CREA

Centre for Research on Energy and Clean Air

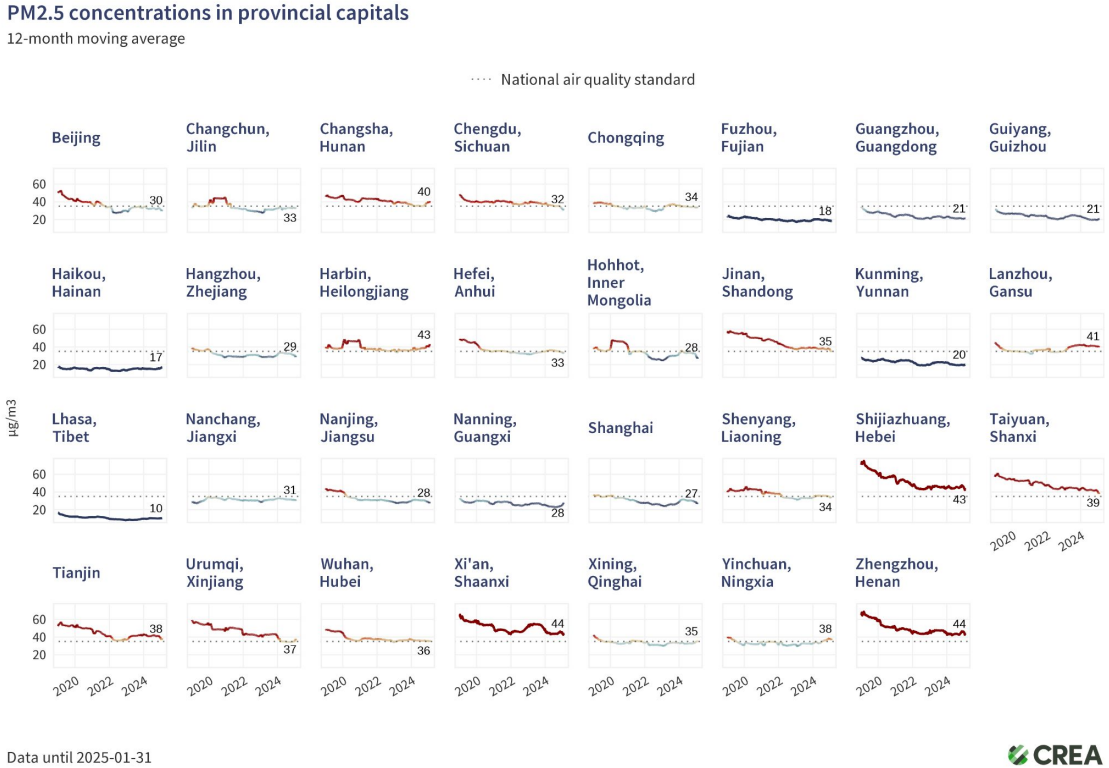
China energy and emissions trends

February 2025 snapshot

Due to the unavailability of energy and industrial raw data for January, this report only includes an analysis of air pollution. Other analyses will resume in next month's snapshot.

The 12-month average PM2.5 levels in 11 provincial capitals exceeded the national standard in January, with Xi’an ranking the highest

- Over the past 12 months, the average PM2.5 levels in 11 out of 31 provincial capitals exceeded the national standard of 35 µg/m³. This marks an increase of one capital city exceeding the standard compared to last month.
- The highest annual average PM2.5 levels were recorded in the provincial capitals of Shaanxi, Henan, Hebei, Heilongjiang, and Gansu, all located in northern China, with values of 44, 44, 43, 43, and 41 µg/m³, respectively.



