



Dear Legco Members

19th December 2011

Please find herewith self explanatory information about the proactive measures our neighbours are taking to legislate PM2.5 particulate standards.

Fine particle pollution is a mixture of microscopic solids and liquid droplets suspended in air. This pollution, also known as respirable suspended particulate matter, is made up of a number of components, including acids (such as nitrates and sulfates and heavy metals like cadmium), organic chemicals, metals, soil or dust particles, and allergens (such as fragments of pollen or mold spores). Fine particle pollution or PM_{2.5} describes particulate matter that is 2.5 micrometers in diameter and smaller < 1/30th the diameter of a human hair. Fine particle pollution can be emitted directly or formed secondarily in the atmosphere. Examples: Sulfates are a type of secondary particle formed from sulfur dioxide emissions from power plants, ships and industrial facilities. Nitrates, another a type of fine particle, are formed from emissions of nitrogen oxides from power plants, automobiles, shipping and other combustion sources like incineration. They enter deep into our lungs unhindered by face masks, nose hairs or tracheal cilia.

US EPA <http://www.epa.gov/pmdesignations/basicinfo.htm>

"Health studies have shown a significant association between exposure to fine particles and premature death from heart or lung disease. Fine particles can aggravate heart and lung diseases and have been linked to effects such as: cardiovascular symptoms; cardiac arrhythmias; heart attacks; respiratory symptoms; asthma attacks; and bronchitis. These effects can result in increased hospital admissions, emergency room visits, absences from school or work, and restricted activity days. Individuals that may be particularly sensitive to fine particle exposure include people with heart or lung disease, older adults, and children."

I am also attaching a spreadsheet of Hong Kong's measured PM2.5 data during 2011 (excluding roadside PM2.5 which is even worse). This general PM2.5 is a speciate amalgamation of trans boundary, power generation, vehicular, construction and shipping origins.

We urge Legco to impress on the Administration to cease prevarication and take urgent action. Seemingly they do not wish to act till they have completed their current list of infrastructure projects since all would fail any EIA report if they adopted first world pollution standards.

Yours sincerely,

James Middleton

Chairman

Clear the Air NGO and Charity

EASTWOOD CENTRE 8/F 5, A KUNG NGAM VILLAGE ROAD SHAUKEIWAN HONG KONG

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<http://www.taipeitimes.com/News/taiwan/print/2011/12/15/2003520788>

TAIPEI TIMES

EPA sets air quality rules

TIGHT CONTROL: : The new **standards** for air quality are the strictest in the world and aim to reduce the amount of small particle pollution that causes heart and lung disease

By Lee I-chia / Staff Reporter

Thu, Dec 15, 2011 - Page 2

The Environmental Protection Administration (EPA) yesterday announced the strictest standards in the world for fine particulate matter with a diameter smaller than 2.5 micrometers (PM2.5), which will be included in the nation's evaluation of air quality.

The EPA said the permitted amount of particles smaller than PM2.5 will be limited to a yearly average of 15 micrograms per cubic meter and a daily average of 35 micrograms per m3, through a two-phase implementation of the new regulations.

PM2.5 — known for its health risks — will be tightly controlled under the stricter regulations, the EPA said.

“Taiwan will be only the third country in the world to adopt these air quality control measures,” said Hsieh Yein-rui (謝燕儒), director-general of the EPA's Department of Air Quality Protection and Noise Control.

Cheng Tsun-jen (鄭尊仁), a professor at National Taiwan University's Institute of Occupational Medicine and Industrial Hygiene, said studies have shown that PM2.5 pollution can cause health problems such as heart or respiratory diseases.

Chang Ken-Hui (張良輝), a professor at the Department of Safety Health and Environmental Engineering at National Yunlin University of Science and Technology, said the sources and effects of PM2.5 were complicated, with the effects often originating from long-range transport of air pollutants from abroad.

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Chang also suggested that a more aggressive approach is needed in terms of dealing with China, because as much as 37 percent of the PM2.5 recorded in Taiwan is borne on the wind across the Taiwan Strait.

