only through tackling fundamental causes of air pollution by reforming energy structure, improving public transportation and enforcing strict emission standards for industries will Beijing see the benefits of the Games long after.

A recent collaborative report by researchers from Argonne National Laboratory have found that on average about 34% of PM<sub>2.5</sub> and 35-60% of ozone during high ozone episodes at the Olympic Stadium site are due to polluting sources in neighboring provinces such as Hebei and Shandong provinces and Tianjin municipality.<sup>50</sup> As a start, in order to realize the efforts to green the Games, Beijing's neighboring

cities and provinces – Tianjin, Hebei Province, Shanxi Province, Inner Mongolia and Shandong Province—have also had to close down and to upgrade cement, chemical and steel factories.<sup>51</sup> Regardless of short- and long-term attempts to reduce pollution in Beijing, these will ultimately fail without rigorous regional and national air quality initiatives and policies. Greenpeace urges Chinese municipal governments to pay more attention to all pollutants as well as to engage in long-term consistent monitoring and reporting to greatly minimize emissions with ongoing aggressive reduction targets after the Games.

### Future Olympic Games - Recommendations to the IOC

The IOC should require all future Olympic host cities to meet minimum air quality standards. Regular and continuous environmental assessments by organizations such as the UNEP in the years leading up to the Games are also necessary to ensure that air quality standards are met.

Although Beijing's air quality has improved each year...compared to developed countries, we still have a long way to go. Beijing has to make every effort to continually improve its air quality."

Yu Xiaoxuan Sept 26, 2007  
BOCOG press conference<sup>52</sup>



50. "Air quality during the 2008 Beijing Olympic Games." Streets G. David, Fu S. Joshua et al. Atmospheric Environment 41 (2007) p.480-492.

51. BOCOG, "Supplement on Olympic Commitments," p.40.

52. China Environmental Problems Focus Point. <http://www.cjcn.net/ShowDetails.aspx?id=415> (in Chinese)

# Climate Change, Energy Use and Refrigerants

According to the 2007 Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (AR4), to stabilize global GHG emissions between 445 and 490 ppm, there needs to be a reduction of at least 50% from 2000 levels by 2050 if we are to avoid catastrophic climate change.<sup>53</sup> Furthermore, global emissions must decline after 2015 for the world to have any chance of limiting the expected temperature rise to below 2°C. As the world's fastest growing economy, China faces an enormous challenge in how it will meet growing energy demands while reducing emissions. Hosting the Olympics has provided Beijing with a great opportunity to test a range of approaches for rapid emissions reductions that can be useful for the country overall. Until recently, Beijing was the city with the highest energy consumption in China. Shanghai has recently taken its place.

According to the National Bureau of Statistics, in 2007 China consumed 2.65 billion tonnes of coal equivalent (TCE). Although Beijing's energy infrastructure is changing, currently, the city still relies heavily on coal. According to Beijing's Statistical Yearbook, in 2006 Beijing's resource expenditure total is 51.45 million TCE. However, China is in the process of reforming its energy structure towards cleaner and renewable energy sources, and these changes are perhaps most evident in Beijing. China's 11th Five-Year Plan on energy development states that the country aims to increase the share of natural gas in the primary energy mix from 2% to 5.3% by 2010 and up to 10% by 2020.<sup>54</sup> Beijing's ratio of natural gas consumption to total energy consumption increased from 0.5 % in 1997 to 7 % in 2007.<sup>55</sup> In 2000, the daily consumption of natural gas in Beijing equaled one billion m<sup>3</sup> and by the end of 2007, it equaled 4.7 billion m<sup>3</sup>.<sup>56</sup>

Growing awareness of the impact of emissions on climate change has prompted some policy changes to encourage the development of renewable energy for China. China's national target for renewable energy also aims to increase renewable energy up to 15% by 2020. Currently, China is already ranked as the world's third largest wind turbine producer. Domestically the installed capacity of wind power has doubled in each of the last three years. China is also one of the world's top three solar photovoltaic (PV) producers.<sup>57</sup>

To increase energy efficiency, China has set a goal of a 20% reduction in energy consumption per unit of GDP by 2010.<sup>58</sup> According to the Beijing Reform and Development Commission, during the Tenth Five Year Plan (2001-2005), Beijing's economy grew by 12 % annually, while its yearly energy consumption increased by only 5.9 %. Energy consumption per 10 000 RMB (1 370 USD)<sup>59</sup> of GDP decreased by 37.4 %, from 1.14 TCE in 2001 to 0.714 TCE in 2007, about 38 % lower than the national average.<sup>60</sup>

In relation to refrigerants, China has become the leading manufacturer of air-conditioners that use the refrigerant hydrochlorofluorocarbons-22 (HCFC-22), which is both ozone depleting and a potent greenhouse gas.<sup>61</sup> As a developing country, China has already phased-out chlorofluorocarbons (CFCs) as of July 2007 — 2.5 years ahead of the 2010 deadline for developing countries — and will phase out HCFCs, with fewer ozone layer damaging effects, by the end of 2030, as stated under the Montreal Protocol.<sup>62</sup>

53. Intergovernmental Panel on Climate Change (IPCC), <http://www.ipcc.ch/>

54. Binbin Jiang, "The Future of Natural Gas vs. Coal Consumption in Beijing, Guangdong and Shanghai: An Assessment utilizing MARKAL," September 2007. [http://lisd.b.stanford.edu/pubs/21967/Jiang\\_China\\_MARKAL\\_Working\\_Paper\\_62\\_REvised1.pdf](http://lisd.b.stanford.edu/pubs/21967/Jiang_China_MARKAL_Working_Paper_62_REvised1.pdf)

55. Beijing Daily, "Beijing's natural gas daily supply capacity increases to 47 million m<sup>3</sup> per day," <http://www.panva.com.cn/news/138/2008/05/14/83828.html>

56. "67% percent of days in Beijing meets Air Quality standards," Environmental Protection Bureau press release, December 30, 2007.

57. To learn more about China's renewable energy alternatives please see "Greenpeace's Energy Revolution: A sustainable China energy outlook," <http://www.greenpeace.org/raw/content/china/en/press/reports/energy-revolution.pdf>

58. "The National Eleventh Five-year Plan for Environmental Protection," [http://english.sepa.gov.cn/Plans\\_Reports/11th\\_five\\_year\\_plan/200803/t20080305\\_119001\\_3.htm](http://english.sepa.gov.cn/Plans_Reports/11th_five_year_plan/200803/t20080305_119001_3.htm)

59. The exchange rate from RMB into USD is based on the rate on December 31, 2005 (where 1USD=7.30RMB).

60. Chinese central government, "2007 figures for energy consumption per 10 000 RMB GDP," [http://www.gov.cn/gzdt/2008-07/14/content\\_1044364.htm](http://www.gov.cn/gzdt/2008-07/14/content_1044364.htm)

61. International Herald Tribune, "Accelerated Ban on Refrigerant Sought," March 15, 2007. <http://www.ihl.com/articles/2007/03/15/business/warm.php?page=2>

62. UNEP, "Beijing 2008 Olympic Games: An Environmental Review," p.70.

## Beijing Commitments

1. To reduce greenhouse gas emissions.<sup>63</sup>
2. At the Olympic Village and other Games venues, to use the largest amount of wind power, geothermal and solar energy possible in providing water heating and power to cut down on energy use.<sup>64</sup>
3. Cleaner energy will be supplied to the urban area for domestic usage and natural gas consumption will be increased by a factor of five by 2007.<sup>65</sup>
4. Geothermal and solar energy will be exploited for hot water supply (for the city). 160 geothermal wells will be added through an investment of 827 million RMB (100 million USD).<sup>66</sup>
5. Increase the annual capacity of electricity generated by windmills around Beijing from 125 million kWh to 1070 million kWh by 2008 (almost 10 times).<sup>67</sup>

## Greenpeace Guidelines

**Guideline 1** – Take all measures to minimize energy use in the overall eco-cycle of the development project at all stages – construction, use and maintenance of the development as well as re-use, recycling and deconstruction. Solar passive design, insulation, natural ventilation and energy-saving materials should be given preference. Heating, cooling, lighting and appliances are key areas where energy conservation or systems requiring no energy should be used.

**Guideline 2** – Eliminate the use of fossil fuel energy source (coal, oil, gas) and replace them with renewable energy sources such as solar, wind, hydro, wave, geothermal and bio-energy (energy from agricultural products, hot water systems and waste on site). Any use of nuclear energy must be banned.

## Ozone Depletion

**Guideline 7** – Ban building processes, products and servicing systems, insulation, refrigeration and air-conditioning that use ozone depleting gases such as HCFCs, CFCs and halons. Natural systems such as hydrocarbons, ammonia and water-and air-based systems should be used instead.

## Selected Achievements

### Greenhouse Gas Emissions Reductions and Energy

The incorporation of energy saving design and the promotion of alternative energy are all important achievements for Beijing. These achievements should act as a catalyst for future host cities to take a more proactive approach to promote the

development of clean renewable energy.

The most important initiatives are:

#### • GHG emissions reduction

According to official data from the Ministry of Science and Technology, the following emissions reductions were achieved in Olympic venues and facilities:

**Table 3**

CO <sub>2</sub> emissions saved by various Olympic projects in total	22 300 tonnes
Improvements to the transportation system in Beijing	19 700 tonnes
Clean fuel transportation used in the Olympic Green	600 tonnes
Solar power electricity generation and water heating systems	740 tonnes
Geothermal/ (reuse water pump system)	450 tonnes
Green lighting and energy saving lighting systems	830 tonnes

CO <sub>2</sub> eliminated by Beijing's energy saving projects	1.24-1.51 million tonnes
Olympics clean vehicle emissions (10 year life span)	130 000 tonnes
Solar power (25 year life span)	11 000 tonnes
Solar power water heating system (10 year life span)	16 000 tonnes
Green lighting (2 year life span)	17 000 tonnes
Geothermal reuse water heat pump system (10 year life span)	32 000 tonnes
Industry reduction of emissions	166 000 tonnes
Even/odd number vehicle control system	80 200-94 000 tonnes
City greening	65 000-203 000 tonnes

Source: 2008 The Hi-Tech Olympics Department of Development and Planning, Ministry of Science and Technology (MOST)

No substantial information is provided about how these emissions reductions were calculated. Many venues will also have to be tested for emissions during use at full capacity. Nevertheless these reductions reflect real measures taken to ensure that energy consumption is minimized through these Olympics initiatives.

### Olympic venues – energy efficient design and new technologies

**Solar Thermal Hot Water System** – This technology absorbs the sun's radiant energy and converts it into heat energy. A solar water heater pre-heats cold municipal water before it goes into a home's hot water tank. According to official data, Solar Thermal Hot Water Systems have been installed in the following venues.<sup>68</sup>

63. BOBICO, "Section Four: Environmental Protection and Meteorology" p.61.

64. BOBICO, "Section Four: Environmental Protection and Meteorology" p.57.

65. BOBICO, "Section Four: Environmental Protection and Meteorology" p.57.

66. BOBICO, "Section Four: Environmental Protection and Meteorology" p.61. Investment amount figure is provided in USD. The conversion to RMB is according to the exchange rate on January 07, 2001 when 1USD=8.27 RMB.

67. BOBICO, "Section Four: Environmental Protection and Meteorology" p.61.

68. BOCOG, "Beijing 2008: Environmental Protection, Innovation and Improvement 2001-2006 Update," p.106.



**The Olympic Village:** Homes in the Olympic Village have been equipped with 6000 m<sup>2</sup> of direct current vacuum tube rooftop solar collectors that will provide hot water for all of the residential and support buildings.

After the Games, this accommodation will be converted to residential housing for Beijing. The systems will continue to provide hot water for the residential housing and its associated buildings such as a preschool facility, clinics and an international center.

**Peking University Gymnasium:** The solar heating water system covering 300m<sup>2</sup> is capable of heating all the swimming pool facilities.

**Beijing Shooting Range Hall:** A solar collector of more than 31m<sup>2</sup> has been installed in the bathing facilities where 15-20 persons can bathe at the same time.