Data until 2025-01-31

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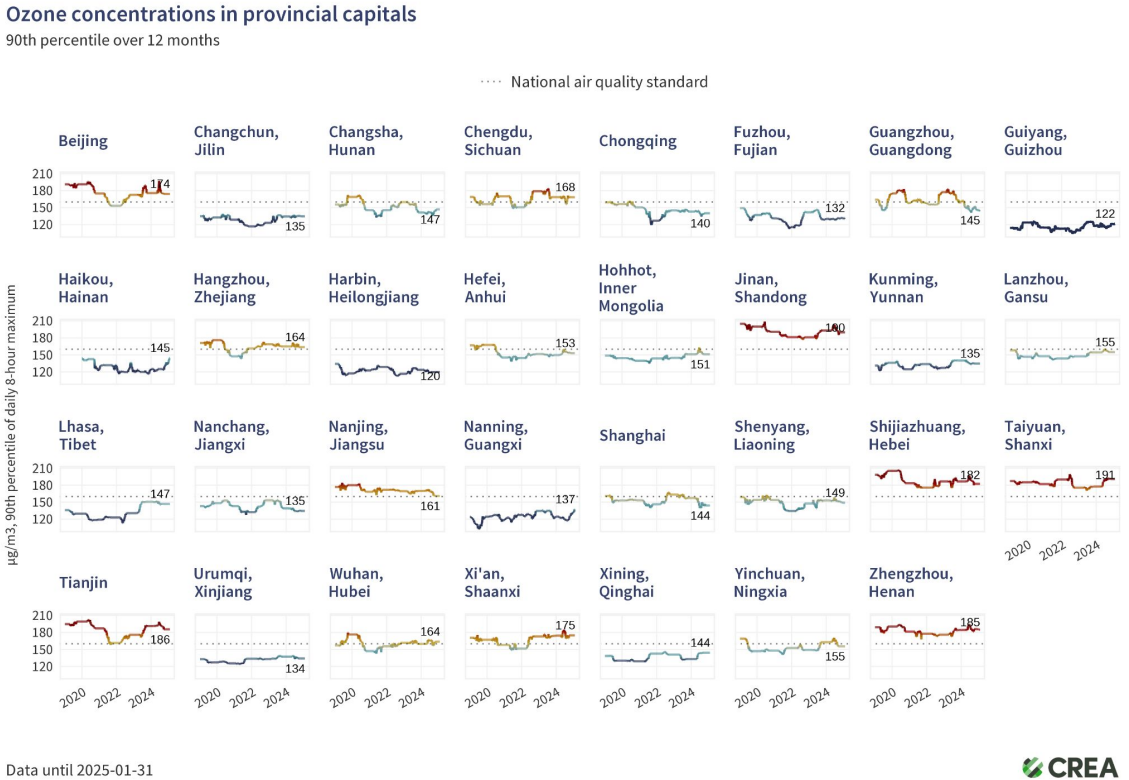
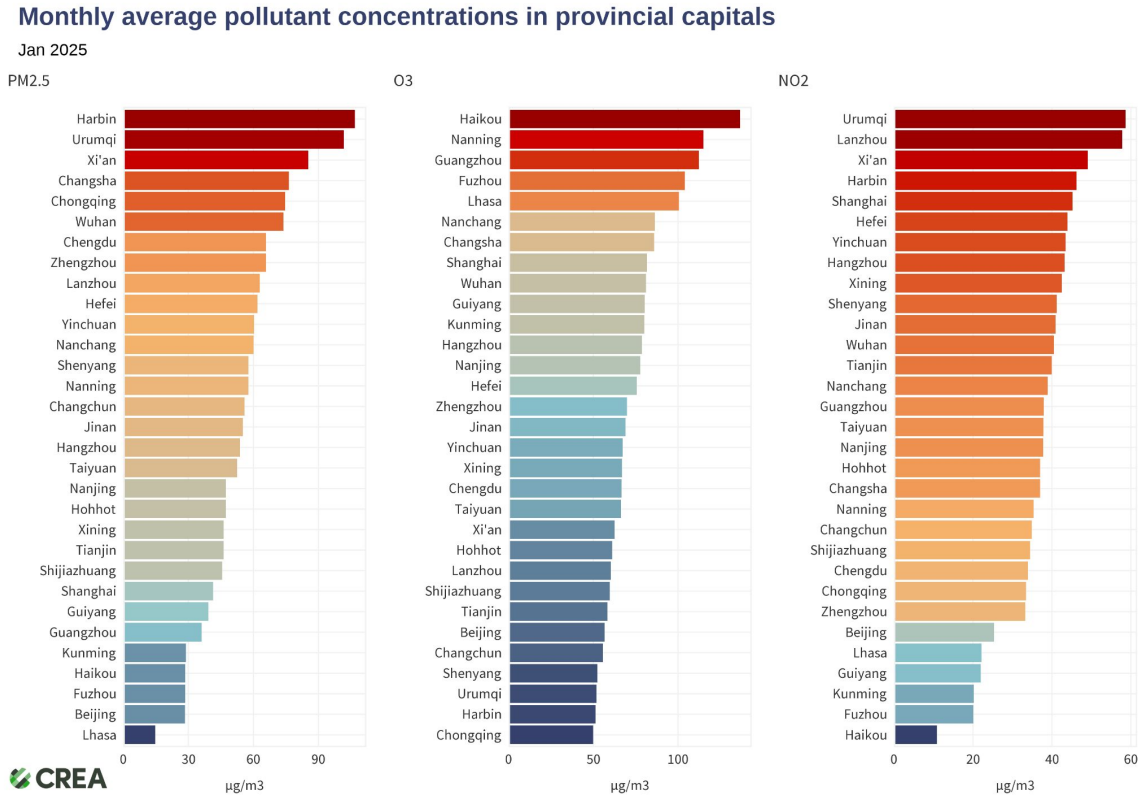
Eleven provincial capitals exceeded the national standard for ozone, led by Taiyuan and other northern cities

