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A series of articles and multimedia examining the human toll, global impact and political challenge of China's epic pollution crisis.

Beijing's Olympic Quest: Turn Smoggy Sky Blue

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Oded Balilty/Associated Press

Beijing residents in Tiananmen Square, used to pea-soup smog, ignored a citywide stay-indoors warning on Thursday.

By **JIM YARDLEY**
Published: December 29, 2007

BEIJING — Every day, monitoring stations across the city measure air pollution to determine if the skies above this national capital can officially be designated blue. It is not an act of whimsy: with Beijing preparing to play host to the 2008 Olympic Games, the official Blue Sky ratings are the city's own measuring stick for how well it is cleaning up its polluted air.

Thursday did not bring good news. The gray, acrid skies rated an eye-reddening 421 on a scale of 500, with 500 being the worst. Friday rated 500. Both days far exceeded pollution levels deemed safe by the [World Health Organization](#). In Beijing, officials warned residents to stay indoors until Saturday, but residents here are accustomed to breathing foul air. One man flew a kite in Tiananmen Square.



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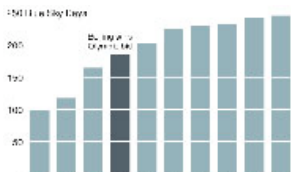
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Graphic: The New York Times. Data: Beijing Municipal Environmental Protection Administration, Beijing Environmental Protection Administration, China's State Environmental Protection Administration, 2007

Beijing's Official Blue Sky Count

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Aaron Kuo-Deemer for The New York Times
ADDED CARS, LOST HORIZONS
The rush-hour haze in western Beijing one morning this month. An additional 1,200 cars and trucks roll into Beijing every day.

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Oded Balilty/Associated Press
BUILDING VERSUS BREATHING As the National Stadium rises for the Olympics, its construction adds to the

For Beijing officials, Thursday was especially depressing because the city was hoping to celebrate an environmental victory. In recent years, Beijing has steadily increased its Blue Sky days. The city needs one more, defined as scoring below 101, to reach its goal of 245 Blue Sky days this year. These improving ratings are how Beijing hopes to reassure the world that Olympic athletes will not be gasping for breath next August.

“We’re definitely hoping for the best,” said Jon Kolb, a member of the Canadian Olympic Committee, “but preparing for the worst.”

For the world’s Olympians, Beijing’s air is a performance issue. The concern is that respiratory problems could impede athletic performance and prevent records from being broken. For the city’s estimated 12 million residents, pollution is an inescapable health and quality-of-life issue. Skepticism about the validity of the Blue Sky ratings is common. Moreover, the concern is whether the city can clean itself up long after the Games are over.

Beijing has long ranked as one of the world’s most polluted cities. To win the Games, Beijing promised a “Green Olympics” and undertook environmental initiatives now considered models for the rest of the country. But greening Beijing has not meant slowing it down. Officials also have encouraged an astonishing urbanization boom that has made environmental gains seem modest, if not illusory.

Beijing is like an athlete trying to get into shape by walking on a treadmill yet eating double cheeseburgers at the same time. Polluting factories have been moved or closed. But auto emissions are rising as the city adds up to 1,200 new cars and trucks every day. Dirty, coal-burning furnaces have been replaced, lowering the city’s sulfur dioxide emissions. But fine-particle pollution has been exacerbated by a staggering citywide construction binge that shows no signs of letting up.

China’s unsolved riddle is how to reconcile fast economic growth with environmental protection. But Beijing’s Olympic deadline means the city needs an immediate answer. The ruling Communist Party envisions the Games as a public relations showcase and is leaving no detail unintended. Scientists are cross-breeding chrysanthemums to ensure that flowers bloom in August.

Now Beijing is also going to try to manipulate air quality. For months, scientists have treated the city like a laboratory, testing wind patterns and atmospheric structure, while pinpointing local and regional pollution sources. Olympics contingency plans have been approved



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level of harmful particulates in the air. Stadiums measured by an Olympic official had four times the safe level of particulates.

for Beijing and surrounding provinces. Details are not public, but officials have discussed shutting down factories and restricting traffic during the Games.

“We are determined to ensure that the air conditions meet the necessary standards in August 2008,” Liu Qi, president of the Beijing Organizing Committee for the Games, told the [International Olympic Committee](#)'s executive board this month.

Beijing residents overwhelmingly support the Games and take for granted that officials will do what is necessary to ensure clean air. Last August, the city removed a million cars from roads during a four-day test intended to gauge pollution and traffic. But people also know that any emergency measures have a limited shelf life.