**Beijing Olympic Tower:** The office tower and BOCOG command center during the Games is equipped with a rooftop solar water heating system that can produce 10 tonnes of hot water per day for 200 showers. The light-heat conversion rate may reach more than 90%.

**Water heat pump system** – Heat pumps are systems designed to move heat from one source to a different location.

**Olympic Village:** Wastewater from the Qinghe Wastewater Treatment Plant is being used to power the heat pump system at the Olympic Village. 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 indoor air through fan-coil units in summer and through in-floor heating in winter.<sup>69</sup> This system can provide cooling/heating services to all residential buildings in the Olympic Village, which covers a total area of more than 400 000m<sup>2</sup>.

**National Indoor Stadium:** This building takes advantage of a single heat pump system with recharged shallow groundwater in a single well as its water source to supply cooling and heating required for tap water and air-conditioning.<sup>70</sup>

**Media Village:** The water for swimming facilities and bathing are heated by an air source heat pump and the solar water heating system.<sup>71</sup>

**Geothermal (ground source) heat pump air-conditioning and heating system** – Geothermal heat pump air-conditioning and heating is a highly efficient system that takes advantage of the earth's constant year-round temperature. Water flows through pipes laid underneath an open landscape area and passes into the building, where a heat pump either collects heat from the water (or uses its cooling effect, depending on the season), then sends it through a radiant floor system of cross-linked tubing.

**Shunyi Olympic Rowing and Canoeing Park:** A geothermal heat pump air-conditioning and heating system will be used to provide all of the air-conditioning and heating needs for the rowing and canoeing venues, central viewing areas, and the media center. This system will also provide heating for everyday hot water use. This system has an air-conditioning capacity of 1560 kWh, and a heating capacity of 1560 kWh.<sup>72</sup>

**Olympic Forest Park:** Geothermal heat pump technology is in use throughout 43 buildings in the Forest Park, covering an area of 59 976 m<sup>2</sup> of construction area.<sup>73</sup>

**Peking University Gymnasium:** Two sets of heat pump systems under this facility can exploit thermal energy from the soil to provide 310kW of cooling and 493 kW of heating to an area of around 300 m<sup>2</sup>.<sup>74</sup>

**Solar Photovoltaic (PV) Power Generation Systems** – Seven different Olympic venue projects have solar PV power generation systems. According to official figures, the central generation capacity of these stations has reached 621 kW, with an annual electricity production of 620 000 kWh. This is equal to a reduction of 242 tonnes/year of coal consumption, and a reduction of 630 tonnes/year of CO<sub>2</sub> emissions.<sup>75</sup>

**The National Stadium Solar PV system:** The National Stadium solar PV system has the capacity to generate 100 kW of electricity. Using domestically developed solar power technology, this system is capable of directly producing electricity for use by the power grid through a power inverter.<sup>76</sup> This system will light the underground garage and stadium.<sup>77</sup>

**Wukesong Stadium:** The Wukesong Stadium has a 100kW solar PV electricity generation station.<sup>78</sup>

69. UNEP, "Beijing 2008 Olympic Games: An Environmental Review," p. 65.

70. BOCOG, "Beijing 2008: Environmental Protection, Innovation and Improvement 2001-2006 Update," p.107.

71. BOCOG, "Beijing 2008: Environmental Protection, Innovation and Improvement 2001-2006 Update," p.107.

72. "Beijing: Olympic Water Park and Olympic Forest Park: Geothermal air-conditioning system." <http://www.51866.cn/Article/hyxx/hydt/200710/3763.html>.

73. 2008 The Hi-Tech Olympics Department of Development and Planning, Ministry of Science and Technology (MOST).

74. BOCOG, "Beijing 2008: Environmental Protection, Innovation and Improvement 2001-2006 Update," p.107.

75. 2008 The Hi-Tech Olympics Department of Development and Planning, Ministry of Science and Technology (MOST). May 21-25th, Beijing International Exhibition Center.

76. 2008 The Hi-Tech Olympics Department of Development and Planning, Ministry of Science and Technology (MOST). May 21-25th, Beijing International Exhibition Center.

77. BOCOG, "Beijing 2008: Environmental Protection, Innovation and Improvement 2001-2006 Update," p.105.

78. BOCOG, "Beijing 2008: Environmental Protection, Innovation and Improvement 2001-2006 Update," p.105.

**Fengtai Softball Stadium and Chaoyang Park Beach Volleyball venue:** Fengtai Softball Stadium also has a solar PV system with a 27 kW capacity comprising of 135 solar panels with 200kW capacity. The Chaoyang Park beach volleyball venue has a 40 kW electricity generation system.

**Olympic Forest Park:** A small solar photovoltaic power station with an area of 1 000 m<sup>2</sup> and a generation capacity of 65 kW<sup>79</sup> is currently being constructed at the south main gate of the Forest Park for energy provision and educational purposes and is scheduled to be completed in time for the Games.

**Renewable Energy and Efficient Lighting** – Grid-connected solar PV lighting systems have been used in and around seven Olympic venues, including the National Stadium. These systems have a total capacity of more than 600 kW and generate more than 580 000 kWh every year. They are estimated to reduce 570 tonnes of CO<sub>2</sub> every year.<sup>80</sup>

**Olympic Green:** Solar semiconductor illuminating lawn and street lighting have been installed throughout the Olympic Green. This solar lighting system captures solar energy in the daytime and uses it for illumination at night. The electricity generated by this system is used for 90% of the lawn and street lighting in the Olympic Green.<sup>81</sup>

**Various venues:** Low energy "Light Emitting Diode" (LED) lighting has been used in various venues such as the National Aquatics Centre (Water Cube), saving 60-70% of electricity use for the venue. This technology is also used for the indoor lighting in the multi-purpose broadcasting tower in the center of the Olympic Green.<sup>82</sup>

**Contract hotels:** BOCOG has also encouraged its contract hotels to switch to energy saving light bulbs. More than 20 000 efficient light products were purchased by a number of hotels.<sup>83</sup>



## Beijing's citywide energy initiatives (additional to venues)

### Technical renovation of large scaled plants

At the end of 2007, 16 000 large-sized coal-fueled boilers, had been converted to cleaner energy, such as natural gas (the majority) or LPG (Liquid Petroleum Gas) as well as clean renewable solar and geothermal energy. 44 000 smaller boilers were also upgraded to become more energy efficient. Upgrading industries should be viewed as a priority for Beijing as moving away from a heavy reliance on coal as a major energy source is needed for long-term emissions reductions.

### Geothermal wells for household heating

Between 1999-2006, Beijing invested 35.4 million RMB (4.53 million USD)<sup>84</sup> in geothermal wells to provide household heating. According to official data released by the Beijing Municipal Bureau of State Land and Resources, 118 plants were in operation by 1998 and 174 new geothermal wells were constructed between 1999-2006. Of the 174 new wells, 141 provide heating to the city. At the end of 2006, 6.6 million m<sup>2</sup> had been connected to the municipal geothermal well system, while 1.2 million m<sup>2</sup> were used for household heating. This is the equivalent of saving 180 000 TCE each year.<sup>85</sup>

### Wind energy development

The Olympics have played an important role in the development of wind power in Beijing and its surrounding areas. 20% of the Olympic venue electricity used during the Games will be purchased from clean wind sources supplied by the Guanting wind power station. This is Beijing's first wind power generation station with 33 wind turbines capable of generating 100 million kWh of electricity a year. The Guanting station is being constructed in time for the Games. According to Chinese news sources the electricity generated by this station is enough to meet the demands of 100 000 families per year.<sup>86</sup> According to the national Renewable Energy Law, a national subsidy has been put into place for renewable energy and municipal governments are also encouraged to provide their own special funding to support renewable energy. Renewable wind power used at the Games will be subsidized by 0.3RMB more per kWh.

### Energy efficient light initiative

Since the start of Beijing's energy saving "Green Lighting Program," Beijing has changed over seven million incandescent bulbs to energy saving CFLs in all elementary and high schools, care homes and across the rest of the city.<sup>87</sup>

79. BOCOG, "Beijing 2008: Environmental Protection, Innovation and Improvement 2001-2006 Update," p.117.

80. Department of Development and Planning, MOST, 2008 "the Hi-Tech Olympic exhibition catalogue." p.21.

81. Department of Development and Planning, MOST, 2008 "the Hi-Tech Olympic exhibition catalogue." p.22.

82. Department of Development and Planning, MOST, 2008 "the Hi-Tech Olympic exhibition catalogue." p.26.

83. BOCOG, "Beijing 2008: Environmental Protection, Innovation and Improvement 2001-2006 Update," p.64.

84. The investment figure was provided in RMB. The conversion to USD was calculated according to the rate on December 31, 2006 when 1USD=7.81 RMB.

85. UNEP, "Beijing 2008 Olympic Games: An Environmental Review" p.113-114.

86. China Daily, "Work starts on Beijing's wind power stations." [http://en.chinagate.com.cn/news/2007-07/24/content\\_8570146.htm](http://en.chinagate.com.cn/news/2007-07/24/content_8570146.htm)

87. Three Olympic ideals: Beijing Olympics Press conference. [http://www.china.com.cn/zhibo/2008-07/10/content\\_15982885.htm?show=t](http://www.china.com.cn/zhibo/2008-07/10/content_15982885.htm?show=t)

City government and enterprises have also teamed up to install solar lamps in various parts of Beijing. Official data from Beijing's Reform and Development Commission shows that there are 90 000 solar powered lamps in the city by 2007. The same municipal department has also pledged to install 20 000 more solar lamps across Beijing in 2008.<sup>88</sup> Greenpeace believes that Beijing should be recognized for introducing urban utilization of renewable energy such as solar street lamps to many regions of the municipality. This sets a good example for other cities in both developing and developed countries and should be widely extended through most cities with adequate solar resources.



Solar street lamps in Beijing.

## Refrigerants

The Beijing Government has made a concerted effort to reduce ozone-depleting substances (ODS) at the Games. Policies such as The "Environmental Protection Guidelines for Olympic Project," the "Environmental Protection Guidelines for the Renovated or Expanded Olympic Project," the "Environmental Protection Guidelines for Beijing 2008 Hotel Services," the "Environmental Protection Guidelines for Beijing 2008 Catering Services," and the "Environmental Protection Requirement Guidelines for Beijing 2008 Partners," have all prohibited the use of ODSs. BOCOG's "Environmental Protection Guidelines for Olympic Projects" clearly states that all the materials in the construction shall not contribute to ozone depletion. It also strongly suggests that ozone depleting CFCs be prohibited from air-conditioners, refrigerators, cleaning, and other coolant and foaming agents during development.<sup>89</sup>

Another major Olympics success is the step taken, after Greenpeace campaign initiatives, by Olympic sponsors, including Coca-Cola and McDonald's, to switch from ozone-depleting and GHG intensive refrigerants to cleaner alternatives.(See sponsor section below.)

## Missed Opportunities and Mixed Results

Although Beijing has to a large extent managed to escape the use of ozone-depleting refrigerants, it missed an opportunity to replace ODSs with climate-friendly natural refrigeration technology. Instead, the Games relied on HFCs, which although not ozone-depleting, are nevertheless GHGs that are thousands of times more potent than CO<sub>2</sub>.

Sponsors McDonald's and Yili also missed the opportunity to use the Games as a platform to widely showcase natural refrigeration technology. (See sponsor section below.)

## Greenpeace Recommendations – Beijing Games and Beyond

### Beijing Beyond 2008

Energy reductions have played an important part in Beijing's green Games commitment and the Games presented a unique opportunity for the city to experiment with state-of-the-art technology to minimize the environmental impact from the added energy demands of hosting such a mega event.

Beijing should be commended for its push for the development of wind energy near the city, solar electricity and hot water systems in many of the venues, as well as the promotion of energy efficiency measures from venue design to lighting for the Olympics. Use of new technologies such as geothermal heat pump heating and air-conditioning during the Olympics may be taken up more broadly beyond the Games. Beijing should be recognized for these efforts and for demonstrating that a rapidly growing developing city can successfully leap ahead of old polluting designs and systems when it is committed to environmental protection.

