

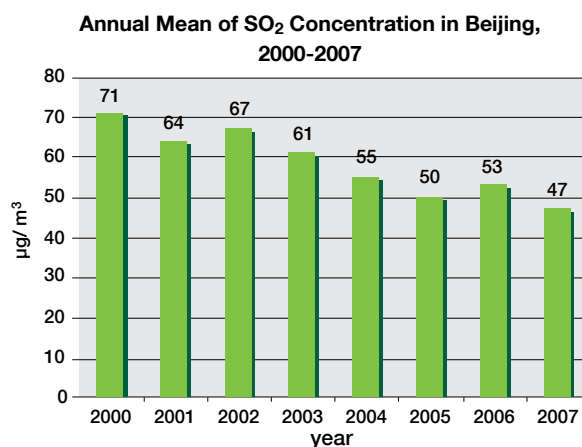
Air Quality

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.³³ Beijing is currently in the 14th 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).³⁴ 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.³⁵ The four main air pollutants related to human health impacts currently monitored daily by the Chinese government are sulphur dioxide (SO₂), carbon monoxide (CO), nitrogen dioxide (NO₂), and particulate matter (PM₁₀).³⁶ (For CO₂ emissions, see the Climate Change and Energy section).

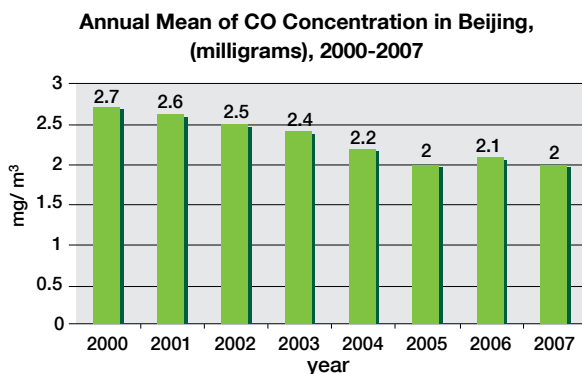
According to official figures collected by the monitoring stations, Beijing's annual air quality has shown a steady improvement since 1998. In most cases, most monitored pollutants have remained very similar from 2005 to 2007, however, the rate of air quality improvement was most evident from 2000 to 2004. The high annual mean level of PM₁₀, 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

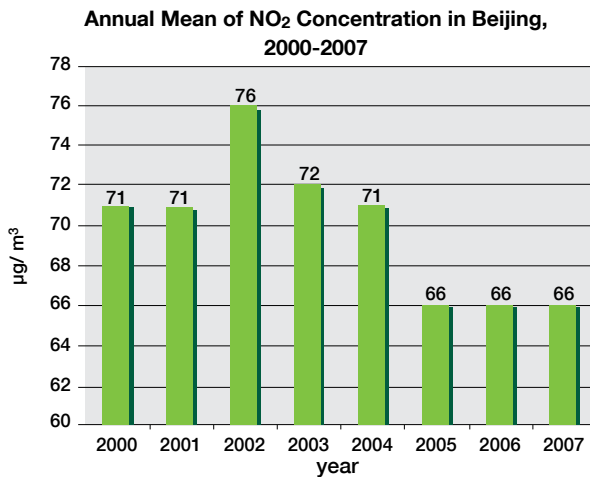
33. The Government of China Official website. "Beijing carries out its 14th phase project to improve air quality," http://www.gov.cn/xwfb/2008-02/27/content_903668.htm (in Chinese)

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

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

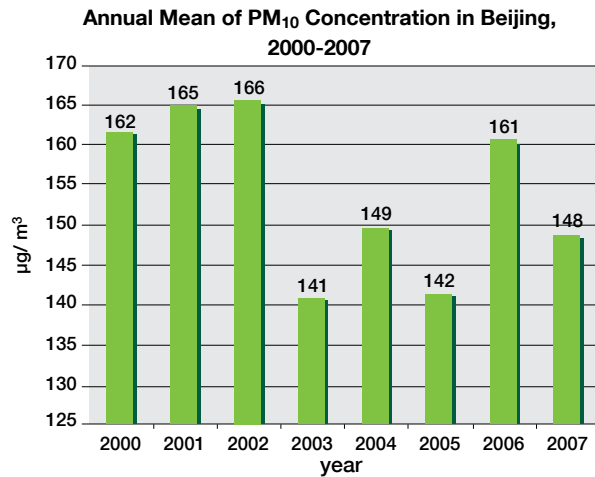
36. Particulate Matter, also known as particle pollution or PM, is a complex mixture of extremely small particles and liquid droplets. Once inhaled these particles can have adverse health effects on the heart and lung. For more on particulate matters please see <http://www.epa.gov/particles/> and also "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 ³⁷	Chinese National Standard II	Monthly average of 24-hour mean for the month of August 2006 ³⁸	Monthly average of 24-hour mean for the month of August 2007 ³⁹
SO ₂	Annual mean	None	60		
	24-hour mean	20 ⁴⁰	150	13	14
	hour mean	None	500		
	10 min mean		500		
NO ₂	annual mean		40	80	
	24-hour mean	None	120	52	58
	hour mean	200			
PM ₁₀	annual mean	20	100		
	24-hour mean	50 ⁴¹	150	99	114
CO	24-hour mean	None	4000	1400	1500
	hour mean	None	10000		
O ₃ ⁴² 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,⁴³ SO₂ monthly average 24-hour mean concentration levels meet the WHO

guideline of 20µg/m³. However, PM₁₀ 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 NO₂ 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 20th 2008, temporary closure or partial closure of 19 of the heaviest polluting industries for the duration of the Games, and limiting motor vehicle use.⁴⁴

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 SO₂ WHO standards also sets Interim targets for pollutants. For SO₂ the 24-hour concentration interim target-1(IT-1) is 125µg/ m³, interim target-2 (IT-2) is 50µg/m³.

41. For PM₁₀ WHO standards also sets Interim targets for pollutants. For SO₂ 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_{2.5} 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 SO₂, the guideline value was decreased from the 1999 24-hour concentration of 125µg/m³ to 20µg/m³ in 2005. NO₂ concentration remains the same while the 1999 WHO guideline offers no clear guideline for PM concentration.

44. BOCOG press release. April 14th, <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.⁴⁵

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.⁴⁶

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 11th Five-Year Plan," lays out clear guidelines to reduce pollutants. The plan sets stringent environmental regulations for Beijing such as cutting 40 % of SO₂ emissions.⁴⁷

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 PM₁₀.

Coal-fired power plants emit large quantities of SO₂ 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.⁴⁸

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_{2.5} and Ozone

A WHO 2005 special report stresses that aside from common pollutants, there are special risks associated with overexposure to PM_{2.5} (smaller-sized particulate matter) and ozone⁴⁹ pollutants that are not currently being monitored by Beijing. Smaller particulate matters such as PM_{2.5}, 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, NO₂ 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_{2.5} 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.⁵⁰ 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.⁵¹ 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 conference⁵²



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.cjnet.com/ShowDetails.aspx?id=415> (in Chinese)