

Environmental Concerns and Policies in the Beijing Olympic Games

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Abstract: In recent years, sustainable issues have become an interesting topic in event tourism studies. Mega events such as the Olympic Games can hardly claim to be environmentally friendly due to its large infrastructure construction to meet a short term demands. However when the environmental impacts become an important issue in the management of the Olympic Games, it turns to be an important dimension in this mega event. Greening was selected as one of the strategies during the bidding for the Beijing Olympic Games. In the implementation stage, measures were taken to promote the green issues and improve the environment in Beijing such as public campaign, reduction of air pollution, greening of the city and restructure of the urban economy.

This study attempts to investigate the process of implementing the environmental policy in the Beijing Olympic Games, local understanding of the greening and the impacts of the greening theme in the 2008 Beijing Olympic Games and its potential influences on the other mega events in China. The short term and long term environmental impacts are discussed. The paper concludes that it is possible to bring some of the environmental improvements by introducing the green theme. But still mega environment can hardly adjust to the environmental impacts. However, the environmental issues caused by the mage events are still substantial.

Keywords: Beijing Olympic Game, Environmental Policy, Sustainability of Event

The impact of tourism industry on climate change is increasingly a focus of discussion and debate. More specifically, the event industry has attracted attention and there is now an increasing international debate about how to encourage the industry to become more environmentally sustainable. Although events have become an effective tool for national building, regional economic development and urban image renewal, its sustainability, especially the environmental sustainability is under debate.

Events always bring good and bad, on one hand they bring us material and spiritual civilization; on the other hand, they are the deeper causes for severe environment damages, for example the huge carbon emission, air pollution, water pollution, land exploitation concomitant with the preparation and carry-out of events.

All these damages have put events on an opposite position to environmental protection. During the Olympic Games, large scale of infrastructure construction and material consumption are generated to meet the operational needs of the short-term event. These two factors and environmental issues are now important parameters of the effect of mega events.

In 1970s, environment issues caused huge global attention. < Declaration of the United Nations Conference on the Human Environment >¹ was published at the first UN human environment congress in June, 1972, followed by <World Conservation Strategy >² in 1980; in 1987, “sustainable development” was revealed in < Our Common Future >³ by the World Commission on Environment and Development (WCED), telling the competitive and cooperative relationship between human and the nature. As the biggest social event of human society, Olympic Games choose ‘green Olympic’ as its best environment strategy. In 1994, < Olympic Charter >⁴ added that the Olympic Games should be held when the environment is truly concerned. Then the International Olympic Committee (IOC) firstly took ‘sports and environment’ as a subject for discussion in the 1994 Olympic Centesimus Annus congress, and signed the Memorandum of Cooperation with UN Environment Programme to enhance the cooperation on environmental protection between the two organizations. And later, environmental protection was listed as one of the IOC’ s duty by <Olympic Charter> on July 18th, 1996, which also stressed that the Olympic Games should be responsible for any environment issues, and should show their responsibility in their actions in order to make all related people understand the importance of sustainable development. The IOC has set up an environmental protection committee, and formulated the < Olympic Movement’s Agenda 21>⁵ in 1999, making clear that the Olympic Games must work on boosting the global sustainable development and environmental protection, and all bidding cities must follow the strict criteria of environmental protection when organizing the event. Hitherto, environmental protection, sports, and culture become the three aspects of the Olympic spirit. However, not enough study has shed light on how the environmental missions of Olympic Game take effects. Thus, the Beijing Olympic Game may provide an opportunity.

After the reform and open policy, China’ s economy has been developing in a fascinating pace. But at the same time, the environmental problems are accumulating. In the early 1990s, the environmental issues were particularly serious and have already impacted on the living conditions of the local residents. Yet, due to strong desire for economic growth, the awareness of the environmental pollutions was weak. The environmental problems were not given enough attention by the authorities or the public yet. A misconception exists that, the western industrial development pattern

-- ‘pollution first and counter-measurement taken later’ , was avoidable in China.

In 1992, when China failed in the bidding for the Olympic Games, Chinese people for the first time recognized the importance of environmental problems if China wanted to be a player globally. After a decade’ s preparation, in 2001, China presented three ideas which are ‘green Olympic, high-tech Olympic and humanistic Olympics’ ⁶. A series of environmental protection promises were proposed to compete for hosting the 2008 Olympic Games. The bid was a success. In the next seven years of preparation, Beijing took various effective measures to achieve ‘green Olympic’ which has some long term impacts on Beijing’ s environment sustainable development and other mega events in China such as 2010 Shanghai Expo, the 16th Asian Games in Guangzhou.

The purpose of this paper is to investigate the impacts of the Green Olympic theme on the environmental sustainability in Beijing. Particular attentions will be paid to the formulation and the implementation of environmental policies, regulations and controls in addressing environmental problems.

2. Literature review

Sustainability has been the main theme in the present world. Sustainable tourism development is also the major field for the academy and human life. According to the World Tourism Organization (2001), sustainable tourism development should follow some criteria:

Sustainable tourism development meets the needs of present tourists and host regions while protecting and enhancing opportunities for the future. It is envisaged as leading to management of all resources in such a way that economic, social and aesthetic needs can be fulfilled while maintaining cultural integrity, essential ecological processes, and biological diversity and life support systems.

Although special events are often considered catalysts to tourism and regional development, negative environmental and social costs are also generated. As a result, environmental sustainability of the mega events has been major concern over the years. Recent researches have focused on how to practice events to be green. Dickson and Arcodia (2010) investigated the roles that professional associations play in promoting sustainable events and evaluated their roles in educating industry professionals on sustainable event practices. “Green event” should establish a sustainability policy or incorporate sustainable practices into its management and operation. Laing & Frost (2010) provided an overview and analysis of operational issues linking to green events, including the importance of developing policies and practices in waste disposal, recycling, traffic, power and carbon offset schemes. They examined some of the challenges involved in incorporating green messages into an event theme. Collins

(2007) introduced the Ecological Footprint Analysis (EFA) to understand the environmental consequences of the 2003/04 FA Cup Final.