The Games have provided an impetus for Beijing to engage in major energy related measures. Investment in developing alternative energy sources, energy efficiency upgrades, and public transport are all commendable steps that Beijing has taken for the Games. However, in order to significantly reduce GHG emissions and to demonstrate a real commitment to environmental protection and clean energy alternatives, Beijing needs to undertake long-term aggressive energy reforms to move away from coal as its primary energy source.

Short-term investments in building energy efficient venues will ensure a reduction in emissions during the Games,

88. Star Daily. "Beijing adds 20 000 more solar lamps in 2008." <http://www.alighting.cn/News/14158/view.html>

89. BOCOG, "Beijing 2008: Environmental Protection, Innovation and Improvement 2001-2006 Update," p.71.

but Beijing needs to continue to invest in alternative and renewable energy resources, such as solar, wind, hydro, wave and geothermal sources, and to begin to pursue mandatory emissions reduction standards to take long-term action against climate change.

## China Beyond 2008

Although China does not yet have a mandatory emissions reduction target, the Chinese government has publicly acknowledged that developing countries need to play a bigger role in GHG emissions reduction. In its 11<sup>th</sup> Five-Year Plan, China has suggested that it will set a 20% energy consumption reduction target per unit of GDP by 2010 and China's new renewable energy laws have also set ambitious goals to increase renewable energy.

As China's economy continues to grow, it is imperative that cities across China follow in the footsteps of Beijing to reshape energy structures and to introduce successful energy saving technologies used at the Games. National building standards could also encourage integrating energy saving and clean energy features into building standards and design.

## Future Olympic Games - Recommendations to the IOC

Greenpeace encourages the IOC and future host cities to invest in the newest and most innovative approaches in energy efficient design and technologies including micro renewable energy generation, co-generation, radical energy efficient design, rooftop gardens, vertical gardens, night purging ventilation, and smart building shading.

IOC should strongly recommend that host cities use an existing, credible green building rating system that can help host cities best choose low or zero emissions and energy saving technologies and also to provide a credible reporting as well as evaluation system to measure results.

### Energy in context

- 4.5 tonnes of GHG pollution is equivalent in volume to one Olympic-sized swimming pool.
- The average household in the United States uses about 8 900 kWh of electricity each year.
- A 500 megawatt coal plant produces 3.5 billion kWh per year, enough to power a city of about 140 000 people. It also on average produces 3.7 million tonnes of CO<sub>2</sub>.<sup>90</sup>



Solar power panels on the Fengtai Softball Field office building.



# Transportation

As part of Beijing's climate change and air quality challenges noted above, transportation is an additional challenge for the city. For the Games, Beijing has introduced a number of cleaner energy transportation measures, most notably 3 759 compressed natural gas public buses, one of the largest fleets in the world.<sup>91</sup> Unfortunately, the number of motor vehicles has increased drastically in Beijing in recent years. By official estimates, the city will be home to roughly 3.35 million motor vehicles by the time the Games are held in August.<sup>92</sup>

Around 120 000 cars were added to Beijing's roads in the first quarter of 2008 alone, which is equal to adding around 1 300 vehicles to Beijing's roads every day.<sup>93</sup>

BOCOG estimates that there will be over 6.4 million visitors to Beijing for the Games.<sup>94</sup> This will add an estimated 1.3 million passengers/day to an already overburdened public transportation system.<sup>95</sup>

## Beijing Commitments

1. Implementation of a vehicle emission standard equal to EURO II for light vehicles by 2004. To strengthen car emission standards.<sup>96</sup>
2. By 2007 exhaust from new vehicles will be reduced by 60%.<sup>97</sup>
3. The daily capacity of the city's subway will be increased from 1.3 million people to 2.66 million by 2008.<sup>98</sup>
4. Public ground transport will rise to 19.5 million people/day.<sup>99</sup>
5. By 2007, 90% of buses and 70% of taxis will use clean fuels.<sup>100</sup>
6. For the Games, the city will build 292 liquid petroleum gas and natural gas stations.<sup>101</sup>
7. All transportation in competition venues and in the Olympic Village will use low or zero emission and low-

noise vehicles.<sup>102</sup>

8. Four new subway lines and an Olympics Line will be opened before the Olympics.<sup>103</sup>

## Greenpeace Guidelines

**Guideline 3** - Reduce the need for private transportation during the building process and during the use of the building(s) by concentrating developments in existing urban areas, using local resources and using facilities to their maximum potential.

**Guideline 4** - Establish a non-fossil fuel-based public transport infrastructure and promote individual non-polluting forms of transportation. Ensure that public education and incentives to use the system are planned from the beginning.

**Guideline 5** - Ban the use of fossil fuel-based transportation vehicles for public and official access to Olympic venues and other events.

## Selected Achievements

Beijing has taken some significant steps toward improving and expanding public transportation and increasing low-emission buses and taxis but most importantly, it has led the developing world in adopting some of the highest fuel emission standards for new vehicles.

## New standards for monitoring and reducing vehicle emissions

In 2001, Beijing introduced an environmental labeling system for vehicles. High emission vehicles that are below EURO I standard are identified with yellow labels, while green labels are provided to newer vehicles with more updated emission systems. Older vehicles with sub-

91. BOCOG, "Beijing 2008: Environmental Protection, Innovation and Improvement 2001-2006 Update," p.33.

92. Xinhua, "Vehicles in Beijing to reach 3.35 million during Olympics," March 27, 2008. [http://www.chinadaily.com.cn/olympics/2008-03/27/content\\_6571379.htm](http://www.chinadaily.com.cn/olympics/2008-03/27/content_6571379.htm)

93. Xinhua, "Vehicles in Beijing to reach 3.35 million during Olympics," March 27, 2008. [http://www.chinadaily.com.cn/olympics/2008-03/27/content\\_6571379.htm](http://www.chinadaily.com.cn/olympics/2008-03/27/content_6571379.htm)

94. People.com.cn, "Hotel reservations increase for the Games," <http://finance.people.com.cn/GB/6708550.html> (in Chinese)

95. BOBICO, "Section Four: Environmental Protection and Meteorology" p.57.

96. Beijing's Green Olympics Action Plan, <http://www.beijing2008.cn/bocog/environment/guidelines/n214067229.shtml> (in Chinese)

97. BOBICO, "Section Four: Environmental Protection and Meteorology" p.55.

98. BOBICO "Section Four: Environmental Protection and Meteorology" p.55.

99. BOBICO "Section Four: Environmental Protection and Meteorology" p.55.

100. Beijing's Green Olympics Action Plan, <http://www.beijing2008.cn/bocog/environment/guidelines/n214067229.shtml> (in Chinese)

101. Beijing's Green Olympics Action Plan, <http://www.beijing2008.cn/bocog/environment/guidelines/n214067229.shtml> (in Chinese)

102. BOBICO, "Section Four: Environmental Protection and Meteorology" p.57.

103. Beijing's Green Olympics Action Plan, <http://www.beijing2008.cn/bocog/environment/guidelines/n214067229.shtml> (in Chinese)

standard emission systems are slowly phased out as well as limited from entering the city center.

From March 1<sup>st</sup> 2008, Beijing initiated a new EURO IV standard, two years ahead of schedule specifically for the Olympics. Beijing was the first Chinese city to implement this stringent standard.<sup>104</sup> The EURO IV standard is the fourth stage of emission and testing standards for vehicle emissions including hydrocarbon (HC), NOx, carbon monoxide (CO) and PM.<sup>105</sup> These standards are amongst the most rigorous in the world for new vehicles, and by some comparative models, Beijing's new standard are more stringent than those for Australia, Canada, California,<sup>106</sup> and the U.S.<sup>107</sup> Beijing's car emission standards implementation schedule has occurred over a shorter period of time compared to Europe and is quickly catching up with European standards.<sup>108</sup> Beijing's move from EURO III in 2005 to EURO IV in 2008 ahead of schedule is estimated to deliver an overall 50% reduction in emissions.<sup>109</sup> Europe is currently making the switch to a new EURO V standard in late 2008/early 2009.

## Public Transportation

With the addition of four new subway lines and an Olympics Branch Line (which will run from Line 10 to Olympic venues), according to official data, Beijing's total subway capacity will increase from 1.3 million in 2000 (with lines one and two) to 3.9 million by 2008.<sup>110</sup> The new lines are Line 13, Line 5, Line 10, the Olympics Branch Line and the Airport Line. Line 13 was completed in January 2003 and Line 5, which runs for a total length of 27.5 km, has been in operation since October 2007. Phase I of Line 10 (about 24.6 km) is scheduled to open in July 2008, while the Airport Line (about 24.5 km) is currently under construction and is scheduled to open in July 2008. The Olympic Branch Line, running through Olympic venues (4.3 km) was scheduled for trial operation in June 2008. The addition of these new lines has been enthusiastically received by Beijing residents and as of June 2008, the new lines were running at capacity during peak

hours. Beijing has also cut subway and public bus fares to encourage public transportation use.

From 2001 to 2006, Beijing has replaced or refitted more than 47 000 old taxis and 7 000 old diesel buses out of around 65 000 taxis and 19 000 buses to lower emissions natural gas.<sup>111</sup>

Beijing now boasts one of the world's largest compressed natural gas (CNG) bus fleets in the world.<sup>112</sup> By 2006 Beijing had put 3 759 CNG buses into operation.<sup>113</sup> Public ground transportation reached a total of 19 million passengers per day.<sup>114</sup>

## Low emission and noise vehicles inside the Olympic Village

Environmental friendly buses will operate in and around the Olympics venues<sup>115</sup>

Table 4

Name	Description	Number
Hydrogen fuel-cell buses	Please see below.	3
Li-ion battery-powered buses	Scheduled to run in the three loop lines in the Olympic village, the northern area of the arena and the press village.  The 50 electric buses for the Beijing Olympics will be the largest number of their kind in the Games.  There will be a recharge stations covering 5 000 m <sup>2</sup> for the buses in southwest Beijing	50
Dongfeng hybrid electric public buses	Scheduled to run in Beijing Olympics Central city area	15
Jiefan brand hybrid electric buses	Scheduled to run in the Athlete's Village and three other Olympic routes	10
Dongfeng pure electric venue vehicles	Scheduled to run in the Athlete's Village and three other Olympic routes	500

104. Beijing Environmental Protection Bureau. <http://www.bjepb.gov.cn/bjhb/tabid/68/InfoID/15382/ftid/426/Default.aspx> (in Chinese)

105. "What is National IV emission standard?" <http://auto.163.com/08/0119/00/42HF0M5J00082HLJ.html> (in Chinese)

106. In the United States, emissions standards are regulated nationally through the Environmental Protection Agency (EPA), however California has introduced its own set of stricter emission standard guidelines, which are managed by the California Air Resources Board (CARB). Other states may choose to follow either the national or California standards. States currently following California's standard (otherwise know as CARB) include Maine, Massachusetts, New York, Oregon, Vermont and Washington.

107. Although different emission standards developed by nine different regions in the world are not easily comparable due to differences in policy, approaches, test drive cycles and units of measurement, some studies have developed a methodology to compare these programs. The "Comparison of passenger vehicle fuel economy and greenhouse gas emission standards around the world," prepared by Feng An and Amanda Sauer for the Pew Center on Global Climate Change, concludes that in terms of fuel economy and GHG emissions the new Chinese Standards are more stringent than those in Australia, Canada, California and the United States, but they are less stringent than those in the European Union and Japan. For the detailed study please see: [http://www.pewclimate.org/docUploads/Fuel%20Economy%20and%20GHG%20Standards\\_010605\\_110719.pdf](http://www.pewclimate.org/docUploads/Fuel%20Economy%20and%20GHG%20Standards_010605_110719.pdf)

108. The move from the initial Economic Commission of Europe (ECE) 1503 Standard to EURO IV in Europe took place from 1979 to 2003, 24 years, while in China the same implementation process took place from 1994 to 2008, 14 years. BOCOG, "Beijing 2008: Environmental Protection, Innovation and Improvement 2001-2006 Update," p.33.