“Yes, I heard about it,” said an engineer at one factory that may temporarily be shut down. He refused to identify himself because he was criticizing government policy. “It is like you invite some guests to your home, and hide all your children underneath the bed to make the house look nicer. If all the polluting factories are shut down for the Olympics, there will be a major pollution outbreak afterward when all the factories restart, right?”

Beijing officials say the Olympics will have a lasting and positive environmental legacy on the city. International Olympic Committee officials acknowledge that air quality remains a problem, but they say the air would be far worse without improvements made for the Games. “The general trend is improvement,” said Simon Balderstone, an environmental adviser for the I.O.C.

But pollution is expected to remain a major, long-term challenge as Beijing's population may eventually exceed 20 million people. Scientists also say the city will never be able to clean itself up if surrounding industrial provinces are not cleaned up, too.

Blue skies, in other words, will remain a challenge.

Growth Offsets Gains

In July 2001, Beijing won the right to serve as the host of the 2008 Games, a victory that carried a touch of vindication. Eight years earlier, the International Olympic Committee had rejected Beijing's first bid for a variety of reasons, including the city's polluted environment.

This time, Beijing organizers promised a “Green Olympics.”

“Beijing has come a long way since its last bid in 1993,” said Wang Wei, a senior Beijing Olympics official, speaking at the city's final Olympic presentation in Moscow in 2001. “The city has taken giant steps to fight pollution caused by industrialization and economic growth.”

Beijing's environmental program had begun in 1997 and became the centerpiece of the city's Olympic environmental commitments. Urban sewage treatment has doubled since 2001. Use of natural gas has jumped 38-fold as city officials have converted thousands of dirty coal-fired furnaces and boilers. Factories have been shut down or relocated to the suburbs. Millions of trees have been planted.

“For many years, the city had few environmental rules,” said Mr. Balderstone, the I.O.C. environmental adviser, who regularly consults with Beijing officials. “It's like they are playing catch-up on a lot of these measures.”

But Beijing's Olympic bid also intensified a stunning urban boom. Since 2000, Beijing's gross domestic product has jumped 144 percent, according to Beijing Olympic officials. New office buildings and apartment towers seem to rise every week. More than 1.7 billion square feet of new construction has been started since 2002, most of it unrelated to the Olympics.

Cleaner Coal, but More of It

The emerging cityscape is often dazzling, but also energy intensive and polluting. Beijing now requires factories and power plants to burn cleaner, low-sulfur coal, but it had also hoped to reduce overall coal consumption in the years before the Olympics. Instead, the city's coal consumption peaked at 30 million tons last year. Beijing also has only one office tower that qualifies under international and national energy efficiency standards as a green building. Construction, meanwhile, is expected to continue at a rapid pace.

"I think there will be another 20 to 30 years of urbanization," said Wu Weijia, a professor at Tsinghua University's Institute of Urban Studies. "The scale of construction in Beijing will not slow down after the Olympics."

Meanwhile, an explosion of car ownership has wrought gridlocked traffic and a halo of auto fumes. Beijing now has more than three million vehicles and is adding more than 400,000 new cars and trucks each year. The city's reliance on cars and trucks leaves its air with few reprieves. As in other Chinese cities, heavy trucks can only enter at night. Diesel exhaust is so severe that Beijing's levels of PM 2.5, a tiny particulate deemed potentially harmful to health, is highest between midnight and 3 a.m., according to one survey.

Beijing is fighting auto pollution by instituting China's highest vehicle emissions standards. Nearly 79,000 new taxis with lower emissions have replaced older, outdated models. But Beijing has been unwilling to discourage private car ownership by instituting exorbitant fees as Shanghai has done. Depending on the car, license plates in Shanghai can cost as much as \$7,000; as a result, Shanghai adds about one-fourth as many cars per year as Beijing.

Beijing's problems are compounded because its public transportation system was neglected for years. Now, the city is expanding subway lines and finishing a rail line from the airport to downtown, but car ownership is expected to keep rising.

"If you discourage people from having a car, the public transportation system would be overburdened," said Mr. Wu, the Tsinghua professor.

Taking Pollution's Measure

Mr. Kolb, the Canadian Olympic official, spent much of August in Beijing trying to answer the question hanging over the city as the Games approach: Has air quality actually improved?

An environmental physiologist, Mr. Kolb visited several stadiums, and sneaked into a few others, to measure pollution with a small monitoring device. On Aug. 5, his measurement of fine particles pollution, or PM 10, reached 200, roughly four times above the level deemed safe by the World Health Organization.

"We're worried," Mr. Kolb said. Of Beijing air pollution, he added: "There's no doubt about it. It's off the charts."

A decade ago, Beijing introduced the Blue Sky program to measure sulfur dioxide,

nitrogen dioxide and PM 10. Under the system, monitors take regular readings of each pollutant and then calculate a 24-hour average for each. The daily Blue Sky rating is determined by whichever pollutant has the highest 24-hour average.

