

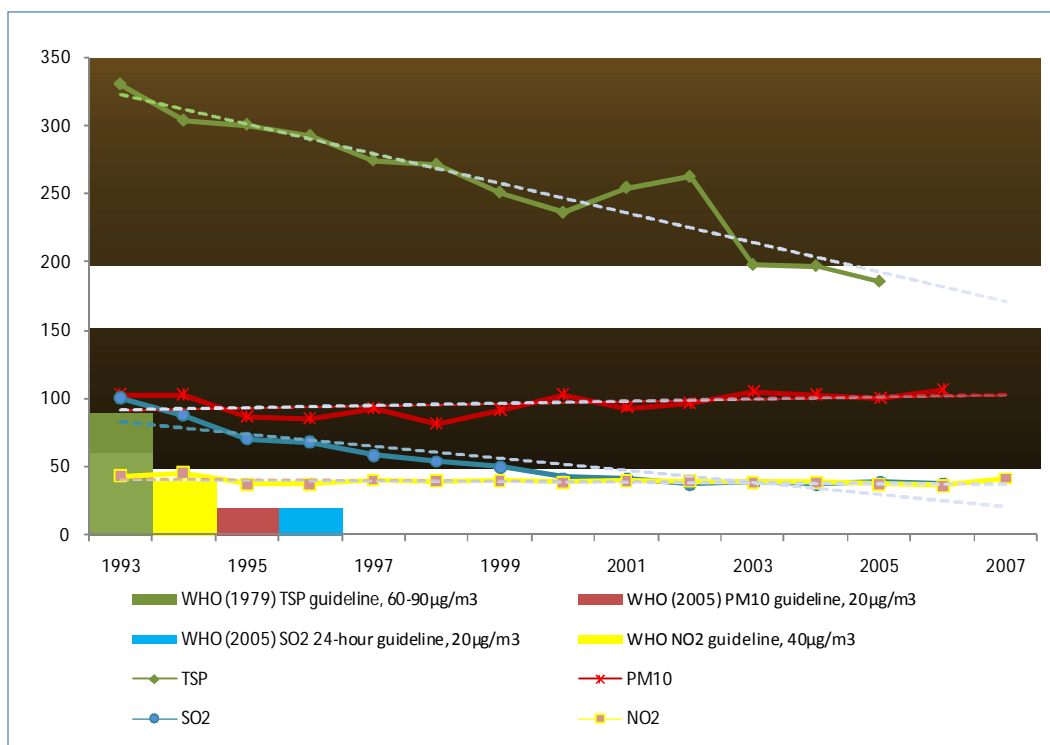


## Air Quality and Climate Change in Asia

(as of April 2008)

The rapid economic development and urbanization in Asia has resulted in environmental stress in the form of growing ambient air pollution and greenhouse gases (GHG) emissions. Air pollution poses a significant threat to the environment, quality of life and human health, particularly those living in the urban areas. In addition, climate change can exacerbate the impacts of air pollution.

The Clean Air Initiative for Asian Cities (CAI-Asia) Center has been compiling information on air quality and pollutant levels from different Asian Cities.<sup>1</sup> The table below shows the trends for the different major criteria air pollutants from 64 Asian Cities.<sup>2</sup> The chart also includes the limits for the concentration of the various pollutants as given by the World Health Organization (WHO) in 2005.



**Fig.1: Trends of Major Criteria Air Pollutants (1993-2007)**

<sup>1</sup> The efforts in collecting air quality data from the different cities commenced during the implementation of the Air Pollution in the Major and Mega-cities of Asia project in -, in cooperation with UNEP and WHO. Air quality data from 20 cities were initially collected. Today, data from 64 Asian cities have been collected and periodically updated.

<sup>2</sup> The number (64) refers to the total number of cities represented in the graph. Gaps in the air quality data for these cities exist in our data sets.

The graph shows significant reduction in the general levels of total suspended particulates (TSP) and Sulfur dioxide (SO<sub>2</sub>) from 1993 onwards. The TSP figures indicate a 44% decrease from 1993-2005 while SO<sub>2</sub> levels decreased by 62%. However, the latest figures for the said pollutants are still above the WHO guidelines.

The PM<sub>10</sub> levels demonstrated a slight increase since 1998, while the NO<sub>2</sub> levels have remained relatively flat and have stabilized around the WHO guideline which is 40µg/m<sup>3</sup>.