- Over the past 12 months, 11 out of 31 provincial capitals exceeded the ozone standard of 160 μg/m^3.
- The highest 90th percentile ozone levels during this period were recorded in the capitals of Shanxi, Shandong, Tianjin, Henan, and Hebei, all located in key northern control regions, at 191, 190, 186, 185, and 182 μg/m^3, respectively.
- The number of capital cities exceeding the ozone standard remained unchanged from last month.



Harbin recorded the highest PM2.5 concentration in January, with severe pollution concentrated in northern China

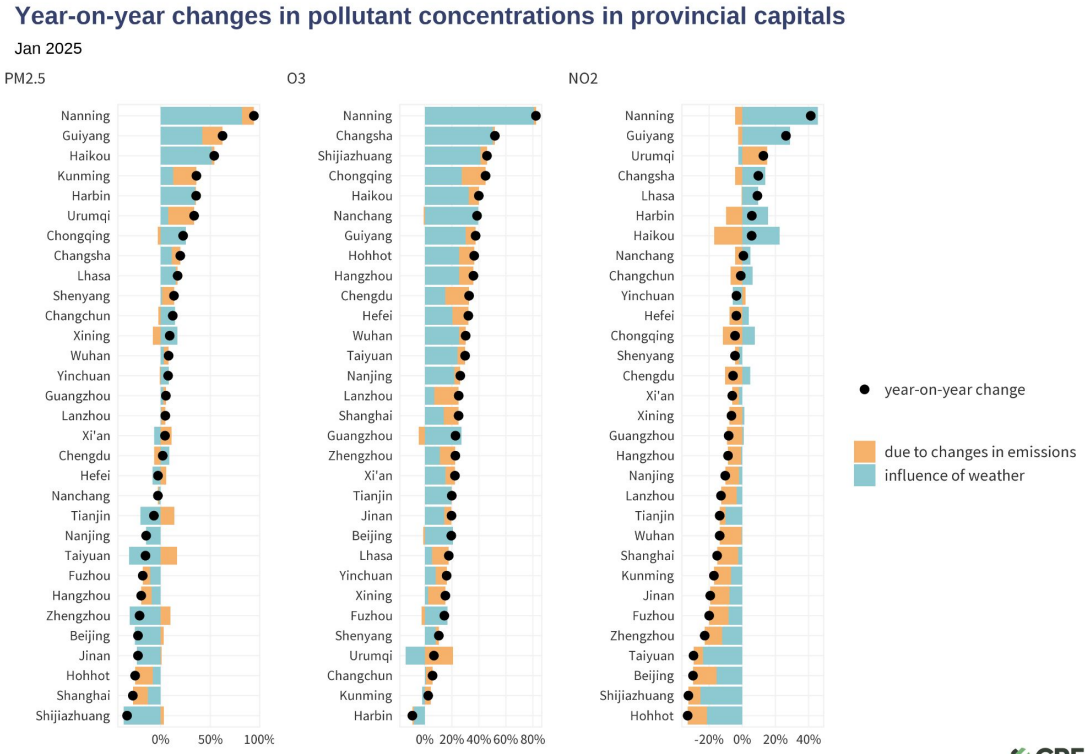
- The worst PM2.5 levels in January were concentrated in northern regions, with Harbin, the capital of Heilongjiang province, recording the highest concentration at 107 μg/m³. It was followed by the capitals of Xinjiang, Shaanxi, and Hunan provinces, with monthly concentrations of 102, 85, and 76 μg/m³, respectively.
- The highest ozone levels were recorded in Haikou, the capital of Hainan province, at 137 μg/m³, followed by the provincial capitals of Guangxi, Guangdong, and Fujian, with monthly concentrations of 115, 112, and 104 μg/m³.
- Urumqi, the capital of Xinjiang, had the highest NO2 levels, ranking worst for this pollutant with a monthly concentration of 59 μg/m³. It was followed by the provincial capitals of Gansu, Shaanxi, and Heilongjiang, all located in northern China. NO2 contributes to both PM2.5 and ozone formation and is a hazardous pollutant on its own.