There are quite a few studies on Beijing Olympic Game. Researchers are interested in the relationship between the national identity and Beijing Olympic game. For example, Xu (2006) held that Beijing Olympics was used for constructing national identity and pursuing international primacy. Ren (2008) explored the role of Olympic status in the national building. Ong (2004) examined Beijing's bidding process and the early stage of the preparation for the game. He predicted that Beijing Game would bring political and economic effects on Beijing, while Broudehoux (2007) presented a critical view on Beijing Olympic redevelopment, and the social, economic, and political impacts of hosting mega events as a means of urban image construction. She concluded that Beijing Olympic preparations acted as a propaganda tool to divert popular attention from the real problems that China is facing.

There are also papers examining the environmental impacts and concerns of the Beijing Olympic Game. Beyer (2005) investigated the essence of Green Games of Beijing Olympic and evaluated the potential of Beijing Olympic Plan for China's Sustainability development. He concluded that Beijing's decision to commit to suitable development was a reaction to losing the bid to Sydney in 2000. MOL(2010) who argued that Beijing had successfully used the sustainability as the attractor to enter into the global system and sustainability had begun to play a role in the mega event.

Within the Chinese context, Researches has been conducted on the environmental protection of Beijing Olympics, and the impacts of 'green Olympics' on Beijing's environment, ecology and civilization. Dong (2001) discussed the impacts of Beijing Olympics on Beijing's sustainable development, especially on politics, culture and economy. He stated that ameliorative environmental protection, appropriate planning and utilization of energy conservative sport venues of Beijing Olympics would contribute to the sustainable development of Beijing. Xiao et al. (2003) interpreted the three themes of Beijing Olympics, and held that although Beijing Olympics encouraged a harmonious society, it still faced challenges. Ren (2005) explored the negative environmental impacts of sports events, and stated that the Olympic had advantages in environmental protection. Zeng et al. (2006) expatiated the concept of 'green Olympic', and examined its development and value on environment protection. They also analyzed the impacts of 'green Olympic' on Beijing's environment and the strategies to deal with the impacts. Fu (2007) systematically introduced the evaluation system of the health and environment impacts that the Olympic Games had on the host cities. Wu (2008) studied the impacts of 'green Olympic' on ecology and civilization

from an eco-economical perspective.

However, most of Chinese studies focus on the discussion of the meaning of the Green Olympics and the pros and cons of the Green Olympics. Empirical studies are seldom conducted to fully understand the process of the Green Olympics and its long term and short term impacts on environmental sustainability. Thus, the above issues will be addressed in this paper.

3. Research method

Policy analysis method is utilized in this research to explore the environmental policy making and the implementation of Beijing Olympic Games, as well as local people's perception of 'green Olympic' and the potential impacts on other mega events in China. Both long-term and short-term environmental impacts are discussed in this study. Though mega events absolutely cause environmental problems, employing green themes in mega events and highlighting the concerns about environment in event policies can improve local environment to some extent. It is believed that event can boost the protection and improvement of local environment in the special social and economic context.

The policy documents and data resources in this research are from <Beijing Master Plan> (approved by the state council), the Environment communiqué from Beijing Environmental protection bureau, Beijing Water Authority, Beijing Gardens Bureau, Beijing Development and Reform Commission, Beijing Olympic Games official website, Beijing Committee of Science and Technology, and Press Conference. The study focuses on the air pollution which was considered the most serious and causes deaths in Beijing, rather than addressing every aspect of the environmental issues.

The documents are drawn from various bureaus, in an attempt to demonstrate that the environmental actions are well integrated into the policies and plans from all the institutions and not only limited to the EPA.

4. The process of environmental policy and implementation

4.1 The failure of the application for Olympic Game in 1992 and the resubmission

The Chinese has developed a strong complex with Olympic Games, a complex which is very much associated with modernity and the regaining of the confidence in the world again after many defeated records since 1840. In 1932 Chinese people firstly attended the Olympic Games, and to the Berlin Olympic Games in 1936 and London Olympic Games in 1948, no Chinese ever fought into to the final. The Chinese began to realize that wars and weak economy makes weak sports. In 1984 Los Angeles Olympic Games Chinese finally took back home 15 pieces of gold. And it is the new

time for Chinese sports. In 2001, the OIC evaluation indicated that there were 96% Beijing local people who supported Beijing to bid for Olympic Games host city. When Chinese athletes brought home 32 pieces of gold at 2004 Olympic Games, Chinese people were so excited for 2008 Olympic Games. Through Olympic Games, an international mega sports event, China can show what she has achieved in her reform. And the Beijing Olympic Games is the best stage to present Chinese people's full passion.

When China initially bid for the Olympic Games in 1993 and failed with national sorrow, the government realized that besides economic growth, environment development and human rights are important criteria for the jury board. China has to construct the similar value to obtain a world event. The impetus for Beijing to make sustainable development a major component of the Olympic bid was rather a reaction to losing the desired 2000 Olympic Games to Sydney.

In the 1990s, the environmental issues received limited concerns nationwide. The city air quality in China deteriorated whilst the economy and urbanization accelerated. A study which compared the air quality in 157 cities of 45 countries found that the air pollution composite index of Beijing was ranked 7th in 1995 and 3rd in 1998, among the worst in the world, where had 35% higher suspended particles and 62% higher sulfur dioxide than the Mexico city, the most polluted city in the world. This number reached the highest level in the history. From 2001 to 2005, on average, 15 serious polluted days were recorded each year, taking up 4.1% of the whole year⁷.