109. Beijing Environmental Protection Bureau. <http://www.bjepb.gov.cn/bjhb/tabid/68/InfoID/15381/ftid/426/Default.aspx> (in Chinese)

110. UNEP, "Beijing 2008 Olympic Games: An Environmental Review," p.101.

111. UNEP, "Beijing 2008 Olympic Games: An Environmental Review" p.102.

112. UNEP, "Beijing 2008 Olympic Games: An Environmental Review" p.102.

113. BOCOG, "Beijing 2008: Environmental Protection, Innovation and Improvement 2001-2006 Update," p.33.

114. UNEP, "Beijing 2008 Olympic Games: An Environmental Review," p.102.

115. Ministry of Science and Technology. "Science Popularization Manual of Electric Vehicles" The 2008 Hi-tech Olympics Exhibition.



A zero-emission hydrogen bus pilot project launched by the Global Environment Facility (GEF), UNDP, and the Chinese Government was launched in 2003 to introduce low emissions fuel cell buses (FCBs), or otherwise known as hydrogen fuel cell buses, in China's urban areas. This project aims to reduce GHG emissions and air pollution as well as to demonstrate the viability of operating FCBs in a developing country. According to the UNEP, three FCBs were purchased and have been operating in Beijing since June 2006. As a part of the FCB project, the Beijing Hydrogen Re-fuelling Station was built within the Beijing Hydro Demo Park and began operations in the same year. These three buses will be used to transport international and national athletes within the Olympic compound during the Games and will also serve to raise public awareness about low-emission transport solutions.<sup>116</sup>



### Public and free transportation during the Games

BOCOG is encouraging public transportation use in Beijing throughout the Games. Those with tickets to Olympic events can travel throughout the city free of charge. Free public transportation for ticket holders will last for 51 days.<sup>117</sup>

According to the UNEP "Beijing 2008 Olympic Games: An Environmental Review" report, a fleet of 200-300 bicycles will be available in the Olympic Park and Olympic Village for visitors during the games.

### Missed Opportunities and Mixed Results

Beijing has made great strides in introducing cleaner energy vehicles for the Games. However, given Beijing's problems with air quality caused by the rapidly increasing number of private vehicles, Beijing could have taken more aggressive measures to tackle the fast increasing car ownership rate in the city. Beijing could have also acted earlier to construct

mass transit systems to reduce reliance on private vehicles. As well, Beijing could have taken more opportunities to develop bicycle lanes in major city planning projects. Beijing could have also introduced higher licensing fees for private vehicles to limit the number of private vehicles on the road, measures already taken by other Chinese cities such as Shanghai.

## Greenpeace Recommendations – Beijing and Beyond

### Beijing Beyond 2008

Hosting the Olympic Games presents a unique opportunity for Beijing to introduce state-of-the-art technology to meet the transport demands of a mega event and the growing transport needs of a fast developing city. Greenpeace strongly recommends Beijing to continue to focus on low-emission public transport options for the city long after the Games.

In addition, with up to eight million bicycles in the city, Beijing residents are one of the biggest groups of bicycle users in the world. As Beijing develops, aside from investments in public transportation, Greenpeace strongly recommends the city to actively support, encourage and enable bicycle use as a major aspect of its transportation plan. Bicycle use has the potential to provide both environmental and health benefits for residents as well as being a low-cost transport option. Development of mass transit systems is the only way for large cities such as Beijing to tackle pollution caused by vehicles and traffic congestion. Beijing needs to continue to promote mass public transport and move away from building highways for private vehicles in its future development in order to set an example for other Chinese cities to follow.

### China Beyond 2008

Beijing's transportation planning model focused first on developing highways and infrastructure for automobiles ahead of developing a comprehensive system of mass public transit. Other Chinese cities should learn from Beijing's mistakes and prioritize public transportation development from the beginning stages of development.

### Future Olympic Games - Recommendations to the IOC

The IOC should highly encourage the development of mass transportation systems as well as to promote bicycle use in Olympic venues to minimize the negative impact of the Games on a city.

116. UNEP, "Beijing 2008 Olympic Games an Environmental Review," p.105.

117. UNEP, "Beijing 2008 Olympic Games an Environmental Review" p.57.

## Water and Sewage Treatment



Located inland on a dry plateau in China's northeast region, Beijing is a city that struggles with severe water shortages. Beijing's water availability per capita is just 1/32 of the international average level.<sup>118</sup> In 2007, Beijing's annual water consumption reached 3.4 billion m<sup>3</sup>.<sup>119</sup>

The Olympic Games will greatly increase the city's demand for water. An increase of 4.7 million m<sup>3</sup> in domestic water use is expected during the Games.<sup>120</sup> According to *Nanfeng Chuang* Magazine, over 300 million m<sup>3</sup> of water from four major water reservoirs in Hebei — the Huangbizhuang reservoir and the Gangnan reservoir in Shijiazhuang municipality and the Wangkuai reservoir and the Xidayang reservoir in Baoding municipality — will be set aside and diverted to Beijing to change the water in its artificial lakes and rivers in order for the city to have clear lakes during the Games.

Beijing's water comes from two major reservoirs — the Miyun Reservoir and Huairou Reservoir, which are both situated to the northeast of the city. The Miyun Reservoir provides Beijing with most of its drinking water, and the Huairou Reservoir provides water for agriculture.

The Beijing Water Authority was established in 2004 to manage water quality and capacity. The Beijing Environmental Protection

Bureau is charged with protecting and managing water sources. Working together, the two agencies are responsible for guaranteeing water sources, quality, and supply for the city.<sup>121</sup>

According to a *Beijing Daily* Report, Beijing will benefit from some 480 million m<sup>3</sup> of recycled water in 2007, about 14% of total water consumed in Beijing that year, and the quantity is expected to increase to 600 million m<sup>3</sup> in 2008 through citywide initiatives.<sup>122</sup>

Beijing has instituted major water projects to divert water from neighboring provinces in order to feed Beijing's increasing water demand. A water redirection project will take water from Hebei Province via a 225 km canal to move over 300 million m<sup>3</sup> of water to Beijing. This project was scheduled for completion in April 2008.<sup>123</sup> Greenpeace was unable to confirm the completion of this project.

A number of new Olympic venues and refurbished venues such as the National Stadium (Bird's Nest), the Olympic Green, and the Olympic Forest Park include water saving design including rainwater collection, water efficiency, water re-use and water recycling features to reduce water demand during and after the Games.

In Beijing, the Games have provided an opportunity to develop the city's sewage treatment structures. According to official sources, by May 2007, nine out of 14 planned sewage treatment plants have been built and the five remaining ones are under construction.<sup>124</sup>

### Beijing Commitments

1. Beijing's drinking water will meet WHO standards.<sup>125</sup>
2. The drinking water source areas will be continuously protected.<sup>126</sup>

118. China Daily. "Project to increase Beijing's water supply." Updated: 2004-08-19 [http://www.chinadaily.com.cn/english/doc/2004-08/19/content\\_366665.htm](http://www.chinadaily.com.cn/english/doc/2004-08/19/content_366665.htm)

119. Beijing Water Authority. 2007 Beijing water projects summary. <http://www.bjwater.gov.cn/tabid/134/Infoid/13694/frtid/133/Default.aspx>.

120. China's Environment in 2006: Changes and Struggles. "How should Beijing cope with water shortage when hosting the 2008 Olympic Games." Social Science Academy Press, 2006.

121. UNEP. "Beijing 2008 Olympic Games: An Environmental Review," p.117.

122. BOCOG Media Center. "Beijing Benefits from Recycled Water." <http://en.beijing2008.cn/58/89/article214028958.shtml>.

123. People's Daily. "South-North Water Diversion emergency water diversion channel has been completed." <http://env.people.com.cn/GB/7107878.html> (in Chinese).

124. BOCOG. "Beijing improves water quality." <http://en.beijing2008.cn/57/06/article214070657.shtml> (in Chinese)

125. BOBICO, "4 Environmental Protection and Meteorology" p.57.

126. BOBICO, "4 Environmental Protection and Meteorology" p.57.

3. Guanting Reservoir's water quality will be gradually cleaned and restored to drinking water quality. A water diversion project to reduce leakage and to increase channel water rate, strengthen surface water and ground water integration will be completed.<sup>127</sup>
4. Water-saving facilities and non-flush toilets will be used, and rainwater collection and reuse systems will be installed in competition venues and the Olympic Village.<sup>128</sup>
5. The daily capacity for sewage treatment for the city of Beijing was 1.08 million tonnes as at 1999 and will rise to 2.8 million tonnes in 2008, which equals 90% of the sewage generated at the time of the Games. The reuse rate of treated water for Beijing will reach 50% by 2008.<sup>129</sup>

### Greenpeace Guidelines

**Guideline 18** - Use sustainably managed water management techniques, practices and products to avoid the exploitation of new water sources. Water conservation, selection of native plants and recycling options should be used whenever possible.

**Guideline 19** - Restore natural water cycles in the development area, minimize run-off and stormwater by establishing systems that retain, re-use and recycle water on-site.

### Selected Achievements

#### Olympic site

BOCOG has made a number of significant achievements related to water saving and sewage treatment to allow treated water to be used at the Olympic site. These achievements include:

According to official statistics, 15 projects including the National Stadium (Bird's Nest), Olympic Green, and Wukesong Baseball Field have incorporated rainwater collection systems, capable of making use of about one million tonnes of rainwater.<sup>130</sup>

#### Olympic Forest Park:

The Park contains an advanced enclosed water circulation

system. Official figures say that about 1.34 million m<sup>3</sup>, or about 95% of rainwater inside the park can be reused for irrigation.<sup>131</sup> This system will also support an ecological wetland area designed for educational purposes. During drought periods, reused water will come from the Qinghe Wastewater Treatment Plant.

Sewage and human waste derived from visitors are treated using advanced composting and source separation methods that allow the waste to return to the park as fertilizer. All park toilets will make use of these advanced technology.



Olympic Forest Park

#### Olympic Green:

According to official sources, the Olympic Green has a systematic and comprehensive rain gathering water reuse technology that has a collection coverage area of 97 hectares. The water reuse rate at the Olympic Green has reached 80%. Each year this system replenishes about 320 000 m<sup>3</sup> of ground water, which also adds about 90 000 m<sup>3</sup> to the water system. The reused water can provide up to 50 000 m<sup>3</sup> of water for irrigation of the grounds.<sup>132</sup> All wastewater from the Olympic Green – will be recycled at Qinghe and Beixiaohu Wastewater Treatment Plants. The treated water will be used for landscape irrigation and toilets in the Olympic Green.

#### Bird's Nest:

China's first rainwater recycling system has been installed in the stadium. The system use underground collecting facilities that can process up to 100 tonnes of rainwater per hour, 80 tonnes of which can be re-used for landscaping, fire-fighting and stadium cleaning.<sup>133</sup>

127. Beijing's Green Olympics Action Plan, <http://www.beijing2008.cn/bocog/environment/guidelines/n214067229.shtml> (in Chinese)

128. BOBICO, "4 Environmental Protection and Meteorology" p.57.

129. BOBICO, "4 Environmental Protection and Meteorology" p.57.

130. "The 14th session of the capital city planning exhibition on building design" Catalogue. p.5. Organized by the Beijing Municipal Planning Commission and the Beijing "2008" Project Construction Headquarters Office.

131. Beijing Evening news. "Following natural design. Introduction to the Olympic Forest Park." <http://2008.sohu.com/20080626/n257762151.shtml>

132. "The 14th session of the capital city planning exhibition on building design" Catalogue. p.94. Organized by the Beijing Municipal Planning Commission and the Beijing "2008" Project Construction Headquarters Office.

133. 7th World Conference on Sport and the Environment brochure" p.29.