Additional reporting by CNA

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<http://www.taipeitimes.com/News/taiwan/archives/2011/12/15/2003520788>

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http://focustaiwan.tw/ShowNews/WebNews_Detail.aspx?Type=aSOC&ID=201112140013

Taiwan enacts new regulations on air particulates

2011/12/14 15:00:46



Taipei, Dec. 14 (CNA) New regulations on the allowable amount of fine particles in the air will help the nation's air quality meet stricter standards within the next decade, the Environmental Protection Administration (EPA) said

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Wednesday.

The EPA said the permitted amount of particles smaller than 2.5 micrometers, or **PM2.5**, will be limited to a **yearly average of 15 micrograms per cubic meter** (ug/m³) and a daily average of 35 ug/m³, through a two-phase implementation of the regulations.

PM2.5 -- known for its health risk as it tends to penetrate the respiratory system and lead to chronic disease -- will be controlled under the regulations, which have been adopted only by the United States and Japan, the EPA said.

"Taiwan will be only the third country in the world to adopt these air quality control measures," said Hsieh Yein-rui, director-general of the EPA's Department of Air Quality Protection and Noise Control.

According to Hsieh, the EPA will work with the nation's heavy industries, such as the petrochemical and the iron and steel sectors, to cut down the precursor gases that can form PM2.5.

Joint efforts with other government branches will also be carried out to develop a public transport system using hybrid-electric vehicles as well as to reduce the use of synthetic fertilizer, Hsieh added.

"I am optimistic that we could catch up soon with Japan and the U.S. in terms of air quality control," said Chang Ken-Hui, a member of an EPA task force set up to implement the move.

Chang said the amount of PM2.5 in Taiwan was reduced by 7.5 percent between 2006 and 2010 and **maintained a yearly average of 20.8 ug/m³, or 1.4 times the average in the U.S. and Japan.**

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Chang also suggested that a more aggressive approach is needed in terms of dealing with China, because as much as 37 percent of the PM 2.5 recorded in Taiwan is borne on the wind from China.

"The seasonal winds usually carry fine particles from China to Taiwan in spring and winter," he said, adding that "multinational cooperation is needed to address the problem." (By Lee Hsin-Yin) ENDITEM/J

<http://www.whatsonxiamen.com/news22714.html>

Xiamen to extend monitoring areas of PM2.5 to the whole city in 2012

Updated: 10 Dec 2011

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Read more on [Xiamen environment](#) [Xiamen air quality](#)

The grey smog that blanketed most cities in the north and south China in the past few days has brought the PM2.5 to the spotlight, which is mainly to be blamed for the fog that not only disrupted traffic, but also decreased air quality.

PM 2.5, or particulate matter under 2.5 micrometers in size, refers to the fine airborne particles that are considered extremely hazardous to people's health as they go deeper into the lungs than the larger particles that exist in the air.

But, China currently uses PM10, or particular matter under 10 micrometers, to measure air quality.

Despite the fact that many cities in China now do not monitor PM 2.5, Xiamen, however, has started keeping track of PM 2.5 since 2010, said Xiamen Environmental Monitoring Central Station.

"At present, two of the 4 state-controlled environment & air monitoring stations in Xiamen has already started monitoring PM2.5 in real time, and another eight automatic air monitoring stations will join the monitoring of PM2.5 next year. By then, Xiamen will cover the monitoring of PM2.5 to the whole city." said Zhuang Mazhan, chief engineer of the Xiamen Environmental Monitoring Central Station.

But the monitoring data is now only used for scientific research and will not be made available to the public until introduction of new national standards.

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SOURCE: [WOXnews.com](http://www.woxnews.com)

Guangzhou to release PM 2.5 data ahead of schedule

http://www.china.org.cn/video/2011-12/16/content_24166810.htm

Following widespread calls for the government to provide more information on pollution, and particularly air quality in the country's sprawling metropolises, the Ministry of Environmental Protection has vowed to revise its air quality appraisal system by 2016. But it turns out China's third largest city, Guangzhou, capital of the southern Guangdong province, is already steps ahead of the pack.

Published data says the air is slightly polluted, but it certainly doesn't feel that way out on the streets.

The reason behind the frequent discrepancies between good government ratings and the actual experience of urban Chinese: PM 2.5 or particles less than 2.5 micrometers in diameter are missing from the equation.