To bid for Olympic Games, environmental problems ran up to the top of the government's agenda. The government proposed 'green Olympic' as the main theme of the three Olympic themes⁸ in the Beijing Olympic Action Plan highlighting 'green Olympic' as the priority in the planning and construction of Olympic infrastructure. Aims were set to strictly follow the eco-environment standard, to employ a broad range of environmental protection techniques, to improve environment in a large scale, to boost the 'green' process of city and village, to enhance the industry of environmental protection, to enhance peoples' awareness of environmental protection, to encourage green consumption behavior, to encourage activities related to environmental protection, to improve the environment of Beijing and to build eco-city. It encouraged a healthy way of living, and is supposed to reach a harmonious relationship between human and nature. When Beijing bid for Olympic Games in 2001, the government promised that 1) the city would monitor sulfur dioxide, carbon

monoxide, nitrogen dioxide, and inhalable particulate every day; 2) the city would improve the air condition; 3) during the Olympic Games, four main pollutants index will reach the national standards and the World Health Organization standards, in order to provide a good air condition to the Olympic Games.

Beijing Olympic Games is considered to be the milestone of China's modernization. After the successful bidding, Beijing started a series of environmental protection work and made 'green Olympic' into reality. Beijing Olympic Games also became a catalyst in boosting the environmental sustainable development of Beijing. According to Beijing Master Urban Planning (2004 ~ 2020)⁹, 2008 is the beginning of the development of eco-city, and 2020 is the maturity of the development of eco-city. 'Green Olympic' creates an important chance for improving environment and the civilization of China.

4.2. Formulation and Implementation of long-term and short-term environmental policies

There are two sets of policies. One is the long term-strategic plans and policies. It can be seen that environmental issues is not only the responsibility of the environment protection agency. It is integrated with the overall social and economic plan and therefore it is the issue for all the institutions.

According to the objectives and principles set by < Beijing Master Urban Plan (2004 ~ 2020) > and < Outline of the Eleventh Five-Year Plan of the National Economy and Social Development>¹⁰, the government decided to make plans for environmental protection and eco-environment development in the 'eleventh five-year period', together with plans for energy development and energy conservation, and plans for recyclable in order to settle the problem of population growth, economy development, the relationship between resource utilizing and environmental protection. These policies and strategies were envisaged to solve the problems of environment, to enhance the carrying capacity of resource and environment, and to make cities suitable to live.

The other was formulated mainly for the period of Olympic Event. In 2002, according to < Olympic Charter >, < Host City Contract for the Games of the XXIX Olympiad >¹¹, < Bidding report >, < Outline of the Tenth Five-Year Plan of the National Economy and Social Development >¹² and other documents, the government came up with < Beijing Olympic Games Action Plan >¹³, which directed the preparation of Beijing Olympic Games in the following seven years. This plan was about strategy

and objectives, including five parts: total strategies, sports venues and relative construction, environment and city infrastructure construction, social environment development and strategic supporting measures.

These two kinds of plans are overlapping, indicating that at least the Beijing Olympic act as a catalyst toward sustainable development. It can be defined as long-term and short-term.

4.2.1 Key long-term practices

- Restructuring economic sector

In 2000, the added value of the primary, secondary and tertiary industry consisted of 3.63%, 38.06% and 58.31% in GDP respectively in Beijing¹⁴. The Urban Master Plan clearly stated that Beijing would make efforts to restructuring its economy from secondary to the service industry (source from: Report of Energy Consumption and the Energy Saving in Beijing in the ninth Fiver Year Plan). The preparation phrase for the Olympic Games was also within the third phase of industry restructure of Beijing. During this phase, the upgrade process of the whole industry accelerated, and the high-tech industry developed dramatically as well. Although one can argue that Beijing would go through this restructuring even without the Olympic Game in the long run, the Olympic Game indeed accelerated this process. The most effective one was to relocate the heavy industry which produced heavy pollution. More than 200 polluting factories were moved out of Beijing, especially the Beijing coking plant, and Shou Gang Iron & Steel Group. ‘Urbanized’ modern agriculture and industry are developing in a fast pace. The finance, wholesale & retailing, culture & innovation, IT, computer science, software, high-tech and service industry grew fast. In 2007, Beijing Development and Reform Commission published <Guidance and comments of the adjustment of industry structure in Beijing>¹⁵ and <Decision on developing recyclable economy and conservation oriented cities>¹⁶, which made reclaimed the objectives of the industry restructure, including aims to develop modern service industry, high-tech industry, modern manufacturing and modern agriculture, to improve innovation, to change the development pattern of economy, to adjust the structure of industry, to optimize space distribution, to enhance integrated competitiveness, and to improve the service ability of city (Beijing Development and Reform Commission ,<Guidance and comments of the adjustment of industry structure in Beijing>¹⁷ . <Action plan of expediting the development of recyclable economy and environmental friendly cities>¹⁸ were also implemented in Beijing in the following four years.

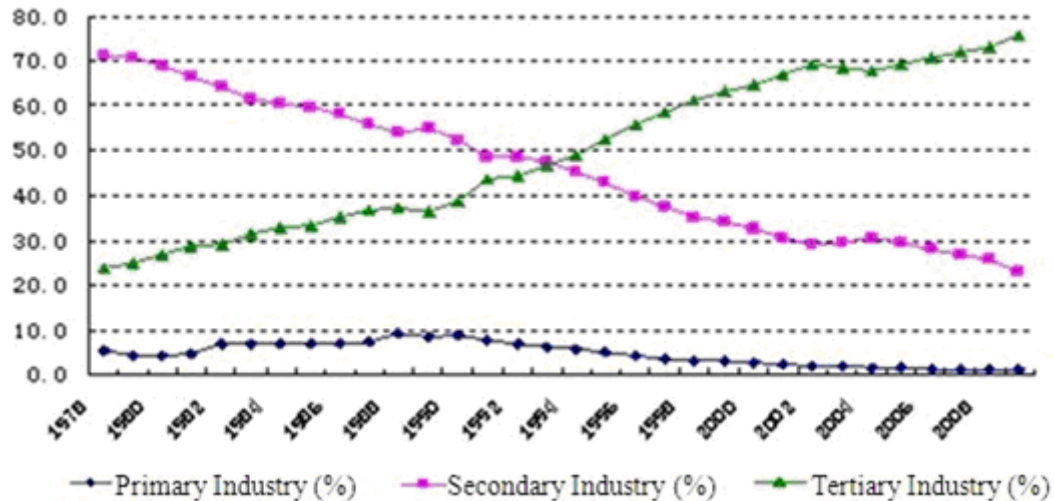


Fig 1. Changes in industry structure of Beijing (1978-2009)