For China's authoritarian government, the system represented a breakthrough. But it is less stringent than air-quality indexes in the United States. Indeed, a day that rates "good" in Beijing would usually be rated polluted in the United States.

In 1998, Beijing recorded only 100 Blue Sky days. Each ensuing year, the city has improved the number until reaching the current 244 and pending. Cleaner coal has helped reduce sulfur dioxide by 25 percent since 2001. Nitrogen dioxide is also down. But Beijing's biggest problem is PM 10 and other particulates, which are attributed to construction, industry and cars.

Average daily levels of PM 10 exceed national and W.H.O. standards. In 2004, the concentration of airborne particulates in Beijing equaled that of New York, Los Angeles, Washington, Chicago and Atlanta combined, according to the United States Embassy in Beijing. Earlier this year, a report by the [United Nations](#) Environment Program concluded that "air pollution is still the single largest environmental and public health issue affecting the city."

"Particularly worrying are the levels of small particulate matter (PM 10) in the atmosphere, which is severely deleterious to public health," the report stated.

The Blue Sky system sets a maximum rating of 500, meaning that on the worst days the actual pollution level could be even higher. "Good" air in Beijing is any Blue Sky rating below 101. But even good air is often not very good; this year, Beijing has had 65 days that rated between 95 and 100. That bulge just inside the break point has attracted attention on Web sites and even at one foreign embassy, which compiled a statistical analysis casting doubt on the Blue Sky results, though the embassy's officials refuse to discuss the findings.

Du Shaozhong, deputy director of Beijing's Environmental Protection Bureau, said the ratings were not manipulated. "People used to ask me if the ratings are scientific, or if we are playing any tricks," Mr. Du said. "But this is most advanced equipment in the world."

Mr. Kolb said Olympic athletes were worried about ozone, which can inflame the respiratory tract and make it more difficult to breathe. But Beijing's monitoring system does not measure ozone, nor does it measure the finer particulates known as PM 2.5.

This year, a team of Chinese and American scientists analyzed air quality issues for the Olympics and found that Beijing's daily concentrations of PM 2.5 rated anywhere from 50 percent to 200 percent higher than American standards. Their study, published in the journal *Atmospheric Environment*, also found that ozone regularly exceeded levels deemed safe by American standards.

Studies are under way to assess the health impact of pollution in Beijing. One 2003 study warned that air pollution could be a major contributor to premature deaths related to chronic pulmonary disease, especially in the winter. Another study showed that visits to hospital emergency rooms rose on days with higher pollution levels.

On a recent afternoon at Beijing Hospital, Dr. Li Yi, a respiratory specialist, said he now saw 50 patients a day for respiratory problems compared with about half that a decade ago. He said asthma cases had increased sharply, as had the number of patients with

nonsmoking-related lung cancer.

“You can’t say that pollution is the only reason,” Dr. Li said. “But nonsmoking-related lung cancer is now increasing more quickly.”

Beyond the Olympics

In August, Beijing marked the one-year countdown to the Games with a celebration at Tiananmen Square and several test competitions at different sites. [Jacques Rogge](#), president of the I.O.C., applauded Beijing’s preparations, but also cautioned that pollution might force the postponement of some endurance sports.

Hu Fei, director of the Institute of Atmosphere Physics in Beijing, said any concern was misplaced. “Don’t worry about the Olympics,” Mr. Hu said, expressing confidence that contingency plans would produce clean air for the Games. “We need to be concerned about the long term.”

Mr. Hu said finding a long-term fix is difficult because of Beijing’s geography. Surrounded by mountains on three sides, Beijing depends on strong winds to disperse pollution. Yet winds also draw pollution into the city. The study in Atmospheric Environment estimated that as much as 60 percent of ozone detected at the National Stadium could be traced to outside provinces.

“Beijing is a pollution source itself, and it is surrounded by other pollution sources,” Mr. Hu said. “When you have wind, it brings in pollution from other sources. When you don’t have wind, the local pollution cannot disperse.”

Xu Jianping, 55, a business consultant, does not need to be told that Beijing is overrun with cars and construction. He is an avid in-line skater who enjoyed skating to work until pollution left him spitting out black phlegm. He went online and ordered a gas mask.

“But I don’t want to wear it,” said Mr. Xu, fearing his mask would be misinterpreted as a protest against the Olympics. “It would hurt China’s image.”

So until the Games are over, Mr. Xu is taking the bus to the office. He plans to vacation outside the city during the Games. Then, when life in Beijing returns to normal, he plans to resume skating to work — with his mask, if necessary.

Zhang Jing, Ma Yi and Huang Yuanxi contributed research.

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