Prof. Pan Xiaochuan from Medical school of Peking Univ., said, "A lot of the toxic matters in the air, such as carcinogens, are attached to the particles. They can cause great damage to your body once breathed in."



Amid calls from the public to revise the current air quality standards to include readings of concentrations less than PM2.5, the government has agreed to this, but not before 2016. But Guangzhou says no need to wait till then. It's already prepared for this, and the advantages are already showing.

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According to the Guangzhou environmental protection bureau, the **city first started collecting PM2.5 samples in 2000**. **Official monitoring began in 2009**. The new standards and strict regulation have proven fruitful. Guangzhou enjoyed fine air 98.8 percent of the time during the first 11 months of the year.

A Guangzhou resident said, "I think PM2.5 data should be published. This is the new standard. It's an international standard and we should use it."

Major cities in China, such as Beijing, Shanghai and Guangzhou, have experienced chronic haze as a result of the surge in vehicle ownership and coal use in recent years. Now with Guangzhou promising to get a head start in cleaning up its environment, residents elsewhere are hoping their cities will follow suit.

<http://nextbigfuture.com/2011/12/fine-particle-health-risks-calculated.html>

DECEMBER 09, 2011

Fine particle health risks calculated for roughly city size areas in California

Three new studies released today by the California Air Resources Board reveal that exposure to airborne fine-particulate matter significantly elevates the risk for premature deaths from heart disease in older adults and elevates incidence of strokes among post-menopausal women. Heart disease is the number one killer in California and is responsible for approximately 35% of annual deaths.

"We've long known particulate matter is a major component of California's air pollution problem," said ARB Chairman Mary D. Nichols. "These new studies underscore the need to eliminate the threat from California's air."

Particulate matter is a complex blend of substances ranging from dry solid fragments, solid-core fragments with liquid coatings, and small droplets of liquid. These particles vary in shape, size and chemical composition, and can contain metals, soot, nitrates, sulfates and very fine dust. One source of particulate matter, including PM2.5 or fine-particulate matter, is exhaust from vehicles, especially from diesel engines. **PM 2.5** is particulate matter smaller than 2.5 microns in diameter - a human hair is about 60 microns in diameter.

Michael Jerrett, Ph.D., of the University of California, Berkeley, found that exposure to fine particulate matter significantly elevated the risks for premature death from heart disease. The most frequent cause of death associated with PM2.5 in this study was ischemic heart disease,

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which can lead to heart attacks and heart failure. The findings of this study are based on the California participants in a large study sponsored by the American Cancer Society, which tracked 76,000 adults from 1982 to 2000.

In another study, Michael Lipsett, M.D., of the California Department of Public Health, led a team that examined the effects of chronic air pollution exposure on heart disease in women. The project tracked over 100,000 current and former female public school teachers and administrators in California. Like the University of California, Berkeley study, Dr. Lipsett found that exposure to PM_{2.5} elevated the risks for premature mortality from ischemic heart disease. In addition, this study found an increased risk of stroke among women who had never had one before, particularly among those who were post-menopausal.

These two studies demonstrate a relationship between long-term PM_{2.5} exposure and cardiovascular effects, such as heart attacks and strokes.

The third study, by Fern Tablin, V.M.D., Ph.D., and Dennis Wilson, D.V.M., Ph.D., of the University of California, Davis, investigated how inhaled PM_{2.5} could contribute to heart attacks and strokes. A common cause of heart attacks and strokes is development of clots in the blood stream. One suggested explanation is that PM_{2.5} exposure activates platelets, the key cells involved in blood clotting, so that they form clots and then trigger heart attacks and strokes. Drs. Tablin and Wilson examined the platelets of mice exposed to PM_{2.5} from the San Joaquin Valley Air Basin, and found that mice exposed to fine particulate matter showed platelet activation in both winter and summer, which could promote clotting and lead to stroke and heart attacks.