Resource from: Beijing economy and information center

- Adjust energy structure

The government aims to optimize the structure of urban energy by introducing and developing clean energy such as natural gas and electricity etc, improving the structure of the supply of power, enhancing the construction of power grid in the central district of urban, improving village power grid; increase the security of the supply of power; developing and utilizing new energy such as geothermal energy, solar energy, wind energy and biomass energy and developing energy conservation campaign. The <Plan of adjusting energy structure of Beijing> issued by the Beijing government in 2001, set up the short-term (2005) and long-term (2010) objectives, planning scheme and measures of the adjustment plan of energy structure in Beijing. This plan was based on the study of consumption, environmental protection and economy development, predominately aiming to plan for the best development of energy. The Beijing Development and Reform Commission issued <Implementation plan for enhancing energy saving in Beijing>¹⁴ and <Measures of supervising energy saving in Beijing>¹⁷ in 2007, which made clear the priorities of energy saving. The structure of a variety of energy consumption was optimized, and coal was replaced by electric power and natural gas as main consumptive energy (see Figure 2A, 2B). From 2001 to 2007 in Beijing, the proportion of good quality energy in the total energy consumption rose from 68.8% to 79.6%. It is estimated that the number will rise to around 83% in 2010.

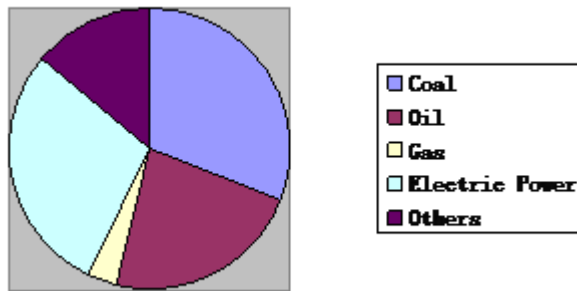


Fig. 2A Structure of varieties of Energy consumption in Beijing 2001

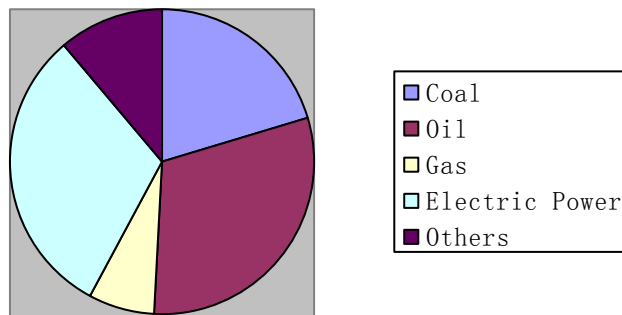


Fig.2 B Structure of varieties of Energy consumption in Beijing 2007

(Resource from: Beijing Statistics Bureau)

- Change the structure of urban land use

According to < Master plan of Beijing urban>, the Gardens Bureau of Beijing aims to develop three green ecological barriers which are mountainous area, plain area, and urban isolated green area to prevent the sands from the northwest of China. From 2001 to 2008, the forest green rate of Beijing rose from 41.9% to 51.6%, and the mountain forest green rate increased from 57.23% to 70.5%. An ecological shelter forest belt over 1000 km long and 25 thousand hectare is constructed and a green belt of 12.6 thousand hectare is built. The area of nature reserve reached 8.2% of the total land area in Beijing, which makes the ‘green Olympics’ into reality³⁴.

- Improve local people’s awareness on environmental protection

Initiatives were also carried out to increase the environmental awareness and the participation in the environmental protection among the public. A campaign of ecological civilization was launched to educate people to choose green products and cultivate environmental friendly consumption habits. It also effects in improving local people’s awareness on environmental protection, developing green community, green shops, green campus, green companies and green organizations³⁶, advocating recycled products in family and company, enhancing people’s awareness on scarce water

resource, regulating the water rate system, employing water-saving technologies, promoting water-saving appliance, encouraging water-saving in the whole society, installing water-saving and energy-saving equipments, implementing separate waste collection, promoting ozonosphere protection equipments, and advocating public transportation³⁷.

The Olympic Games is the most popular event with the largest number of participants. It is granted a refined social image and social charisma. Hence, its impact on environmental protection is widely spread. The objective for 'green Olympic' is not only to optimize and green the natural environment of the city, but also to transform the mentality for cooperation between the Olympic Games and environment, people's value on environment and their behaviors. By participating in the Beijing Olympic Games, local people are aware of the changes of the environment, and understand the importance of environment. It is reported that the Beijing Olympic increases local people's perception of happiness. Moreover, 3,032 telephone interviews conducted by Beijing public opinion survey center reveal that 91.9% people pay attention to environmental protection after the campaign of Olympic Environment Protection³⁹.

- Readjust the Transportation system

The rapid urbanization and economic development perplex the traffic condition in Beijing. In 2004, Outlines of Beijing Transportation Development was issues to develop and improve the attractiveness of the public transportation system. Rapid transportation system was given priority to the Olympic Game in 2008. Price of the public transportation was also reduced in 2007 and 2008. For the first time in 2008, the ratio of passengers using public transport exceeded that of the private vehicle (Mao, et al, 2008).