#### Water treatment system at Olympic Venues:

The sewage and wastewater reuse systems at the Olympic site use various treatment methods for water processing such as the Fixed Activated Sludge Treatment (FAST) wastewater system<sup>134</sup> which uses cultivated microorganisms to digest the wastewater to transform it into a clear, odorless and high-quality effluent. FAST has obtained certification from the Canadian Great Lakes water quality standard (the most stringent marine standard in the world).<sup>135</sup> Another technology that is used for wastewater treatment is the Membrane Biological Reactor (MBR).<sup>136</sup> These technologies have allowed some venues to achieve “zero-waste.”

Each of the five venues including the National Aquatics Center (Water Cube), the Shunyi Water Park, the Olympic Tennis Center, the Olympic Forest Park, and the Olympic Center all have wastewater treatment systems, with a treatment capacity of one million tonnes in total.



Qinghe Wastewater Treatment Plant

#### Beijing

Beijing plans to build 14 Wastewater Treatment Plants from 2001-2006. In 2006, the newly constructed sewage disposal plants' daily disposal capacity reached 2.9 million tonnes.<sup>137</sup>

According to the UNEP's Environmental Review, the central government has also closed down heavily polluting

enterprises in the catchment area close to the reservoir to guarantee the quality of water supply to the city.<sup>138</sup> Official sources report that in order to ensure that the quality of water from Miyun and Huairou Reservoirs will continue to meet portable water standards, relevant government authorities have banned illegal construction and fish farming, closed down small mines on the upper stream, as well as developed rural sanitation facilities in the protection zones for ground water resources.<sup>139</sup>

#### Missed Opportunities and Mixed Results

Water efficiency is the most effective way to reduce water demand. Upgrading outdated water infrastructure is vital to ensuring efficiency. The Olympics offered Beijing a great opportunity to improve the efficiency of its water infrastructure to meet increased demand from the Games. While innovative water reuse technologies were installed in Olympic venues, more could have been done to incorporate these technologies in infrastructures more broadly across the city. Such initiatives would reduce water demand and improve water efficiency.

In many cases, although water reuse technologies were introduced into venues, they did not go far enough to ensure that the Games had a minimal impact on the city's precious water supply. The Shunyi Olympic Rowing and Canoeing Park, the third largest venue in the Games, is one such example. This venue is designed with water saving features: it combines rowing and canoeing venues into one facility — a first for any Olympic Games, in an attempt to minimize Olympic water demands. There will also be a 72 000 m<sup>3</sup>/day water treatment plant in the facilities for water re-use. However, this venue still draws a vast amount of water from the Miyun water reservoir.<sup>140</sup> This large, water-demanding venue should have gone further to eliminate its reliance on precious water sources.

Water conservation and reuse is particularly important for Beijing due to the city's large dependency on water diversion and groundwater to meet the city's demand, thereby creating water shortage problems for other regions.

Furthermore, according to official statements, the Beijing Municipal Water Authority announced in 2007 that water in the capital had passed all 106 tests for contaminants as

134. For more information on the FAST wastewater treatment technology please see U.S. Environmental Protection Agency. <http://www.epa.gov/NE/assistance/ceitts/wastewater/techs/fast.html>

135. U.S. Environmental Protection Agency. <http://www.epa.gov/NE/assistance/ceitts/wastewater/techs/fast.html>

136. For more information on one system of water treatment technology please see <http://www.chinawater.net/chinaWaterToday/viewpaper.asp?id=5884>

137. BOCOG, "Beijing 2008: Environmental Protection, Innovation and Improvement: 2001-2006 Update," p.42.

138. UNEP, "Beijing 2008 Olympic Games: An Environmental Review," p.120.

139. BOCOG, "Beijing 2008: Environmental Protection, Innovation and Improvement: 2001-2006 Update," p.39.

140. UNEP, "Beijing 2008 Olympic Games: An Environmental Review," p.68.



required by new national standards. Fan Kangping, director of the Water Quality Center of Beijing Waterworks Group, said the city's water had been potable since 2003.<sup>141</sup> However, due to secondary pollution caused by the estimated 7 000 km of underground pipes, authorities acknowledge that when water reaches residents, it often has a metallic taste. The Beijing municipal government should upgrade major water pipes in the city as well as pass strong legislation requiring private buildings to upgrade their piping systems to ensure water quality at the reservoir is of similar quality when it reaches individual homes.

### Greenpeace Recommendations – Beijing Games and Beyond Beijing Beyond 2008

To ensure water supply for Games venues is a huge burden for any city, perhaps even more so for a city affected by persistent water shortage such as Beijing. After the Games, Beijing should increase efforts to maximize water efficiency, water recapture, treatment and reuse as well as improve existing infrastructure to ensure a secure future for water supply to support a growing city. Beijing should also continue to protect its water source as well as pass relevant policies for industry to push them towards clean production and to regulate agro-chemicals to ensure water source quality.

The preparation process for the Games have also highlighted water resource problems in the region. Water scarcity is a growing global concern. At this year's World Economic Forum in Davos, Switzerland, UN secretary Ban Ki-moon warned

that water stress poses a risk to economic growth, human rights, health, safety and national security. Both international and domestic media such as *Nanfeng Chuang* and the *Associated Press*<sup>142</sup> have reported on the impact of long-distance water diversion projects on Beijing's neighboring regions. Greenpeace urges Beijing to radically re-think the city's long-term water consumption and conservation policy to avoid negatively impacting other regions.

### China Beyond 2008

Successful water treatment, re-use and rain collection technologies used at the Games should be applied widely to other Chinese cities as much as possible, especially in areas that have struggled with severe drought in the past. Furthermore, China's northeast region should take a critical look at its water projects to ensure that attempts to supply China's urban centers will not affect access to water for rural areas, agricultural water, water safety and security for future generations.

### Future Olympic Games - Recommendations to the IOC

The IOC should strongly promote a wide application of state-of-the-art technologies to minimize demand on water resources in all future Games venues. Sustainable water management techniques should also be applied to new infrastructure and buildings in and around host cities. Future Olympic host cities should be strongly discouraged from bringing water in from distant regions to meet increased water demands due to the environmental and economic burdens on other areas.



141. China Daily. "Beijing tap water now safe to drink." July 4th, 2007. <http://en.beijing2008.cn/news/olympiccities/beijing/n214105640.shtml>

142. Associated Press. "Group criticizes Beijing water diversion plans." [http://news.findlaw.com/ap/i/1104/06-26-2008/20080626083503\\_059.html](http://news.findlaw.com/ap/i/1104/06-26-2008/20080626083503_059.html)

## Forests

Despite the necessity of forest protection being widely recognized, the rapid pace of deforestation still remains a global concern for all governments — and China is no exception. Deforestation is a primary cause of diminishing biodiversity, ecological degradation, flooding, and soil erosion. A report from the IPCC states that deforestation also contributes greatly to global climate change.<sup>143</sup> Unfortunately, virgin forests around the world, especially tropical rainforests, are still logged heavily to meet the current unsustainable demands of economic development. Every two seconds, a forest area the size of a soccer field vanishes.<sup>144</sup> As the world's largest log importer, China has a great responsibility to work with international organizations and other governments to protect the world's endangered forests.



As one of the largest developing countries, in recent years, China has demonstrated some willingness to share responsibility for the world's global environmental problems. Aside from some memoranda of understanding signed with countries such as Indonesia and the United States which

commit the parties to collaborate on tackling the issue of illegal logging and trade, there are no national or provincial timber purchasing policies in place in China. While China has been proactive in many multilateral and bilateral wood purchasing processes, the Chinese government has not introduced a national wood procurement policy or implemented processes to trace the origin of timber entering the country. The Chinese government needs to strengthen their work in this area.

At the same time, the Chinese government has begun encouraging governmental departments to adopt green procurement policies in order to set an example for industries and to raise social awareness around sustainable purchasing. The Department of Finance and the State Environmental Protection Administration has released a "Preferential Purchasing Guideline for Products with Environmental Labeling" for governmental departments.<sup>145</sup> However, these guidelines do not require the origin of timber to be legally verified nor do they suggest a preferential FSC-certified timber procurement process. The issue of whether or not to adopt or to widely implement FSC standards in China is still being debated amongst governmental departments. Thus currently, FSC, an internationally recognized timber certification system, has not been widely adopted in China's domestic markets or been taken up amongst industries heavily involved in exporting timber products to overseas markets.

Although BOCOG released an "Environmental Protection Guidelines for Olympic Project" in 2002, these guidelines do not suggest sustainable wood purchasing or require that a tracking system be implemented to trace where wood products are sourced. However, in a May 30, 2006 press release regarding whether or not Olympic venues would use timber sourced from the tropical forests of Indonesia, BOCOG clearly presented their position in support of following the principals of the green Games. BOCOG took a strong stance and opposed the use of virgin timber and supported the use

143. United Nations Food and Agriculture Organization. Global Forest Resources Assessment, 2005. [www.fao.org/forestry/fra2005](http://www.fao.org/forestry/fra2005)

144. United Nations Food and Agriculture Organization. Global Forest Resources Assessment, 2005. [www.fao.org/forestry/fra2005](http://www.fao.org/forestry/fra2005)

145. Department of Finance and the State Environmental Protection Administration "Implementing environmental labeling on government procured products" guidelines. <http://www.ccgp.gov.cn/purcjlaw/hongtou.jsp?condition=822>



of construction materials that will have a minimal impact on the environment and human health. This is the first time that the Chinese government has issued a specific purchasing guideline aimed at protecting virgin forests. However, due to the fact that these were only guidelines, and given the inadequate opportunities for independent assessment, Greenpeace is unable to confirm whether or not timber used for the construction of Olympics venues and related competition facilities meet BOCOG's guidelines.

BOCOG outlined a series of greening projects for both Olympic venues and the city of Beijing. These include an ambitious plan to develop an Olympic Forest Park, to carry out greening near five major waterways as well as along highways. BOCOG also commits to improve forest coverage in mountain areas.

### Beijing Commitments

1. Lumber obtained directly from virgin forests should be prohibited.<sup>146</sup>
2. Forest coverage in mountain areas will reach 70%.<sup>147</sup>
3. Trees and grasses with a total area of 23 000 hectares will be planted along the banks of the five waterways and the sides of the 10 [major] highways.<sup>148</sup>
4. Green belts with a total area of 12 000 hectares will be built within the urban area.<sup>149</sup>
5. The green coverage of the lands for construction projects for the Games will reach 40%-50%. A 760-hectare green land will be created in the Olympic Green.<sup>150</sup>

### Greenpeace Guidelines

**Guideline 8** - Use timber from Forest Stewardship Councils (FSC) certified sources wherever possible. Maximize the use of recycled timber.

### Selected Achievements

#### Reforestation and greening

##### Olympic Forest Park:

The Olympic Forest Park is located directly north of the Olympic Green and occupies an area of 680 hectares, about 1.5 times the size of Central Park in New York City, with 475 hectares of green space. The Olympic Park is able to

accommodate 5.3 million visitors annually, with the capacity of reaching 40 000 visitors daily. During the Games, the southern gardens will be open to athletes and participants of the Olympic Games, and the Forest Park is scheduled to be open to the public after the Games.

#### Disposable Wood Products

In the "Environmental Protection Guidelines for Beijing 2008 Catering Services," BOCOG has stated that catering companies should not use disposable chopsticks.<sup>151</sup> However, Greenpeace has been unable to confirm whether or not this policy has been successfully implemented.

### Missed Opportunities and Mixed Results

#### Procurement Policy

Although the guidelines for purchasing has provided an excellent example for the 2008 Games, due to a lack of transparency and a lack of third party auditing, Greenpeace was unable to confirm the effectiveness of this guideline in practice. Furthermore, Beijing has not produced a stringent and mandatory set of timber purchasing guidelines for its Olympic venues. Beijing missed an excellent opportunity to show its commitment to sustainable forestry by developing a clear and specific policy and to openly disclose where its timber was sourced.

