



A Summary of the 2015 Annual PM2.5 City Rankings

Key Findings

Cities

Greenpeace gathered statistics for 367 cities. Zhuji City, Zhejiang, has been excluded from analysis due to data deficiencies. Thus the rankings comprise a total of 366 cities.

The five cities with the highest annual average concentrations of PM2.5 in 2015 were:

Kashgar, Baoding, Dezhou, Xingtai and Hengshui.

The five cities with the lowest annual average concentrations of PM2.5 in 2015 were: Linzhi, Altay, Lijiang, Diqing and Sanya.

Beijing ranked 27 with $80.4\mu\text{g}/\text{m}^3$
Shanghai ranked 144 with $53.9\mu\text{g}/\text{m}^3$
Guangzhou ranked 261 with $38.8\mu\text{g}/\text{m}^3$
Shenzhen ranked 320 with $29.9\mu\text{g}/\text{m}^3$

The national average concentration of PM2.5 in all 366 cities was $50.2\mu\text{g}/\text{m}^3$.

Out of 366 cities, 293 cities, or 80.1%, did not reach 'National Ambient Air Quality Standard' level two limit of $35\mu\text{g}/\text{m}^3$.

Mainland Provinces, Municipalities and Autonomous Regions

In 2015, the three provinces with the highest average concentration of PM2.5 were Henan, Beijing, and Hebei.

In 2015, the three provinces with the lowest average concentration of PM2.5 were Hainan, Tibet, and Yunnan.

Of 31 Chinese mainland provinces and municipalities, only six met second grade

'National Ambient Air Quality Standards' ¹ of an annual average PM2.5 concentration of less than 35µg/m³: Guangdong, Guizhou, Fujian, Yunnan, Tibet, and Hainan.

See Appendix 1 for full rankings by province

How the data was compiled

Greenpeace's city ranking statistics were downloaded from the China National Environment Monitoring Center,² which provides hourly air quality readings from 367 cities around China. Greenpeace's City Rankings are released quarterly and aim to provide comprehensive data on national air quality and to monitor the implementation of government initiatives on air quality.

Greenpeace Analysis

2014 v. 2015

Data from 189 cities can be compared with Greenpeace's 2014 City Rankings. Comparison shows:

- 171 cities, or 90.5%, saw PM2.5 concentration fall in 2015. For the 189 cities compared with 2014, PM2.5 fell by an average of 10.3%.
- Beijing's average PM2.5 concentration for 2015 averaged 80.4µg/m³, decreasing by 3.3% on last year's Greenpeace ranking. Shanghai's 2015 annual PM2.5 average was 53.9µg/m³, an increase of 3.14% on the 2014 data. For Guangzhou, PM2.5 averaged 38.8µg/m³ in 2015, 18.4% lower than in 2014. For Shenzhen, the PM2.5 annual average was 29.9µg/m³, a drop of 7.8% on 2014 data.
- In 2015, PM2.5 concentrations fell in almost all provinces. In the ten provinces with highest PM2.5 levels, only Henan posted increases. A 1.25% increase on 2014 also means that it ranked first of all 31 provinces in the 2015 city rankings.
- Six cities have consistently appeared in the top ten worst polluted in the country. Greenpeace has classified them as 'repeat offenders'.

City	2014 Ranking	2015 Ranking	Province
Baoding	2	2	Hebei
Dezhou	6	3	Shandong
Xingtai	1	4	Hebei
Hengshui	5	5	Hebei
Liaocheng	8	6	Shandong
Heze	7	9	Shandong

¹ *National Ambient Air Quality Standards* only applies to city averages. In our analysis the second grade (35µg/m³) is used as standard for provinces.

² China National Environment Monitoring Center, <http://113.108.142.147:20035/emcpublish/>

Q4 2015 v. Q4 2014

Comparable data is available for 189 cities. Comparison shows:

- An average drop in PM2.5 concentration of 0.65%, a very slight decline compared to the national average of 10.3%.
- PM2.5 data show that 18 cities had 20 or more days of heavy pollution³ in Q4 2015 and 76 cities experienced 3 or more consecutive days of heavy pollution, meeting the criterion for a red alert under Beijing's 'Heavy Air Pollution Emergency Response Plan.'
 - ✧ Baoding experienced 35 days of heavy pollution, Langfang 32 days, Liaocheng 32 days, Hengshui 30 days, Beijing 26 days, Shijiazhuang 23 days, Jinan 20 days and Zhengzhou 20 days.
- Beijing Q4 2015 saw heavier pollution than Q4 2014 and Q4 2013. See graph:

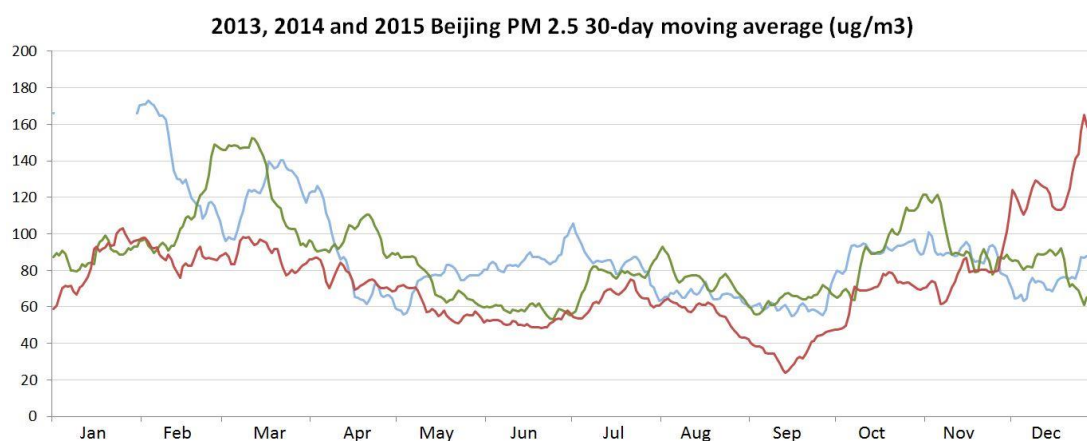


Figure 1: Blue line: 2013; Green line: 2014; Red line: 2015

What happened this winter?