- Prevent industrial pollution

The authority implemented strict controls over pollutants emission. These measures included: reducing the discharge of pollutants in all industries, promoting clean production and ISO14000 in key companies, reinforcing pollutant control especially in industries like metallurgy, chemical engineering, electric power, cement etc, accelerating the relocation of companies in Beijing. Except for direct environmental protection measures, further economic incentive policies were implemented, which included <Temporary measures of encouraging regional pollutants reduction in Beijing>²⁴ and <Implementation details of Beijing <Temporary measures of auditing clean production>¹⁵ issued by Beijing Finance Bureau and Environmental Protection Bureau, and < Temporary measures of encouraging withdrawing from the award of 'High polluted, High energy consumed, High water consumed'>¹⁶ issued by Beijing Finance Bureau and Industry Promotion Department.

4.2.2 Short-term policies and temporary control measures

Concerning the infrastructure construction of Beijing Olympic, three policies were issued by the Beijing science and technology commission, including the <Handbook on environmental protection in Olympic construction>, < Handbook on environmental protection in Olympic temporary venue construction> and < Handbook on environmental protection in Olympic rebuilding projects>¹⁷.

The <Green Olympic construction assessment system>¹⁸ was the first assessment system about green construction in China, it established scientific and operative assessment methods according to different construction phrase in order to ensure that any Olympic construction could reach the objective of being green and sustainable.

At the beginning of 2008, based on <The 29th Olympic Games Beijing air condition protection measures>¹⁹ approved by the State Council, the municipal Party committee and Beijing government issued <The 14th phrase of air pollution control measures>²⁰, <Air condition protection measures during Olympics and Paralympics> and <Emergent measures of air pollution control in extreme adverse meteorological conditions>²¹. Departments of construction, environmental protection and urban management issued <Scheme of dust pollution control in 2008 Beijing construction venue>²², employing grid management in construction dust control, and control of dust pollution efficiently.

Temporary pollution reduction measures were applied for the Olympic since June 1, 2008. These measures were implemented to reduce the pollution to 30%, included limiting motor vehicles on roads, shutting down construction companies with heavy pollution, ensuring emission of heavy polluted companies to an acceptable level, stopping or limiting producing in some companies²³. Emergency plan of air quality was initiated to tackle with the sustained high temperature, severe humid and no-winds adverse weather conditions. Collaboration between the Bureaus of environmental protection was established with the neighboring Tianjin city and Hebei province to implement stricter pollution control²⁴.

4.3 Effect of Beijing Olympic on air quality

With the entire endeavor, the air pollution control achieved unprecedented good result, where the air condition was improved dramatically. From 2001 to 2005, the fifth to 11th phrases measures were employed to control air pollution, and the average concentration of sulfur dioxide (SO₂), nitrogen dioxide (NO₂), inhalable particles (PM₁₀) and carbon monoxide (CO) is measured at 0.050, 0.066, 0.142, and 2.0 mg/m³ respectively in Beijing 2005²⁵.

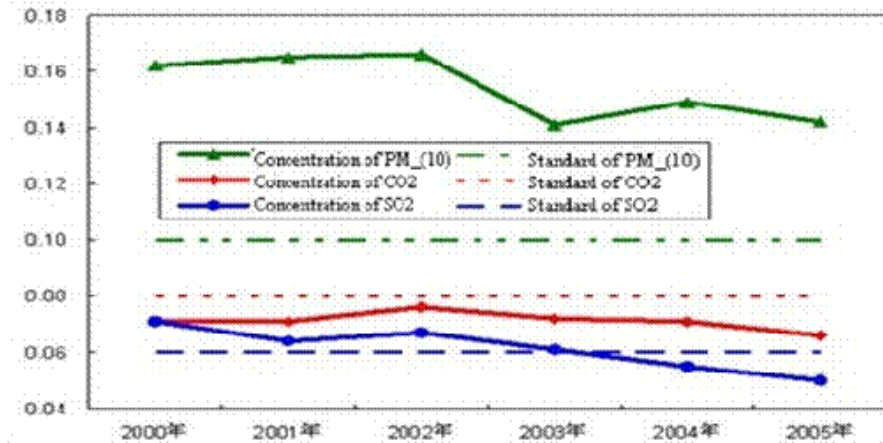


Fig 3 The Change of the air quality over 2000-2005

(Source from: Beijing Bureau of Environmental protection, 2000-2005 Bulletin of Beijing environment condition)

In 2008, all index in the air in Beijing met National air quality standard. In 1998, there were only 100 days reaching the air quality standard, which was about 27.4% of the whole year; in 2008, there were 274 days reaching the air quality standard and it was a 75.1%; in 2009, after the Olympics, there were 285 days, which reached 78.1%²⁶. Seen from the figure 27, considering improvement had been achieved on air quality from 1998 to 2009.