### Particulate Matter (TSP and PM<sub>10</sub>)

An analysis of the levels of ambient concentrations of pollutants on a per city basis indicates that particulate matter (specifically PM<sub>10</sub>) is the main pollutant of concern for most of the Asian cities. Some countries, such as China, have shifted to measuring PM<sub>10</sub> levels instead of TSP. This is because epidemiological studies have shown that PM<sub>10</sub> has greater health effects than the particles which are greater than 10 microns. Although there is no PM<sub>10</sub> threshold level below which no health impacts exists, WHO set its PM<sub>10</sub> guideline at 20µg/m<sup>3</sup> since it is the lowest level at which total, cardiopulmonary and lung cancer mortality has been shown to substantially increase. The latest PM<sub>10</sub> figures for the Asian Cities (2005 and 2006) show that none of the cities were able to comply with the guideline set by WHO (Figure 2).

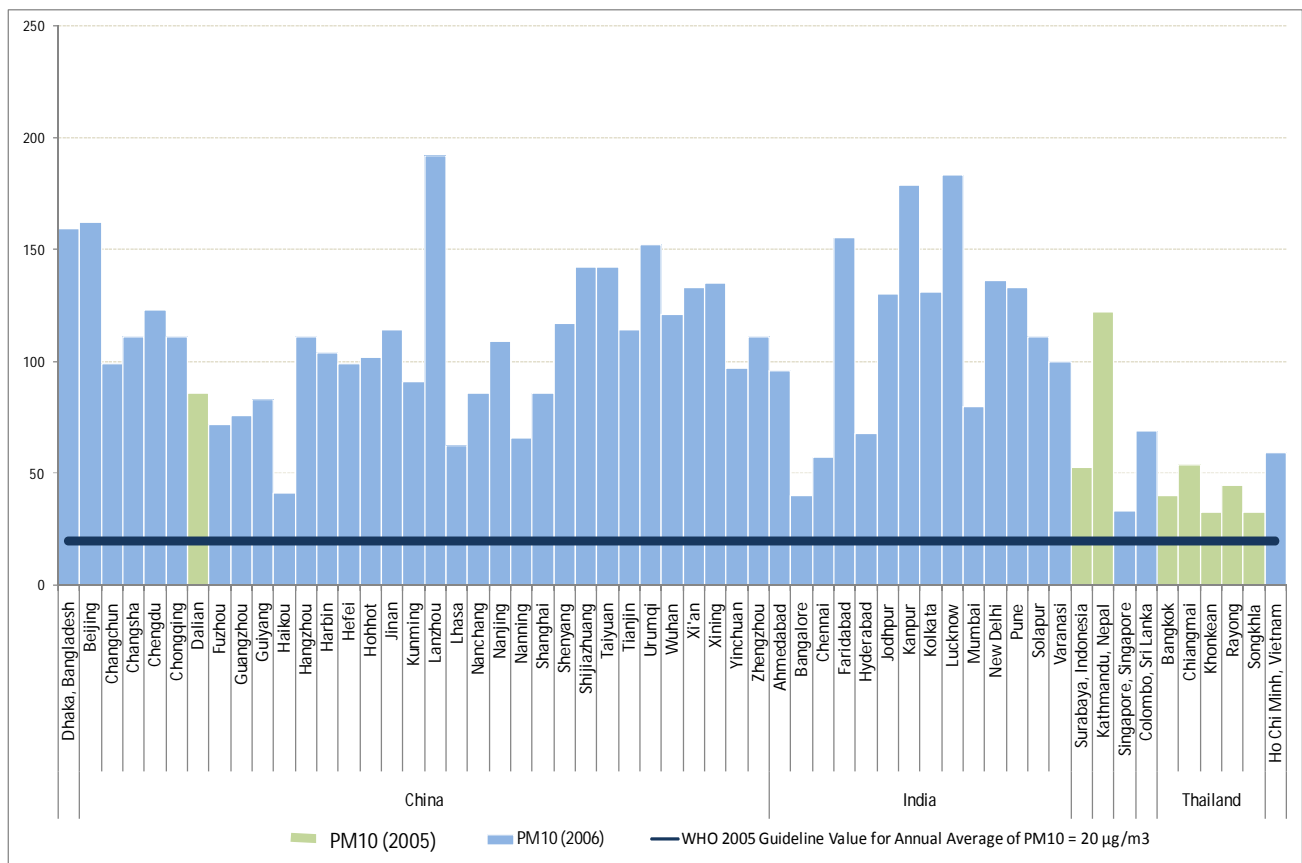


Fig.2: PM<sub>10</sub> Annual Ambient Concentrations in Asian Cities

### Sulfur dioxide (SO<sub>2</sub>)

Out of the 49 cities which have SO<sub>2</sub> data in 2006, 32 cities are at levels higher than 20µg/m<sup>3</sup>. WHO (2005) adopted a 24-hour SO<sub>2</sub> guideline of 20µg/m<sup>3</sup> but has not set any annual SO<sub>2</sub> guideline. However, it is important to note that most of the cities have achieved significant reduction in their SO<sub>2</sub> levels and only a handful of the cities have positive growth rates in their SO<sub>2</sub> levels.