These new studies add to the existing scientific literature indicating that microscopic airborne particles pose a threat to public health. California Air Resources Board calculations of combined cardiovascular and respiratory (i.e., cardiopulmonary) deaths associated with PM_{2.5} exposure are based on the results of the national American Cancer Society study. Annually, 7,300 to 11,000 premature cardiopulmonary deaths in California are estimated to be associated with exposures to fine particulate matter.

[Estimate of Premature Deaths Associated with Fine Particle Pollution \(PM_{2.5}\) in California Using a U.S. Environmental Protection Agency Methodology \(39 pages\)](#)

The U.S. EPA's reports were peer reviewed in a public process by the Clean Air Scientific Advisory Committee (CASAC) Particulate Matter Review Panel, an independent peer review body of national scientists.

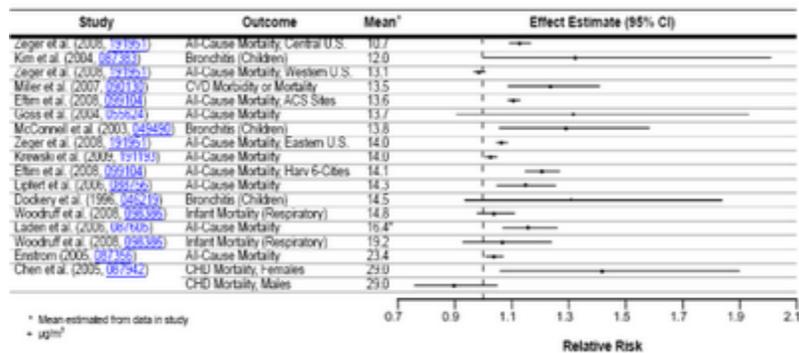
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There are a large number of published health studies that estimate the additional risk of mortality due to long-term exposure to PM_{2.5}. U.S. EPA's new quantitative health risk assessment for particulate matter uses a 2009 study (Krewski et al., 2009) for the core analysis. This study is an extension of a 2002 study (Pope et al., 2002) used in the previous PM_{2.5} NAAQS risk assessment. This report estimates premature death from PM_{2.5} in California based on the 2009 Krewski study.

Using U.S. EPA's methodology, the estimated number of annual PM_{2.5}-related premature deaths in California is 9,200 with an uncertainty range of 7,300 – 11,000. This estimate of premature deaths is based on the latest exposure period in the 2009 Krewski study with data from 116 U.S. cities and about 500,000 people.

Figure 1: Summary of effect estimates (per 10 µg/m³) by increasing concentration from U.S. studies examining the association between long-term exposure to PM_{2.5} and cardiovascular and respiratory effects, and mortality*



From Figure 2-2 of U.S. EPA Integrated Science Assessment (2009), page 2-15

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Table 2: U.S. Environmental Protection Agency National Assessment: Estimated PM2.5-related premature mortality associated with incremental air quality differences between 2005 ambient mean PM2.5 levels and lowest measured level from epidemiology studies or policy relevant background (90th percentile confidence interval)⁹

Air Quality Level	Estimates Based on Krewski et al. (2009)		Estimates Based on Laden et al. (2006)
	'79-'83 estimate (90th percentile confidence interval)	'99-'00 estimate (90th percentile confidence interval)	(90th percentile confidence interval)
10 µg/m ³ (LML for Laden et al., 2006)	26,000 (16,000—36,000)	33,000 (22,000—44,000)	88,000 (49,000—130,000)
5.8 µg/m ³ (LML for Krewski et al., 2009)	63,000 (39,000—87,000)	80,000 (54,000—110,000)	210,000 (120,000—300,000)
Policy-Relevant Background	110,000 (68,000—150,000)	140,000 (94,000—180,000)	360,000 (200,000—500,000)

Bold indicates that the minimum air quality level used to calculate this estimate corresponds to the lowest measured level identified in the epidemiological study

The results of the national scale assessment are shown above. In U.S. EPA's table the bolded figures indicate the estimate that corresponds with the lowest measured level in the epidemiological study. The bolded estimates in the Krewski et al. (2009) column were calculated using the same risk coefficients as the urban case study. U.S. EPA indicates a greater emphasis is placed on the results calculated using the lowest measured level reported in the epidemiological studies. The estimated total PM2.5-related premature mortality ranges from 63,000 – 80,000 for the two time periods in the Krewski et al. (2009) study to the lowest measured level of 5.8 µg/m³. For the Laden et al. (2006) study the estimate is 88,000 with a lowest measured level of 10 µg/m³. The 90% percent confidence intervals are shown in each case. The U.S. EPA national assessment is based on 2005 PM2.5 levels. This report provides a California estimate based on air quality data from the years 2006-2008.