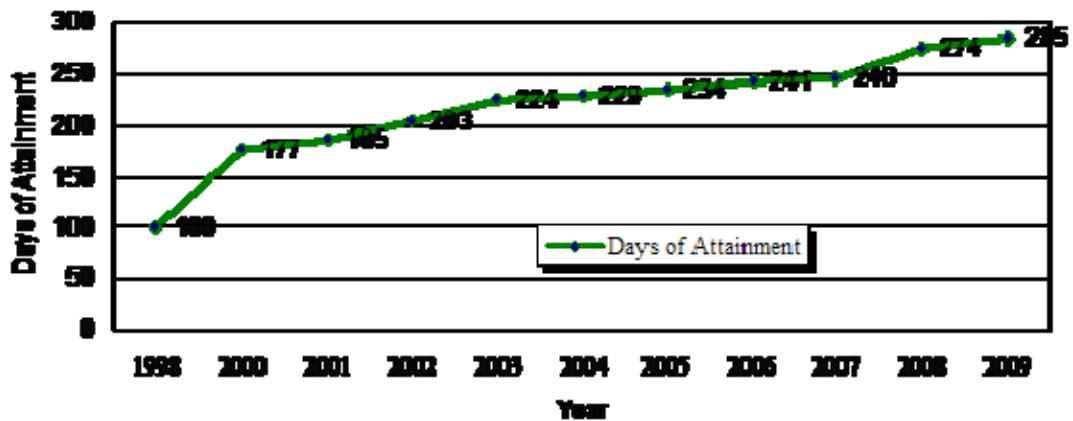


Fig 2 The days reaching the environmental standards over 1998 to 2009

(Source from: Beijing Bureau of Environmental protection, 1998-2009 Bulletin of Beijing environment condition)

During the Beijing Olympic, the air condition in Beijing all reached the standard. There were ten days when air quality met the first grade and 7 days in second grade. The concentration of all key pollutants and inhalable particles dropped dramatically. The air condition during Beijing Olympic created the best record compared with the same period in the past 10 years²⁷.

5. Discussions

Judging from the direct result and the *ad hoc* effect of the Beijing Olympic Games, Chinese government and the Beijing administrative department have delivered the promises in the bidding process. The Olympic Game actually facilitates the change towards the sustainable development of Beijing and arouses environmental friendly philosophy in China. However, whether it is optimal and sustainable is open to debate.

5.1 The costs of using mega event as an environmental rehabilitation tool

Although researchers are criticizing that China is using Olympic Green Movement to divert the other problems, it is an undeniable fact that efforts to improve environmental quality have been increasing in China. Beijing Olympic Game made contribution to the increasing the awareness of the environmental issues and facilitate the integration of the environment target into the overall social and economic plan which would normally involve a long process. Zhou's research (2009) confirms that majority of respondents perceived the impacts of the 2008 Games very positively, especially in the area of urban development impacts

However, the question should be asked that whether the mega-event model can be copied in other places in China as a catalyst for environmental improvement. The costs of environmental treatment and rehabilitation during the preparation stage are high. During the ninth five-year period (1995-2000), Beijing invested near 34 billion RMB on environmental protection, which was 3.3% of the GDP at the same period. Especially in 1999 and 2000, the investment on key projects related to environmental protection was over tens of billion RMB, which was 3.2% of the GDP at the same period²⁸. From 1998 to 2008, over 140 billion RMB was invested into controlling and managing the environmental pollution by Beijing government and over 200 measures were also implemented²⁹.

5.2 The ongoing costs of the facilities

To meet the requirements of Olympic match, Beijing Olympic built and rebuilt 36 match venues, 66 private training venues and national training bases. There were totally 102 Olympic items, new built venues and other related construction projects included 1,123 thousand square meters residential buildings, and 1,888 thousand square meters public buildings (match venues and affiliated buildings)³⁰. The total investment on all projects reached 19.49 billion RMB. Though the design, idea and techniques of sustainable development were employed in all these projects, and the consumption of conventional energy was greatly controlled and limited, the consumption of energy in construction consisted of 35% to 40% in all energy consumption in China. The consumption in construction is hardly avoided. In addition,

Beijing's Olympic bid also intensified a stunning urban boom, it is reported that more than 1.7 billion square feet of new construction has been started since 2002, most of it unrelated to the Olympics³¹.

In addition, how to manage the venues and equipments effectively after the Olympic is always the question left for almost every host cities. The after-use of Olympic venues is a worldwide problem.

5.3 The threats from the regional environmental degradations

Most measure of the environmental rehabilitation was implemented in Beijing. Concerns are also raised that since most of the polluting sources are out of Beijing, sustainability of the improved environmental quality in Beijing is doubtful (Streets, 2007). Without a long term regional environmental, social and economic plan, the environmental issues would come back to Beijing soon.

6. Conclusions

For many countries, especially the developing countries, hosting Olympic Game is a symbol of modernity and the globalization. Political and cultural representation of the Olympic Game may appear more conspicuous than the environmental concerns. However, it is possible to use the Olympic Tool to introduce and raise the awareness of sustainability and facilitate the integration of environmental concerns into the regional development. The Environmental themes therefore can act as a catalyst for the environmental campaign in the host cities.

In the case of Beijing Olympic, the awareness of the environmental issues came into the picture of the policy maker and the general public. The integration of the environmental component into regional development plan is made possible. Internationalized environmental protection standard is measured-up by Beijing, where more attentions are paid on green, environmental protection and low carbon with the world community. The 'green Olympic' Beijing helps to introduce new mechanism, ameliorate policies and improve the air condition and eco-environment.

After Beijing Olympic, the ideas of environmental protection, green and low carbon are continued in mega events in China. In June 2002, at the 132nd Representative Assembly of International Bureau of Exhibitions, China won to host the 2010 Shanghai Expo. The theme of Shanghai Expo is 'better city, better life', which incorporates three important concepts—greening, environmental protection, and energy-saving. Shanghai Expo will become a mark for urbanization, an ecological and harmonious city. Applying the idea of 'ecological urban' to guide modern cities has changed the cities from industrial cities with high energy consumption and pollution to ecological cities with the objectives of saving energy and no emission. The Expo now

has reached a high standard. It not only saves energy but also produces energy to keep balanced energy. On July 28, 2009, Shanghai government issued <Report on the environment of China 2010 Expo> with Shanghai Expo Bureau and Environmental protection Bureau³². The report shows how Shanghai attempts to improve the environment, implement green practice and advocate public participation. It illustrates the process of developing resource-saving and environmental friendly city and building a good ecological environment. It also discusses the model of urban sustainable development and advocates the idea of eco-civilization. Besides, it approves a three-year plan for environment protection practice to boost water protection, air protection, and solid waste recycling. Shanghai increased the investment in environmental protection year by year, from 14.191 billion RMB in 2000 to 42.237 billion RMB in 2008, which made 'green Expo' into reality.