Although PM2.5 levels nationwide and in Beijing fell again in 2015, Beijing and some other northern cities experienced particularly bad air pollution in the last two months of the year. This was the cause of public outcry and led to the first ever announcement of a red alert for smog.

Using Beijing as an example, Greenpeace analysis of weather statistics from Weather Underground⁴ found that the weather conditions this winter had a large impact on causing smog to form more easily.

Greenpeace assessed days with wind speeds of less than 8km/h and with relative

³ In accordance with the *Technical Regulation on Ambient Air Quality Index*, 'heavy pollution' is defined as $200 < AQI \leq 300$, and 'severe pollution' is defined as $AQI > 300$. A day with 24-hour-average PM2.5 > 150 means $AQI > 200$, and is classified as a day of heavy pollution in our analysis.

⁴ Weather Underground provide WHO METAR data which covers surrounding regions around Beijing Capital Airport. (<http://www.wunderground.com/>)

humidity of over 75%, defined as 'smog-prone condition days'. According to statistics drawn from this sample, in November and December 2014 only 19 days fell into the category of 'smog-prone condition days', whereas in 2015 wind and humidity conditions that favoured the creation of smog were present on 41 days in the same period. This shows that the weather conditions were a major cause of the high incidence of smog during November and December 2015.

Though the weather had a large impact on the frequent concentration of smog in Beijing this winter, it is not the *cause* of the pollution. The number one cause of air pollution is emissions from the burning of coal.

Trends in Key Areas, 2013-2014-2015

From 2013-2015, air quality in the Beijing-Tianjin-Hebei area, Yangtze River Delta area and Pearl River Delta (PRD) area improved significantly.

- 2015 average concentration of PM_{2.5} in the Beijing-Tianjin-Hebei area was 77.1 $\mu\text{g}/\text{m}^3$, a decrease of 25.6% on 2013.
 - ✧ According to a plan issued by the NDRC on December 30, 2015, entitled the 'Jing-Jin-Ji Development of Ecological Environment Protection Plan', by 2017 Beijing-Tianjin-Hebei region's PM_{2.5} concentrations should average 73 $\mu\text{g}/\text{m}^3$.
 - ✧ In 2013 to 2015, Beijing-Tianjin-Hebei annual average PM_{2.5} concentrations were 103.6 $\mu\text{g}/\text{m}^3$, 92.6 $\mu\text{g}/\text{m}^3$, and 77.1 $\mu\text{g}/\text{m}^3$, respectively.
- For the Yangtze River Delta area, the 2015 average was 52.9 $\mu\text{g}/\text{m}^3$, 20.2% lower than in 2013.
- In the PRD area the 2015 average was 34.4 $\mu\text{g}/\text{m}^3$, a drop of 25.5% on 2013.
- In accordance with the September 2013 'Air Pollution Prevention and Control Action Plan', the State Council issued targets for the 2017 annual average concentration of PM_{2.5} in Beijing of 60 $\mu\text{g}/\text{m}^3$. In 2013, 2014 and 2015 Beijing PM_{2.5} concentration averaged 90.1 $\mu\text{g}/\text{m}^3$, 83.2 $\mu\text{g}/\text{m}^3$, 80.4 $\mu\text{g}/\text{m}^3$, respectively.

Greenpeace calls for:

1. The Chinese government should include national coal consumption cap in the upcoming 13th Five Year Plan in order to improve China's air quality.
2. Local governments should revise and strengthen the 'Heavy Air Pollution Emergency Response Plan' in order to provide appropriate reaction to heavy pollution episodes. Local governments must also ensure that the Response Plan is effectively implemented.
3. China should use the opportunity of the mid-term review of the 'Air Pollution Prevention Plan' to review progress in curbing air pollution and update PM2.5 targets accordingly, and to extend such PM2.5 governance objectives to other areas of China outside of the three key regions.

Appendix 1: 2015 air quality ranking by province. Note, provinces marked in blue are those which met the second grade 'National Ambient Air Quality Standard'⁵ of 35µg/m³.

	Province	Average PM2.5 concentration 2015 (µg/m ³)
1	Henan	80.7
2	Beijing	80.4
3	Hebei	77.3
4	Tianjin	71.5
5	Shandong	66.4
6	Hubei	65.9
7	Jiangsu	56.6
8	Shanxi	56.4
9	Anhui	55.1
10	Chongqing	55.0
11	Liaoning	55.0
12	Jilin	54.4
13	Shanghai	53.9
14	Xinjiang	53.7
15	Hunan	52.5
16	Shaanxi	52.0
17	Zhejiang	47.7
18	Sichuan	46.7
19	Ningxia	45.8
20	Jiangxi	42.8
21	Qinghai	42.6
22	Gansu	41.2
23	Inner Mongolia	41.0
24	Guangxi	40.2
25	Heilongjiang	39.4
26	Guangdong	34.0
27	Guizhou	31.7
28	Fujian	28.7
29	Yunnan	28.0
30	Tibet	25.4
31	Hainan	19.3

⁵ *National Ambient Air Quality Standards* only applies to city averages. In our analysis the second grade (35µg/m³) is used as standard for provinces.