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Table 4: Concentration-response functions per $\mu\text{g}/\text{m}^3$ used in U.S. EPA Risk Assessment (Krewski et al., 2009)

Endpoint	Lower Bound	Coefficient	Upper Bound
First exposure period			
Mortality, all-cause	0.00276	0.00431	0.00583
Mortality, cardiopulmonary	0.00677	0.00898	0.01115
Mortality, ischemic heart disease	0.01363	0.01689	0.02005
Mortality, lung cancer	0.00325	0.00880	0.01432
Second exposure period			
Mortality, all-cause	0.00354	0.00554	0.00760
Mortality, cardiopulmonary	0.01007	0.01293	0.01587
Mortality, ischemic heart disease	0.01748	0.02167	0.02585
Mortality, lung cancer	0.00554	0.01293	0.02029

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Current Air Quality, First Exposure Period of Krewski et al. (2009)

Annual premature deaths associated with exposure to ambient PM2.5. The numbers were calculated using rollback to 5.8 µg/m³ and the first exposure period from Krewski et al. (2009). Air quality data is an average of the years 2006 to 2008. Health impacts were assessed only in areas with ambient PM2.5 levels greater than 5.8 µg/m³.

All-Cause Mortality			
Air Basin	Low	Mean	High
Great Basin Valley	1	1	1
Lake County	1	2	3
Lake Tahoe	1	1	2
Mojave Desert	57	89	120
Mountain Counties	31	49	66
North Central Coast	13	20	26
North Coast	12	18	24
Northeast Plateau	9	13	18
Sacramento Valley	300	460	620
Salton Sea	37	58	78
San Diego County	340	530	710
San Francisco	410	630	850
San Joaquin Valley	710	1,100	1,500
South Central Coast	94	150	200
South Coast	2,200	3,500	4,700
Statewide Total	4,300	6,600	8,900

Ischemic Heart Disease Mortality			
Air Basin	Low	Mean	High
Great Basin Valley	0	1	1
Lake County	1	1	2
Lake Tahoe	1	1	1
Mojave Desert	62	76	89
Mountain Counties	26	32	38
North Central Coast	10	13	15
North Coast	9	11	13
Northeast Plateau	7	8	10
Sacramento Valley	260	330	380
Salton Sea	40	49	58
San Diego County	300	370	440
San Francisco	340	420	500
San Joaquin Valley	720	880	1,000
South Central Coast	94	120	140
South Coast	2,500	3,100	3,600
Statewide Total	4,400	5,400	6,300

Cardiopulmonary Mortality			
Air Basin	Low	Mean	High
Great Basin Valley	0	1	1
Lake County	2	2	3
Lake Tahoe	1	1	2
Mojave Desert	68	90	110
Mountain Counties	35	46	57
North Central Coast	14	18	22
North Coast	12	16	20
Northeast Plateau	9	12	15
Sacramento Valley	340	450	560
Salton Sea	44	58	72
San Diego County	370	490	610
San Francisco	440	580	720
San Joaquin Valley	840	1,100	1,300
South Central Coast	110	140	180
South Coast	2,700	3,500	4,300
Statewide Total	5,000	6,500	8,000

Links to the studies:

Michael Jerrett: http://www.arb.ca.gov/research/single-project.php?row_id=64805

Michael Lipsett: http://www.arb.ca.gov/research/single-project.php?row_id=64806

Fern Tablin: http://www.arb.ca.gov/research/single-project.php?row_id=64824

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<http://www.bloomberg.com/news/2011-12-15/death-by-air-in-beijing-shows-china-s-heart-risk-from-worsening-pollution.html>

Death-by-Air in Beijing Shows China's Heart Risk From Worsening Pollution

By Bloomberg News - Dec 16, 2011 6:39 AM GMT+0800Thu Dec 15 22:39:25 GMT 2011

Death-by-Air in Beijing Exposes Pollution's Untold Heart



Mark Ralston/AFP/Getty Images

Cars travel on the second ring road as pollution reaches what the US Embassy monitoring station says are 'Hazardous' levels in Beijing on December 5, 2011.