Beijing has also missed an opportunity to establish a more stringent set of wood purchasing standards. Beijing could have furthered its greening effort to exclusively use FSC-certified timber in Olympic venues, as the Sydney organizing committee did during the 2000 Games. If BOCOG had used FSC-certified timber they could be certain that all timber utilized in Olympic venues had been legally and sustainably sourced. The lack of a binding procurement policy and a lack of independent auditing mean that there is no third party confirmation of timber sources.

#### Greening and treeplanting

Although Beijing has made efforts to "green" the city through reforestation projects to provide a more livable urban space and these efforts are to be commended, this cannot be substituted for policies that conserve ancient forests and complex ecological systems.

Furthermore, Greenpeace has discovered that Beijing's new greening process has widely introduced exotic species to

146. BOCOG, "Beijing 2008: Environmental Protection, Innovation and Improvement 2001-2006 Update," p.97.

147. BOBICO, "Section Four: Environmental Protection and Meteorology" p.59.

148. BOBICO, "Section Four: Environmental Protection and Meteorology" p.59.

149. BOBICO, "Section Four: Environmental Protection and Meteorology" p.59.

150. BOBICO, "Section Four: Environmental Protection and Meteorology" p.59.

151. BOCOG, "Beijing 2008: Environmental Protection, Innovation and Improvement 2001-2006 Update," p.67.

the region, namely, *Rhus typhina* L.<sup>152</sup> In greening efforts, the mass plantation of a single species, as well as large scale irrigation, use of pesticides and fertilizers can all bring negative impacts to the local ecosystem.

## Greenpeace Recommendations – Beijing and Beyond

### Beijing Beyond 2008

Beijing municipal government is in a good position to further the legacies of the Games by adopting a green procurement policy. Furthermore, in reforestation projects, the government should use domestic species, and avoid exotic species or transgenic organisms.

### China Beyond 2008

The Chinese government should adopt a set of stringent internationally recognized purchasing standard, and ban the purchasing of illegal or unsustainable timber products. The government should also adopt a set of preferential purchasing policy to promote the use of FSC-certified and recycled timbers.

Government procurement and bidding processes should

encourage professional third party organizations to confirm that green purchasing policies are implemented. Governments should also publicize relevant information for third party scrutiny and consumer education purpose, as well as encourage the industry and market to move towards responsible purchasing.

### Future Olympic Games - Recommendations to the IOC

In order to make sure that these goals are carried out in practice, the IOC needs to pass binding policies that ban the use of illegal timber in Olympic venues. These cities should also be required to adopt mandatory timber purchasing policies for Olympic construction. These procurement policies should be made public, involving open and transparent communications with independent assessors and/or NGOs focused on forest protection.

Olympic host cities should adopt a clear, thorough and accessible Construction Materials Guide. This guide should be made available prior to selecting contractors to ensure that FSC-certified timber or other environmentally sound material is used as widely as possible.



Workers landscaping at the Olympic Forest Park.

## Toxic Materials and Waste Management

BOCOG set ambitious waste management commitments and saw the Olympics as a way to kick-start improving waste management in the city.

The environmental department of BOCOG in charge of waste management during the Games has set out a "Venue Cleaning and Waste Management Operation Outline" that includes various waste management standards, policies, and procedures.

In 2004, the primary method of the treatment of waste was 89.6% landfills, 5.8% composting and 4.6% incineration. At the end of 2006, Beijing had 23 domestic waste disposal facilities. Of the 23 existing facilities six are domestic waste transfer stations, 13 are landfills and four are comprehensive processing plants. Only three stations, the Shunyi Comprehensive Processing Plant, The Nangong Composting Plant and the Huairou Comprehensive Processing Plant offer composting service. According to official figures, 4.13 million tonnes were produced in the eight central districts, where overall processing capacity was close to 3.989 million tonnes (processing rate: 96.5 %).<sup>153</sup> By 2008, the Beijing municipal government plans to build 15 new garbage treatment facilities to process 12 500 tonnes of waste daily. This includes three new landfills, seven new comprehensive processing plants, three new incineration plants, and two transfer stations.<sup>154</sup>

In 2003, Beijing introduced its first incineration plant in Gaoantun, which can process about 1600 tonnes of waste per day.<sup>155</sup> Beijing authorities see the introduction of waste incineration plants as a gain for the city as they use the latest German technology to treat flue gas while eliminating the amount of land taken up by landfills. It is reported that by 2010, there will be four incineration plants constructed in Beijing.<sup>156</sup> These incineration plants are: Nangong,

located in the Daxing District; Asuwei located in Changping District; Liulitun, located in Haidian district; and Gaoantun in Chaoyang District.<sup>157</sup> Landfill remains the primary waste treatment method for Beijing to date although the three new waste incineration plants to be brought on line in time for the Games may signify a shift towards incineration as a popular method of waste treatment.<sup>158</sup>



### Beijing Commitments

1. To implement a safe urban domestic waste disposal system by 2007 and to establish processing facilities for non-hazardous urban waste in the Beijing suburban area.<sup>159</sup>
2. To safely treat and dispose of all solid wastes produced in the city by 2008, 50% of the solid wastes will be separately collected and 30% recycled for use as resources. All solid wastes produced during the Games will be separately collected and disposed of.<sup>160</sup>
3. To construct disposal facilities for hazardous waste with a total capacity of approximately 10 000 tonnes a year (which includes processing and disposal of medical and radioactive waste) for Beijing.<sup>161</sup>

153 UNEP, "Beijing 2008 Olympic Games: An Environmental Review," p.132.

154 Xinhua, "Beijing's primary medical waste facility is constructed, Beijing is able to process 93% of waste in the city," [http://news.xinhuanet.com/newscenter/2004-12/28/content\\_2388684.htm](http://news.xinhuanet.com/newscenter/2004-12/28/content_2388684.htm)

155 2003 Beijing economic development update. <http://www.sei.gov.cn/ShowArticle2008.asp?ArticleID=85572>(in Chinese)

156 "Beijing builds cogeneration plants, the first garbage facilities will be constructed this year." <http://2008.people.com.cn/GB/22180/46353/4182524.html>.

157 "Friends of Nature" <http://www.fon.org.cn/content.php?aid=9230>. (in Chinese)

158 Xinhua. [http://news.xinhuanet.com/newscenter/2004-12/28/content\\_2388684.htm](http://news.xinhuanet.com/newscenter/2004-12/28/content_2388684.htm) (in Chinese)

159 UNEP, "Beijing 2008 Olympic Games – An Environmental Review," p.132.

160 BOBICO, "Section Four: Environmental Protection and Meteorology" p.57.

161 UNEP, "Beijing 2008 Olympic Games – An Environmental Review." p.132.

4. To construct facilities for the concentrated disposal of medical wastes with the daily disposal capacity of 60 tonnes.<sup>162</sup>

## Greenpeace Guidelines

**Guideline 14** - Use only environmentally-safe building materials and products that minimize pollution of the environment (air, soil, water, ground water) throughout their entire lifecycle (production, use and disposal). Ban polyvinyl chloride (PVC) and other organochlorine materials and use more environmentally acceptable materials.

**Guideline 15** - Ban persistent, bioaccumulative and/or toxic substances and materials that incorporate them in Olympic construction or merchandising. Ban persistent organic pollutants (POPs) such as organochlorine-based chemicals. Other examples of persistent, bioaccumulative and/or toxic substances that should be excluded from use include: organotins, phthalates, artificial masks, cadmium, lead, chromium, brominated or chlorinated flame retardants. Ban any material that exhibits or is suspected of exhibiting endocrine disrupting properties.

**Guideline 24** - Apply an integrated waste management program based on waste avoidance and minimization.

**Guideline 25** - Establish a 100% closed-loop recycling system for packaging, temporary structures and other short-life products and ban all non-recycled and non-compostable materials.

**Guideline 26** - Use systems to minimize waste generation to the fullest extent. All waste systems must be fully integrated and have the elimination of waste as their main aim.

## Selected Achievements

Selective venues at the Games have undertaken zero-waste approaches to waste management. The Olympic Park produces 5000-7000 tonnes of green waste a year, which includes grass, leaves and branches that are produced by plant life in the park. The treatment center at the north end of the Park can process about 3000 tonnes of waste per annum. There will also be a unique "yellow water" treatment system that will process human waste to allow these waste products to return to the park as fertilizer.

According to official documents, BOCOG was directly in

charge of the Olympic venue waste management test run at the Fengtai softball test event, where it claimed that of the total 48 734 kg of waste produced by the event, 32 207 kg was sorted as recyclable waste, 11 013 kg was sorted as compostable waste, and 5 514 kg was managed as mixed waste. BOCOG claims that of all the waste generated, 100% was safely treated and disposed and 88.7% was recycled.

However, Greenpeace has not seen the official waste management plan for the 2008 Beijing Games, and thus it is very difficult both to confirm how waste will be dealt with during the Games, and how successful BOCOG's approach will be. Greenpeace's access to information and involvement in Beijing in this area is very different from that of the Sydney Games where Greenpeace and other organizations were part of a waste management group that advised SOCOG on how to deal with waste generated by the Olympics and how to carry out public education on waste reduction.

## Beijing

According to government figures, many goals set for the reform of Beijing's waste management system were met. The most important criteria that the Beijing government uses when addressing waste reform is the urban non-toxic disposal ratio. According to official data, this rate has steadily risen from 85% in 2001 to 96.50% in 2007.<sup>163</sup> Greenpeace was unable to confirm how this urban non-toxic disposal ratio is derived.

According to official documents and Chinese media, several new garbage treatment facilities offer integrated waste treatment methods. The biogas technology introduced at the Beishenshu landfill site transforms the biogas produced at the landfill into electricity, which is then used to power the percolate treatment plant.

The Asuwei power plant has developed a method to trap landfill gas for electricity generation. According to BOCOG, the leachate treatment facility can generate 20 million kWh of electricity per year, enough to provide energy for 1 700 families.<sup>164</sup>

## Beijing's new plastic bag ban

Beginning June 1st, 2008 China has banned all shops and grocery stores from providing free plastic bags to customers as a first step to eliminating white pollution in the country. This

162. BOCOG, "Beijing 2008: Environmental Protection, Innovation and Improvement 2001-2006 Update," p.49.

163. BOCOG, "Beijing 2008: Environmental Protection, Innovation and Improvement 2001-2006 Update," p.49.

164. "Beijing's Asuwei plant starts to generate power by use of marsh gas." <http://en.beijing2008.cn/20/67/article214076720.shtml>.



nationwide policy is an important step to reduce packaging and to cut back on the over three billion plastic bags used by shoppers in China each day.<sup>165</sup>

### Missed Opportunities and Mixed Results

The development of three new incinerators for Beijing in the run up to the Olympics represents an important missed opportunity. Incineration plants are liable to release various harmful chemicals into the atmosphere, especially cancer-inducing dioxins. The introduction of incineration as a waste treatment method also means that waste is not viewed as a potential resource by the city. In China's rapidly developing economy and rapidly urbanizing cities, it is essential to promote re-use and recycling strategies. Moreover, the Games should be seen as an opportunity to speed up the development of a zero-waste strategy. More public engagement programs before the Games could have helped to boost awareness for waste reduction.

### Greenpeace Recommendations – Beijing Games and Beyond

#### Beijing Beyond 2008

Incineration will only increase the amount of pollutants released into the atmosphere. Greenpeace recommends that Beijing moves away from this method of waste treatment. Beijing's investment in urban waste management should also move away from the development of landfills, which have a high potential for contamination by producing leachate which may threaten precious water sources. Landfills may also produce dangerous amounts of methane gas. Municipal waste reduction targets should be set in order to move the city towards increased waste separation. Furthermore, citizens need to be encouraged to engage in re-use, recycling, and composting.



#### China Beyond 2008

China's waste treatment system is still developing and at this stage, it is important to push for a more integrated system of waste treatment as well as to move towards more advanced technologies that eliminate our reliance on incinerators and landfills. Incineration does not represent a sustainable method of waste treatment and other Chinese cities should take all precautions to avoid incineration.

China should urge manufacturers and producers to take responsibility for their products over their entire life-cycle. Mandatory regulations should be enforced so that all manufacturers are forced to take Extended Producer Responsibility (EPR)<sup>166</sup> for their products.