## Nitrogen dioxide (NO<sub>2</sub>)

Out of the 51 cities which have NO<sub>2</sub> data in 2006, 15 cities exceeded the WHO NO<sub>2</sub> guideline, which is 40µg/m<sup>3</sup>. The said cities exceeded the WHO guideline at an average of 11.8 µg/m<sup>3</sup> (roughly by around 30%). As mentioned before, the main observation for the NO<sub>2</sub> levels of the Asian cities is that the levels have stabilized around the WHO guideline.

## Carbon dioxide (CO<sub>2</sub>)

While most of the developed countries (Annex 1) have managed to reduce their CO<sub>2</sub> emissions growth rate (2000-2005 versus 1995-2000), CO<sub>2</sub> emissions growth rate of developing countries in Asia (non-Annex 1) (with the exception of Pakistan and Philippines) have increased substantially, in general. The CO<sub>2</sub> per capita of developing Asian countries however are still much lower than countries in Europe and North America (Figure 3).

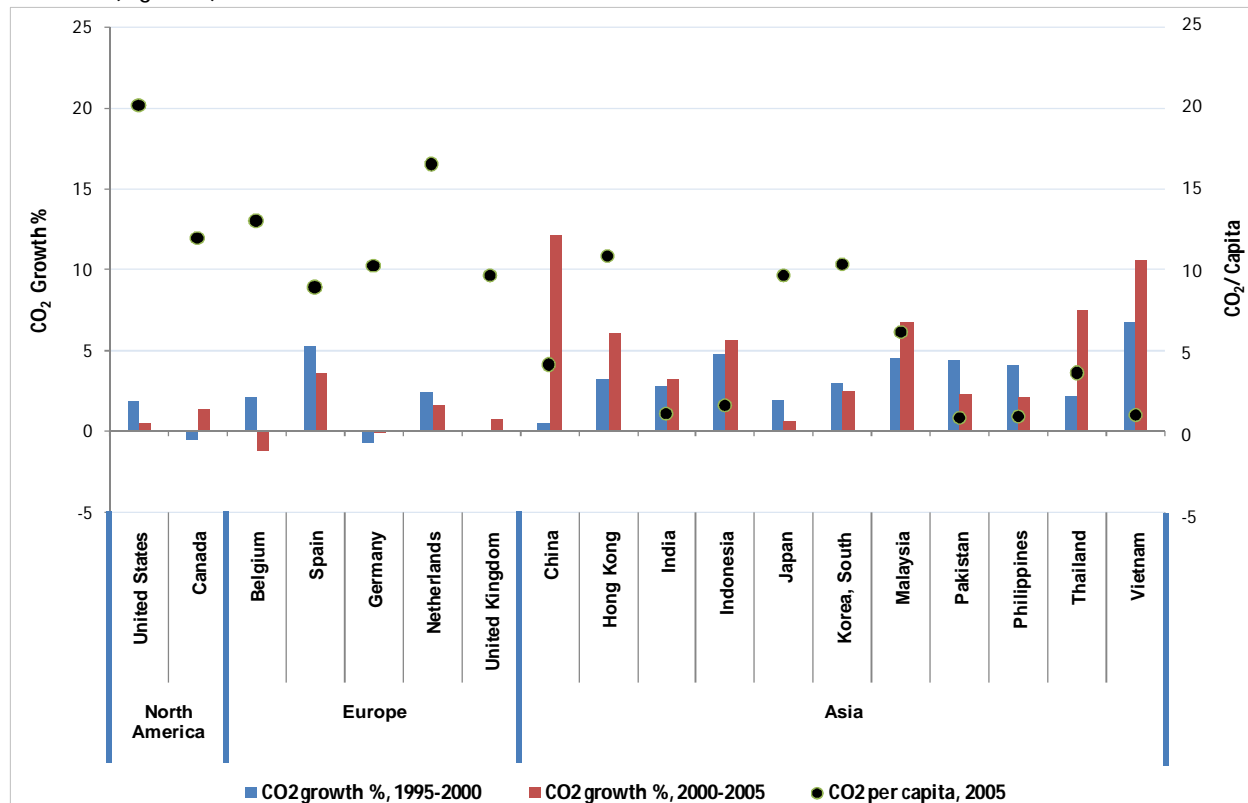


Figure 3. CO<sub>2</sub> emissions profile of select Asian, North American and European countries

Source: World Bank. 2008. Towards a Strategic Framework on Climate Change and Development for the World Bank Group: Consultation Draft

### For more information, contact:

Clean Air Initiative for Asian Cities (CAI-Asia) Center  
 3510 Robinson's Equitable Tower, ADB Avenue,  
 Ortigas Center, Pasig City, 1605 Philippines  
 Tel: (63-2) 395-2843/(63-2) 395-2845  
 Fax: (63-2) 395-2846  
 Email: center@cai-asia.org