Cars travel on the second ring road as pollution reaches what the US Embassy monitoring station says are 'Hazardous' levels in Beijing on December 5, 2011. Photographer: Mark Ralston/AFP/Getty Images



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Dec. 12 (Bloomberg) -- Bloomberg's Paul Allen reports on Beijing's air pollution levels. Poor air quality in Beijing, and the way it's reported by government authorities, is prompting some of the city's residents to take measurements into their own hands and post the results online. (Source: Bloomberg)

As smog grounded hundreds of flights from Beijing last week, emergency doctors at Peking University People's Hospital faced a rush of patients.

Lungs weren't the problem, says Ding Rongjing, the hospital's deputy head of cardiology. Five people were admitted for heart attacks from Dec. 4 to 6, compared with one or two a week typically. One 60-year-old male patient died.

The illnesses are an unwanted consequence of the economic growth that helped spur a 32 percent jump in China's car sales last year. Outdoor air pollution kills 1.3 million people globally each year, the World Health Organization estimates. A growing body of evidence shows dirty air not only triggers asthma and other respiratory conditions, over time it may damage the heart and blood vessels, and even cause birth defects.

"Whenever we have days with bad pollution, we get significantly more patients with symptoms like high blood pressure, feeling of suffocation, and chest pains," Ding said in an interview at the hospital, where she's worked since 1996. On days of extreme pollution, heart and stroke cases at the 1,450-bed center can increase as much as 40 percent to 280 patients, she said.

Before hosting the 2008 Olympics, Beijing imposed driving limits, suspended work at construction sites and moved factories out of the city to clean up the capital's air. Economic growth, averaging 10 percent a year, and a population of 19.6 million people expanding at a 3.8 percent clip is making air-quality improvements harder to sustain.

Starve the Heart

Microscopic air particles 30 times smaller than the width of a human hair penetrate deep in the lungs, where they can pass into the bloodstream, said Jon Ayres, professor of environmental and respiratory medicine at the University of Birmingham, in a telephone interview. The contaminants increase the risk of artery-blocking clots that can starve the heart, brain and other organs of oxygen, according to Ayres. "In somebody with coronary artery disease where the arteries are narrower anyway, having blood that is more likely to clot is a bad thing," said Ayres, who chairs a U.K. panel on the medical effects of air pollutants.

The danger is increased when the inhaled substances cause the coronary arteries to become inflamed, he said. Cardiovascular disease is the biggest killer in China, accounting for 38 percent of deaths, the WHO says.

Traffic Jams

Constant traffic jams and resultant idling engines emit lung-penetrating toxic material, said Pan Xiaochuan, a professor of environmental health at Peking University who studies the impact of air pollution.

The U.S. embassy in Beijing monitors pollutants smaller than 2.5 micrometers in diameter, known as PM2.5, and releases the information via Twitter.

"What is needed is better traffic management," Pan said. "People still drive even if the traffic is bad, and it's hard to convince them to take public transport after they spent so much money to buy their own cars."

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There were 4.81 million vehicles on Beijing roads last year, triple the number in 2000, [government data](#) show. Car ownership in China is offsetting the benefits of the past decade's efforts to limit industrial emissions, said Xu Dongqun, deputy director of the Institute for [Environmental Health](#) and Related Product Safety at the [Chinese Center for Disease Control and Prevention](#).

Murky Haze

"The level of fine particulate matter is still increasing because it comes not just from industrial emission and coal-burning, but also from the large amount of cars on the roads," Xu said on Dec. 5 from a second-floor meeting room in central Beijing, where [murky haze](#) outside rendered the housing blocks across the street barely visible. "This is why we see the level of PM2.5 worsening in cities."

Emissions data on PM2.5 are slated to be made publicly available throughout China's cities, including Beijing, by 2016. The timeframe is too slow, according to a Dec. 8 editorial in the state-owned China Daily newspaper, which called on the government to be "brave enough" to measure the tiny contaminants.