The theme of Guangzhou 2010 Asian Games is 'harmonious games, green games, and civilized games'. Also, themed as 'green games', the event is trying to improve the environment with the drive from the government. By implementing four projects, which are 'green hills and lands', 'blue sky and clear water', 'glorify the appearance of city', and 'environmental protection in games venues', the event attempts to build up a natural eco-system balanced with the urban construction, so as to highlight the natural characteristics of Guangzhou, which are 'hill, water, city, farmland, sea'. The event is expected to facilitate a virtuous cycle of urban eco-system, and to make Guangzhou a suitable eco-city with natural and cultural characteristics for business, career, and living.

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Notes:

1. Declaration of the United Nations Conference on the Human Environment
<http://www.un-documents.net/unchedec.htm>
2. World Conservation Strategy <http://data.iucn.org/dbtw-wpd/edocs/WCS-004.pdf>
3. Our Common Future <http://www.un-documents.net/ocf-02.htm>
4. Olympic Charter http://www.olympic.org/Documents/olympic_charter_en.pdf
5. Olympic Movement's Agenda
21 http://www.turin2006.com/Documents/Reports/EN/en_report_300.pdf
6. Beijing's Bid Report for the 2008 Olympic Games
<http://www.people.com.cn/GB/shizheng/252/5934/5940/20010731/524806.html>
7. Environmental Monitoring of China

- <http://www.cnemc.cn/showTiaomu.aspx?id=bffb9938-de3c-4442-a28d-7040732ab0ec>
8. Beijing Olympic Action Plan, Beijing Organising Committee for the Olympic Games <http://www.people.com.cn/GB/paper53/5846/588497.html>
 9. Beijing Overall Urban Planning (2004 ~ 2020) , Beijing Municipal People's Government <http://unpan1.un.org/intradoc/groups/public/documents/APCITY/UNPAN023930.pdf>
 10. Outline of the Eleventh Five-Year Plan of the National Economy and Social Development <http://www.beijing.gov.cn/zfzx/ghxx/sywgh/t653689.htm>
 11. Host City Contract for the Games of the XXIX Olympiad http://baike.baidu.com/view/1705367.htm?fromenter=%B1%B1%BE%A9%B0%C2%D4%CB%BB%E1%D6%F7%B0%EC%B3%C7%CA%D0%BA%CF%CD%AC&fr=ala0_1
 12. Outline of the Tenth Five-Year Plan of the National Economy and Social Development <http://www.sdpc.gov.cn/fzgh/ghwb/dfgh/W020050614802777788614.pdf>
 13. Beijing Olympic Action Plan <http://www.people.com.cn/GB/paper53/5846/588497.html>
 14. Outline of the Eleventh Five-Year Plan of the National Economy and Social Development <http://www.beijing.gov.cn/zfzx/ghxx/sywgh/t653689.htm>
 15. <Guiding Opinion of Readjustment of Beijing Industrial Structures> by Beijing Development and Reform Commission <http://www.bjpc.gov.cn/zcwj/policy/tz/200904/t370276.htm>
 16. <Beijing Temporary measures of encouraging withdrawing from the award of 'High polluted, High energy consumed, High water consumed'> by Beijing Development and Reform Commission, Beijing Environmental Protection Bureau, Beijing Municipal Bureau of Industrial Development, Beijing Municipal Bureau of Finance, Beijing Municipal Bureau of Labor and Social Security, Beijing Water Authority, Beijing Administration for Industry and Commerce and Beijing Statistics Bureau <http://gyj.bjsh.gov.cn/html/jinqiyaowen/wenzi/20071120/375.html>
 17. Beijing Municipal Science & Technology Commission <http://www.bjkw.gov.cn/n1143/n1240/n1390/n1795/616702.html>
 18. Green Olympic Construction Research Team (2003). *Green Olympic Construction Assessment System*. Beijing: China Architecture & Building Press
 19. <Announcement of Air Quality Supporting Measures during 2008 Olympic Games About the Beijing 2008 games in the during the safeguards>by Beijing Municipal People's Government <http://zhengwu.beijing.gov.cn/gzdt/gggs/t948957.htm>
 20. Beijing has implemented the measures in the 14th phase of air pollution prevention http://www.gov.cn/xwfb/2008-02/27/content_903668.htm
 21. <Announcement of Emergency Schedules for Controlling Air Pollution under Extreme Weather> by Ministry of Environmental Protection of China, Beijing Municipal People's Government, Tianjin Municipal People's Government , Hebei Province People's Government http://www.gov.cn/gzdt/2008-07/31/content_1060286.htm
 22. <Control Projects of Sand Pollution in Construction Sites> by Beijing Municipal Commission of Housing and Urban-rural Development <http://www.bjjs.gov.cn/publish/portal0/tab1279/info30282.htm>
 23. Air quality during the Games ensured <http://en.beijing2008.cn/news/official/preparation/n214515904.shtml>