### Future Olympic Games - Recommendations to the IOC

The IOC should take steps to strongly discourage expanding landfill and incineration systems by Olympic host cities and encourage cities to move towards closed-loop, integrated waste treatment systems that focus on waste minimization, reuse, recycling, and large-scale composting of food and organic waste. Future Olympic host cities should minimize waste generation for all aspects of Olympic venue construction. Finally, the IOC should require all bid cities to follow the huge success story for Sydney and to engage in large-scale recycling of construction waste for all new Olympic venues.

165. Xinhua. "China uses over 3 billion plastic bags per day." [http://news.xinhuanet.com/newscenter/2007-11/22/content\\_7123377.htm](http://news.xinhuanet.com/newscenter/2007-11/22/content_7123377.htm) (in Chinese)

166. Extended producer responsibility imposes accountability by the producers of products over the entire life-cycle of the product and has been endorsed by the EU and is being implemented in EU member countries for packaging and other products.



# Environmental Assessment of Olympic Sponsors

Olympic sponsors, who provide large numbers of products and services for the Games, also have a significant impact on the overall environmental footprint of the Olympics. Sponsors have an equal responsibility to promote environmental protection during the Olympics, starting with minimizing their own environmental impacts.

Greenpeace believes that the most significant way for sponsors to uphold the theme of Green Olympics is to provide best-available-technology (BAT) and to engage in best practices that not only reduce their environmental footprint for the Olympic Games but also serve as a model for their respective industries.

Greenpeace's involvement with Olympic sponsors began in 1997 as part of Sydney's push for a Green Olympics. Greenpeace approached select companies and requested that they demonstrate state-of-the-art products and best practices that decrease their respective environmental footprint.

Rather than approaching all Olympic sponsors, Greenpeace has historically selected a number of sponsors that have the largest influence in their own industries. Moreover, rather than campaigning on all environmental issues related to particular sponsors, Greenpeace has chosen to work on a few environmental issues that can be addressed or solved with more leadership from select corporate leaders.

For the 2008 Games, Greenpeace contacted seven sponsors, including Coca-Cola, Haier, Lenovo, McDonald's, Panasonic, Samsung, and Yili. We focused our engagement with selected sponsors on two key issues: 1) climate change and ozone protection where we pushed refrigeration-using sponsors to adopt climate-friendly (HFC-free) refrigeration technology and 2) toxic contamination and waste management, where we pushed electronic sponsors to showcase greener electronic products with less toxic substances.

Climate-friendly cooling and green electronics are both significant environmental issues that have been met with significant amounts of corporate inertia or disinterest. With escalated efforts by NGOs to make these issues a more important part of the corporate agenda, and sincere efforts by companies truly committed to corporate social responsibility, green electronic products and climate-friendly cooling technologies could soon become the norm. Greenpeace believes the Games provide an ideal platform to shine a spotlight on these best available technologies and bring them into the mainstream.

## Beyond ozone-friendly — climate-friendly cooling

### How do refrigerants used in air-conditioning and food and beverage cooling contribute to climate change?

In the race to save the ozone layer in the late 1980s, the chemical industry invented a new set of chemicals called HFCs. These chemicals were to replace CFCs and HCFCs, which were widely used in refrigeration and air-conditioning and were to be phased out under the Montreal Protocol due to their ozone-destroying properties.

While ozone-friendly, HFCs are nonetheless thousands of times more potent than CO<sub>2</sub> as GHGs. Left unchecked, HFCs are expected to constitute 8.6% of all GHGs by 2050.<sup>167</sup> Fortunately, natural alternatives—which are both ozone- and climate-friendly and include a wide variety of refrigerants such as hydrocarbons, CO<sub>2</sub>, ammonia, water, and others—exist.

Greenpeace has played an active role in developing and promoting climate-friendly natural refrigerants. In 1993, when the chemical industry claimed that there were no green alternatives to HFCs, Greenpeace worked with a German company—Foron—to develop and market the first climate-

167. Schwarz, Winfried. The high and still growing share of fluorinated greenhouse gases in overall global warming emissions-Summary of an Öko-Recherche study (including special remarks on commercial refrigeration), Frankfurt, June 2004, on behalf of Greenpeace

## Section 2: Evaluation

### Olympic Sponsor Environmental Commitments

friendly cooling refrigerators.

The resulting “Greenfreeze” technology relies on climate-friendly hydrocarbons instead of HFCs. There are now close to 300 million Greenfreeze units worldwide. Greenpeace has also played a role in facilitating the transfer of natural refrigeration technology into China.<sup>168</sup> Today, more than 75% of China’s domestic refrigeration market uses Greenfreeze refrigerators.<sup>169</sup>

Greenpeace’s first ever Olympics sponsor campaign was around the issue of climate-friendly cooling. In the lead-up to the Sydney Olympics, Greenpeace actively campaigned on Olympic sponsor companies such as The Coca-Cola Company and McDonald’s to take action to eliminate potent HFCs in its refrigerant systems. Greenpeace continues to advocate companies to directly leapfrog into natural refrigeration technology.



Greenpeace campaigned to push Coca-Cola to supply climate-friendly cooling for the Sydney Games.

### Selected Achievements

#### The Coca-Cola Company

Greenpeace has lobbied successfully for Coca-Cola to make 100% of its 5 658 coolers used in the Olympic venues HFC-free. Coca-Cola’s coolers and vending machines will instead be powered by CO<sub>2</sub>. Ironically, while CO<sub>2</sub> is a potent GHG, when used as refrigerant, it has a negligible impact on the climate.<sup>170</sup> Coca-Cola’s coolers will be the largest number of HFC-free commercial refrigerators of this kind to ever be introduced into China.

In May 2008, Coca-Cola further announced that by 2010, the company will deploy 100 000 CO<sub>2</sub> refrigerators on the market worldwide. While Greenpeace recognizes Coca-Cola’s

efforts to take on the climate-friendly cooling issue beyond the Olympics, we believe that Coca-Cola needs to do much more, as the 100 000 coolers represent less than 1% of the company’s 11 million refrigeration units.

As a next step, Greenpeace is asking Coca-Cola to phase-out the use of HFCs in all of its new equipment worldwide by 2012, in time for the London Olympic Games. Greenpeace is also asking other refrigeration-using food and beverage companies to give a concrete HFC phase-out timeline.

Coca-Cola is part of a coalition called “Refrigerants, Naturally!”, supported by Greenpeace and UNEP. This coalition includes some of the world’s biggest corporations, such as Pepsi, McDonald’s, Unilever, Ikea and Carlsberg, all of whom are in the process of adopting climate-friendly cooling systems.<sup>171</sup>

#### Haier

China’s largest home appliance manufacturer is providing over 30 different product categories to the Games. Haier receives credit for promoting prototypes of climate-friendly and energy efficient solar-based HFC-free air-conditioners. These prototypes, which use water — a natural refrigerant — for cooling, will be partially showcased in the Olympic Village, the tennis center and other venues.<sup>172</sup>

Haier is to be commended for showcasing HFC-free air-conditioner prototypes, however, the majority of Haier’s air-conditioners for Games venues still heavily rely on HFCs as refrigerants. Moreover, while Haier has provided Coca-Cola with HFC-free coolers, which can be seen all throughout Olympic venues, Haier has also provided a large fleet of commercial coolers using HFCs for other sponsors who did not request Haier to supply HFC-free cooling technology.

Presently, a few prototypes of HFC-free air-conditioners exist but this has not been taken up by the industry. HCFCs—which are to be phased-out under the Montreal Protocol—and HFCs—which are to be regulated as part of Kyoto Protocol’s basket of GHGs—still dominate the air-conditioning industry.

Greenpeace urges Haier to work after the Olympics to invest in the development and promotion of HFC-free air-conditioning technology, and thereby play a significant role in greening the air-conditioning industry after the Games.

168. To learn more about climate-friendly cooling, please refer to: <http://www.greenpeace.org/china/climate-friendly-cooling>

169. China Household Electrical Appliances Association (CHEAA)

170. CO<sub>2</sub> does not need to be newly produced but can be taken out of the environment where it is more than abundant and thus does not have any additional impact on the climate. When used as a refrigerant, the global warming potential (GWP) of CO<sub>2</sub> is one (this figure remains the same whether using a 20-, 50-, or a 100-year GWP estimate). On the other hand, the most commonly used HFC, HFC-134a, has a GWP that is 1430 times greater than that of CO<sub>2</sub>.

171. For more information on Refrigerants, Naturally!, please refer to <http://refrigerantsnaturally.com>

172. Haier website <http://tjhaier.58.com.cn/active-8-1194959604703>

## Missed Opportunities and Mixed Results

### McDonald's

After lobbying by Greenpeace to showcase state-of-the-art HFC-free technology in its four Olympic restaurants, McDonald's has committed to making two refrigeration equipment categories—grill-side freezers and ice machines—HFC-free.

While these will be the first HFC-free prototypes of their kinds to be showcased in China, McDonald's has missed an opportunity to make all its refrigeration equipments in its four restaurants—including bigger refrigeration systems with higher greenhouse emissions such as the HVAC (heating, ventilation, and air-conditioning systems) and walk-in freezers—HFC-free. McDonald's has already demonstrated that a 100% HFC-free restaurant is possible by opening a HFC-free pilot restaurant in Denmark in 2003.<sup>173</sup>

Greenpeace urges McDonald's to hasten the adoption of HFC-free refrigeration equipment in all its restaurants, both in China and worldwide. Along with Coca-Cola, McDonald's is also a founding member of the Refrigerants, Naturally! initiative.

### Yili

While most sponsors were open to discussion, Greenpeace had difficulties reaching or obtaining answers from Yili, one of the largest dairy companies in China, and consequently also one of the largest commercial refrigeration users in the country. Despite Greenpeace's persistent email and phone-call attempts to contact Yili about its use of climate-damaging refrigeration technology for the Olympics, Yili was unavailable for discussion at all times.

Industry sources have confirmed that Yili is providing commercial coolers containing HFCs for the Olympics. Greenpeace believes that Yili has missed an important opportunity to use the Games to introduce cutting edge climate-friendly technology and to demonstrate the company's commitment to environmental protection.

Greenpeace urges Yili to use the post-Olympics period to phase-out the use of HFCs in its ice-cream coolers in favor of refrigeration systems using natural refrigerants.

## Hi-Tech Toxic Products

### What is in electronic devices?

As the world consumes more and more electronic products every year, hundreds of thousands of tonnes of toxic electronic scrap (otherwise known as e-waste) is dumped in landfills or exported illegally from developed countries to developing countries to be disassembled in backyard operations. This rudimentary recycling process exposes workers, including children, to a cocktail of toxic chemicals.



Guiyu, Guangdong Province (2005)

While the European Union's Restriction of Hazardous Substances (RoHS) regulation has curbed the use of many toxic substances—including cadmium, hexavalent chromium, lead, mercury, polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE) flame retardants—there are many exemptions and not all toxic substances have been regulated. For example, other BFRs and PVC or vinyl plastic, which are widely used in electronic products, are also especially harmful but not regulated.

PVC is a relatively cheap and widely used chlorinated plastic, often used by the electronics industry as an insulator and coating for electrical cables. PVC creates environmental problems throughout its lifecycle. For instance, its manufacturing requires the use of hazardous raw materials, including the basic building block of the plastic, vinyl chloride monomer (VCM) which is explosive, highly toxic, and carcinogenic. When PVC enters the waste stream, if it is burned during disposal (e.g. incineration, uncontrolled burning) or, in the case of electrical cables, to recover valuable copper wire, its high chlorine content can contribute to the

173. To learn more about McDonald's HFC-free pilot restaurant in Vejle, Denmark, please refer to: <http://www.refrigerantsnaturally.com/docs/20060425090000.pdf> p.38.

formation of highly toxic and persistent chlorinated dioxins.

BFR refers to a wide range of brominated chemicals added to materials to both inhibit their ignition and slow their rate of combustion. Several BFRs, including certain PBDEs and HBCD, have known toxic properties, are highly resistant to degradation in the environment, and are able to bioaccumulate.