The provincial capital of Guangxi recorded the highest year-on-year increases for PM2.5, O3, and NO2 in January due to adverse weather conditions

- PM2.5 pollution saw the largest year-on-year increases in the provincial capitals of Guangxi, Guizhou, Hainan, and Yunnan, rising by 94%, 62%, 54%, and 36%, respectively, mainly due to weather influences.
- The highest year-on-year increases in ozone levels for January were recorded in the capital cities of Guangxi, Hunan, Hebei, and Chongqing, also primarily driven by weather conditions.
- Year-on-year NO2 increases were most significant in the capital cities of Guangxi, Guizhou, and Xinjiang in January.

Our analysis projects the influence of weather conditions on air pollution levels using a machine-learning model trained on actual data for each city. The variations that cannot be explained by weather conditions are attributed to changes in emissions.



Worst 7-day air pollution episodes by pollutant

PM2.5 (excluding sandstorms)

city	province	dates	average concentration	highest daily concentration
Wujiaqu	Xinjiang	Jan 16 – Jan 22	272	339
Harbin	Heilongjiang	Jan 20 – Jan 26	185	238
Suihua	Heilongjiang	Jan 19 – Jan 25	156	235
Xi'an	Shaanxi	Jan 27 – Feb 02	149	262
Xianyang	Shaanxi	Jan 27 – Feb 02	148	233

Ozone

city	province	dates	average concentration	highest daily concentration
Zhanjiang	Guangdong	Jan 01 – Jan 07	168	185
Haikou	Hainan	Jan 04 – Jan 10	167	198
Yangjiang	Guangdong	Jan 03 – Jan 09	161	182
Maoming	Guangdong	Jan 01 – Jan 07	158	170
Beihai	Guangxi	Jan 01 – Jan 07	155	179

Sandstorms ($PM_{2.5}$)

city	province	dates	average concentration	highest daily concentration
Zhumadian	Henan	Jan 24 – Jan 30	39	150
Changde	Henan	Jan 23 – Jan 29	33	234
Bozhou	Anhui	Jan 23 – Jan 29	23	163
Changsha	Hunan	Jan 23 – Jan 29	19	131
Huanggang	Hubei	Jan 23 – Jan 29	19	131

NO_2

city	province	dates	average concentration	highest daily concentration
Wujiaqu	Xinjiang	Jan 15 – Jan 21	95	115
Urumqi	Xinjiang	Jan 16 – Jan 22	76	84
Lanzhou	Gansu	Jan 17 – Jan 23	71	78
Zhenjiang	Jiangsu	Jan 16 – Jan 22	71	87
Ili Kazak	Xinjiang	Jan 12 – Jan 18	70	81

Unit: μg/m³

Data sources

- Industrial output, power generation and power capacity additions, as well as fuel imports and exports, are based on Chinese government data, through Wind Financial Terminal. Some of the data is not included in public releases.
- Measured air quality data is compiled from Chinese government air quality monitoring stations. Weather-controlled air quality is derived from CREA's deweathering algorithm.