24. < Work Summary of Beijing Environmental Protection 2008 and work Plan of Environmental Protection 2009> by Environmental Protection Bureau,
Beijing <http://www.bjepb.gov.cn/bjhb/publish/portal0/tab403/info18253.htm>
25. Planning of Environmental Protection and Ecological Construction During Beijing's Eleventh Five-Year
Period <http://www.cbm.com.cn/data/files/%B1%B1%BE%A9%CA%D0%A1%B0%CA%AE%D2%BB%CE%E5%A1%B1%CA%B1%C6%DA%BB%B7%BE%B3%B1%A3%BB%A4%BA%CD%C9%FA%CC%AC%BD%A8%C9%E8%B9%E6%BB%AE.pdf>
26. <Beijing Air Quality Report>by Environmental Protection Bureau,
Beijing <http://www.bjepb.gov.cn/bjhb/publish/portal0/tab377/>
27. News Press of Beijing Weather Monitoring
Status <http://www.beijing2008.cn/live/pressconference/pool/bimc/n214565585.shtml>
28. Planning of Environmental Protection and Ecological Construction During Beijing's Eleventh Five-Year
Period <http://www.cbm.com.cn/data/files/%B1%B1%BE%A9%CA%D0%A1%B0%CA%AE%D2%BB%CE%E5%A1%B1%CA%B1%C6%DA%BB%B7%BE%B3%B1%A3%BB%A4%BA%CD%C9%FA%CC%AC%BD%A8%C9%E8%B9%E6%BB%AE.pdf>
29. <Green Olympics--From Concepts to Action>by Beijing Municipal Commission of Development and Reform <http://www.bjpc.gov.cn/gzdt/200807/t263831.htm>
30. Results Announcement on The Beijing Olympics Games Financial Transactions and its Venues Construction Projects http://www.gov.cn/zwgk/2009-06/19/content_1344706.htm
31. JIM YARDLEY (2007). Beijing's Olympic Quest: Turn Smoggy Sky Blue. *The New York Times* (December 29, 2007)
32. Environmental Statement of World Expo 2010
Shanghai <http://putuoshibo.eastday.com/p/node64084/u1a611887.html>

References:

- Beyer, S. (2006). The Green Olympic Movement: Beijing 2008. *Chinese Journal of International Law*, Volume 5(2), Page 423-440.
- Broudehoux, A. M.(2007). Spectacular Beijing: the conspicuous construction of an Olympic metropolis . *Journal of Urban Affairs*; Volume 29(4), Pages 383 – 399, 2007
- Dickson, C., Arcodia, C.(2010). Promoting sustainable event practice: The role of professional associations *International Journal of Hospitality Management*, Volume 29(2), Pages 236-244
- Che Le, Deng XB. (2009). 'Eco-EXPO' Planning Guidance from Conception to System. *City Planning Review*, 2009(11), Pages 26-31.
- Collins et al.. (2007). Assessing the environmental Consequences of Major Sporting Events: The 2003/04 FA Cup Final, *Urban Studies* 44 (3) Pages 457–476.
- D. Getz. (2009). Policy for sustainable and responsible festivals and events: institutionalization of a new paradigm. *Journal of Policy Research in Tourism, Leisure and Events* 1 (1) Page 61–78.

- FU, LIU, LIANG, GAO. (2007). Brief introduction of an indicator systems assessing for the impact of 2008 Beijing Olympic Games on city health environment. *Capital Journal of Public Health*, 1(4), Page 145-147.
- Gan Jing, Hu Yong. (2002). Theories and Practices for Green Olympic Games and Ecological Environment Construction in Beijing. *Journal of Beijing Forestry University*, Volume24(5), Page 61-66.
- Hyounggon Kima, Marcos C. Borgesa, Jinhyung. (2006) . Impacts of environmental values on tourism motivation:The case of FICA, Brazil. *Tourism Management 2006 (27) Page 957 - 967.*
- Jennifer Laing, Warwick Frost. (2010). How green was my festival: Exploring challenges and opportunities associated with staging green events. *International Journal of Hospitality Management*, Volume 29(2), June 2010, Pages 261-267
- Mao, B, H at al.(2008). A historical review of transportation development in Beijing. *Journal of Transportation Systems Engineering and Information Technology Volume 8(3), Page 58-67.*
- NI Yike, CAO Yueyong.(2008). Heritage from Guangzhou Asian Games 2010 from the perspective of heritage from Beijing Olympic Games 2008, *Journal of Physical Education*, 2009(10), Page 14-18.
- QU Dong. (2001). Beneficial analysis in hosting the Olympic Games and Beijing's sustainable development. *Journal of Shandong Physical Education Institute*, 2001(17) Page 52-55.
- Ren, X F. (2008). Architecture and nation building in the age of globalization: construction of the national stadium of Beijing for the 2008 Olympics. *Volume 30(2), Pages 175-190.*
- R Ong. (2004). New Beijing, great Olympics: Beijing and its unfolding Olympic legacystanford.edu - Stanford Journal of East Asian Affairs, *Volume 4(2)*
- Streets, D.G. at al. (2007) . Air quality during the 2008 Beijing Olympic Games. *Atmospheric Environment Volume 41, Pages 480-492.*
- Timsheva. (2001). *Environmental legacy of the Olympic Games*. Report on the International Olympic Academy's Special Sessions and Seminars. Retrieved from the International Olympic Academy website: http://www.ioa.org.gr/books/reports/2001/R2001_116.pdf.
- Vincent May. (1995). Environmental implications of the 1992 Winter Olympic Games. *Tourism Management*, Volume 16(4), Pages 269-275.
- Wang Weicheng. (2009). Readjustment Energy Structure, Optimization the Way of Using Energy. *Energy Conservation and Environmental Protection*. Volume 7, Page 11-13.
- WTO (2001). *The concept of sustainable tourism*. URL: <http://www.worldtourism.org/sustainable/concepts.htm>.
- Xavier Font, Catherine Harris.(2004). Rethinking Standards from Green to Sustainable. *Annals of Tourism Research*, Volume 31 (4) , Page 986-1007.
- Xu, X(2006), Modernizing China in the Olympic spotlight: China's national identity and the 2008 Beijing Olympiad. *Sociological Review*. Volume 54(2), Pages 90 - 107.
- Zhou, Y; Ap, J. (2009) Residents' Perceptions towards the Impacts of the Beijing 2008 Olympic Games; 48(1): 78-91