Greenpeace has been actively campaigning worldwide on the issue of e-waste by pushing electronics producers to phase out toxic substances from their products. Since 2006, Greenpeace has released a “Guide to Greener Electronics” to rank the top 18 electronics manufacturers on a quarterly basis. Most recently, Greenpeace stopped a shipment of illegal electronic waste from docking in Hong Kong. The shipment was sent from the United States and designated for mainland China.

Greenpeace asked the three electronic sponsors of the 2008 Beijing Olympics, namely Lenovo, Panasonic, and Samsung, to provide PVC- and BFR-free products for the Olympics. PVC- and BFR-free electronic products are slowly being introduced to the market.

## **Selected Achievements**

### **Samsung**

After lobbying by Greenpeace, Samsung announced that it will make one of its official Olympics consumer phone, SGH-F268, 100% PVC and BFR-free, with no intentional use of these hazardous substances and negligible traces of these contaminants. The Beijing Olympics consumer phone will be Samsung's first PVC and BFR-free phone on the market and the first PVC- and BFR-free phone to ever to be distributed for the Olympics. The phone will not only be used in Olympic venues, but also sold throughout China.

Samsung will also move ahead its global BFRs and PVC phase-out plans for mobile phones, originally dated Jan 1st 2010 for BFRs and Jan 1st 2011 for PVC, by one year, to Jan 1st 2009 and Jan 1st 2010 respectively, in support of the green principles of the 2008 Beijing Olympics.

While Samsung is setting a precedent for the Olympics, its commitment is not flawless. SGH-F268 is only one of the three models that will be provided in Olympic venues and to consumers all across China. The other two models are not PVC- and BFR-free.

## **Missed Opportunities and Mixed Results**

### **Lenovo**

Lenovo will supply two computer models – the ThinkPad T60 notebook PC and ThinkCentre M55e — that contain both PVC and BFRs for the Olympics. In 2006, Lenovo gave Greenpeace a commitment to phase-out PVC and BFRs from all its products by the end of 2009, but the company has yet to put a 100% PVC- and BFR-free product on the market. Lenovo has missed an opportunity to use the Olympics as a platform to phase-in green computers that do not harm the environment.

### **Panasonic**

Panasonic will provide more than 16 000 electronic products ranging from audio-visual equipment and high-definition televisions to large screen displays and camcorders to this Olympic Games. However, the company has failed to provide any products that are either PVC or BFR-free for the 2008 Beijing Olympics. This comes despite the fact that the Panasonic already has many products on the market that are PVC-free and a few that are BFR-free. Panasonic has yet to give a comprehensive timeline to phase-out PVC and BFRs in all its products.

## **Greenpeace Recommendations – Beijing Games and Beyond**

Decisions on which companies will become Olympics partners or sponsors is almost purely a financial decision for the IOC and Olympics host cities. While financial considerations are undoubtedly important, the IOC and every host city should also require basic environmental guidelines for sponsors to encourage real leadership on the environment. As part of the sponsors bidding criteria, the IOC should set mandatory standards that prohibit or limit sponsors from using substances that are toxic, polluting, or contribute to climate change and make sure they are enforced by host cities. The IOC should also require sponsors to disclose the environmental information of the products and services they provide for the Olympics for public scrutiny. Moreover, multiple environmental offenders with a negative track record should not be considered in the Olympic sponsors' selection process.

## Public Engagement

### Non-Government Organization involvement

In China, NGOs have only begun to develop after Chinese reforms in the late 1970s and NGO and government relationships are still developing. BOCOG elicited some environmental NGO consultation in the designing and planning of Olympic events and venues. BOCOG has also collaborated with NGOs on some specific campaign efforts (see below).

From as early as 1992, Greenpeace began working with Sydney Olympic bid organizers to encourage them to include far-reaching environmental initiatives in venues and event systems to showcase environmental solutions. At the Sydney, Athens and now Beijing Games, Greenpeace believes NGOs have a role to play in encouraging and monitoring the environmental aspects of events such as the Olympics to ensure the best possible outcomes.

### Greenpeace Guidelines

#### Guideline 34

Full, comprehensive and publicly accountable independent auditing of all environmental data for all aspects of the Olympics must be mandatory.

#### Guiding Environmental Principles

##### 6. Community, NGO and public involvement

Consistent and high level consultation with community, environmental and social groups and the public is essential from the start. Establish a clear process for conflict resolution.

### Selected NGO projects in the Beijing Games

Environmental NGOs were eager to put the theme “Green Olympics” into practice and conducted various campaigns aimed at raising public awareness in the areas of energy efficiency, conservation, and environmental standards.

Greenpeace’s own lightbulb campaign aimed to raise public



Greenpeace pushing Beijing restaurants to eliminate disposable chopsticks.

awareness about the need for energy efficient lighting in order to reduce GHG emissions. With Olympian and BOCOG organizing committee member Deng Yaping as campaign spokesperson, the campaign raised awareness about energy efficiency and helped elementary schools and households to change over 15 000 of their old incandescent bulbs to more energy efficient compact fluorescent light bulbs (CFLs).

While BOCOG has issued their own “Environmental Protection Guidelines for Beijing’s 2008 Catering Services” to demand catering companies not to use disposable products, Greenpeace went a step further. Greenpeace’s chopsticks campaign has successfully received pledges from more than 300 restaurants in Beijing and over 1 000 restaurants in Guangzhou to stop using disposable chopsticks in an attempt to protect tropical forests, namely the Paradise Forests, which stretch from Southeast Asia to the Solomon Islands in the Pacific. Greenpeace’s campaigns aimed to encourage the direct participation of civil society in taking action on environmental issues.

NGO representatives from Friends of Nature and Global Village were appointed as environmental consultants by BOCOG to participate in key levels of decision making.



## Section 2: Evaluation

### Olympic Sponsor Environmental Commitments

Conservation International (CI), an advocate for nature conservation, has worked with BOCOG in providing design advice for the five Olympic mascots as well as integrating environmental messages into the torch relay. CI has launched its own “For Our Natural Splendor” campaign in partnership with the China Environmental Cultural Promotion Association (CECPA), a state affiliated group. This is a campaign involving various activities across China aimed at promoting environmental awareness, treeplanting, wildlife free dining choices, and carbon footprint awareness.

The World Wide Fund for Nature (WWF) has launched its 20 ways to 20% energy efficiency campaign to educate the public on how to reach China’s energy efficiency goals. The organization has also worked to promote forest stewardship and sustainable timber use within China and the region. Its sustainable kindergarten demonstration project aims to educate the public about eco-labeling.

### Greenpeace Recommendations – Beijing Games and Beyond

Opening communication channels with environmental NGOs represents a good first step in setting up the conditions for collaboration between government and civil society. While some public engagement efforts were organized by BOCOG<sup>174</sup> and sponsors, Greenpeace believes that there should be more public engagement efforts that lead to wider citizen participation involving concrete environmental actions. Governments need to utilize the expertise and suggestions of NGOs in developing a strong role for civil society engagement in protecting the environment and in other areas of public concern.

Although government-NGO joint efforts have increased through the process of the Games, China still has a long ways to go in engaging with civil society as true partners. Chinese official governing bodies could have worked more with environmental NGOs to further efforts to green the Games as well as to further engage the public if more open, regular and transparent communication had been established. Currently, there is still limited communication between NGO groups and government. Environmental information needs to be more transparent and easily accessible to ensure third party assessment and scrutiny.

Future Olympic host cities should regard NGO environmental engagement in the Torino Games as best practice. In 2001,

the Torino Olympic Organizing Committee established the Environment Advisory Assembly and invited representatives from Italian environmental non-governmental organizations and local authorities to be involved in the organization of the Games. The Assembly met four times a year to work together towards sustainable solutions to environmental issues. These forms of continuous, open and transparent partnerships represent true civil society engagement in Olympics planning. Furthermore, as the Sydney and Torino Games have demonstrated, NGOs can often help to deliver many of the goals and objectives of environmental protection.



Greenpeace introduces energy saving light bulbs to students in Beijing.

174. BOCOG has also organized a number of public education campaigns such as the “Stop Driving for One Day” Campaign to raise awareness around car pollution, and to encourage students to “Reserve a Barrel of Rainwater” to encourage water reuse.

## Conclusion – Lessons for future Games and Beijing beyond 2008

### Beijing Beyond 2008

Beijing's tremendous efforts and investment in environmental initiatives for the 2008 Games have allowed many of the city's bid commitments to be met. What is particularly unique about the 2008 Games is that they will leave an important environmental legacy for the city of Beijing in areas such as transportation infrastructure, energy efficiency, and in the development of renewable energy, water, and waste treatment capacities.

However, in other areas, such as forestry and water minimization, Beijing has missed a key opportunity to use the Games to initiate world's best practice and policies for all venues. In 2008 and beyond, it is important to look at how these successes can be adopted by other cities throughout China as well as how missed opportunities of the Games can inform future environmental policies.

Perhaps the greatest problem in Beijing's attempt at hosting a Green Games is the limited engagement and minimal third party assessments of its environmental efforts. A lack of available independently verified data and limited ability for third parties such as NGOs to access information undermine the ability to evaluate Beijing's environmental performance. More openness, transparency and efforts to engage civil society in decision making processes and environmental action could help to strengthen the development of green initiatives in the future.

### China Beyond 2008

The 2008 Games will not only leave important legacies for the city of Beijing, but also important lessons for other Chinese cities. The development of public transportation systems and stricter emission standards will help to reduce air pollutants. These relocations coupled with technological upgrades are first steps in helping industries to move towards clean



production methods. The introduction of renewable energy and water reuse technologies to the city's infrastructures will go a long way to push cities away from its reliance on fossil fuels and precious resources. Beijing can serve as an excellent case study for other Chinese cities, which are also struggling with the huge challenge of attempting to balance environmental sustainability and rapid development. The 2008 Games are the first time a developing country has placed sustainability and environmental initiatives at the forefront of its efforts to host the Olympics. The environmental problems Beijing and China face are immense. Beijing has come a long way and its efforts and achievements must not be underestimated. For a developing country such as China, the Games should be seen as an opportunity to showcase and to implement state-of-the-art energy saving technologies in new infrastructures and as a catalyst to extend Olympic achievements and successful environmental policies from Beijing to other Chinese cities well beyond 2008.

Many of Beijing's problems are similar to other developing cities and, as China urbanizes, the lessons learned in the Beijing Olympics are vital for China to build sustainable cities beyond 2008.

### **Future Olympic Games - Recommendations to the IOC**

The environmental achievements of the 2008 Beijing Games demonstrate the positive impact that the Olympics can have on a city in raising the profile of environmental issues. Many of the missed opportunities during these and other attempts to host a green Games demonstrate the necessity for the IOC to set a minimal comparable set of standards and to place the environment at the forefront of policy considerations in the planning of international events. As global efforts towards addressing climate change intensify, and the impact of our ecological foot print becomes more evident, it is time for the IOC to issue some minimal mandatory standards for environmental protection to ensure that the goals expressed in its Agenda 21 are fulfilled. Future Olympic organizing committees and host cities should be required to meet environmental guidelines.

In addition to being evaluated by organizations such as the UNEP, the IOC should issue a set of standards for host cities so that their environmental efforts and achievements are

comparable. Host cities should be required to use one of the existing and excellent independent evaluation systems to rate their environmental design and construction, as well as to make information available to partner organizations, universities, and the public to ensure greater transparency and to encourage rapid take-up of new green technologies after the Games.

From Sydney to Beijing, host cities have taken a number of excellent initiatives in combining environmental awareness with the Olympic Games. While a number of lessons have been learned, there is a need to strengthen efforts in other areas, such as sponsors' environmental records, as well as the need for more transparency and independent assessments. It is high time for the IOC to issue a set of environmental standards for all host cities. The goals of the green Olympics can only be realized through these concerted efforts.



A wind turbine at the Guanting Wind Power Plant, Beijing's first large-scale wind farm.