The government currently uses an indicator known as PM10 that measures particulate as big as 10 micrometers in diameter for its public pollution data.

[Air quality](#) in all of the 32 Chinese cities that track pollution fall short of WHO [guidelines](#). The air in Beijing is the fifth-worst in China, based on the PM10 measure. Annual levels average 121 micrograms per cubic meter of air, compared with a [global average](#) of 71 micrograms and the 20 micrograms recommended by the Geneva-based agency.

Deadly Air

Each 10-microgram increase above WHO guidelines for PM2.5 boosts emergency room visits for cardiovascular ailments by as much as 7 percent, a 2009 [study](#) by the Peking University School of [Public Health](#) found.

Breathing dirty air does have an impact on mortality, researchers found in a [12-year study](#) in June involving 12,584 residents of the northeastern city of Shenyang. After adjusting for smoking and other known risk factors, the authors found levels of PM10 and the air pollutant nitrogen oxide "were significantly associated" with death from cardiovascular and cerebrovascular diseases, they said.

Information on air quality in Beijing is provided by multiple sources, including the U.S. embassy, and daily measurements are often inconsistent. That makes it harder for residents to know how and when they should take extra precautions, says cardiologist Ding.

Smog Deterrent

The Chinese CDC would like to see coordinated warning data broadcast on the nightly news, the center's Xu said. Publicizing the data may have implications for businesses if it means more people are worried about air quality and are reluctant to live in the city.

"That's one of the major factors that has an impact on standard of living in Beijing," said Lee Quane, the Hong Kong-based regional director for [Asia](#) at ECA International. Executives relocating from abroad will typically opt for [Hong Kong](#) over Beijing if they have choice, he said.

The human resources advisory firm recommends employers pay Beijing staff a higher hardship allowance than those in [Chinese cities](#) such as [Shanghai](#), Guangzhou, Shenzhen, Quane said.

"Beijing has historically had the worst air pollution out of the 20 mainland Chinese cities that we look at," he said. "Many of these senior executives are married and have children, who are much more affected by air pollution, so they need greater financial incentives to come."

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ECA recommends companies offer an extra 15-to-25 percent of base salary to top-level executives relocating to Beijing, compared with 10-20 percent for Shanghai.

“We definitely worry about young kids and elderly people with lung and heart diseases,” said Richard Saint Cyr, a doctor at the [Beijing United Family Hospital](#). “Most people think it’s just lungs. But if you’re already on the edge with [heart disease](#), and you’re out playing golf when the air pollution is really bad, it is a very high risk for having a heart attack.”

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Emissions key culprit for smog

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By Li Jing and Zheng Xin (China Daily)

BEIJING - A majority of the country's most hazardous airborne pollutants are coming from industrial sources, according to a newly released report by the Institute of Public and Environmental Affairs.

Known as PM2.5 pollutants - hazardous particulates smaller than 2.5 microns - such pollution can travel deep into the lungs and damage people's respiratory systems.

According to the study, China emitted 13.2 million tons of **PM2.5** in 2007, among which more than 9 million tons came from industrial sources such as petrochemical plants, cement kilns, and iron and steel smelters.

The transportation sector was responsible for nearly 600,000 tons of PM2.5 emissions that year, while residential activities contributed to 2.7 million tons of the fine particulate matter, according to the report, which cited a study on China's pollution inventory in 2007.

Such findings show industrial pollution is still the nation's biggest culprit for the worsening haze and smog in China's economically well-off eastern region.

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"Therefore, curbing pollution from industrial sources is still the key in reducing PM2.5 and improving the nationwide air quality in the long run," said Ma Jun, director of the Institute of Public and Environmental Affairs.

"Anyway, clear regulations and restrictions already exist for curbing pollution from industrial sources, so it's relatively easier to start with fixing the industries first," he said.

But for major cities, such as Beijing and Shanghai, where polluting factories have been moved out of the urban areas, emissions from vehicles play a bigger role in their worsening PM2.5 levels, making it more difficult to tackle in the short run, said Ma.

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