



China Air Quality Management Assessment Report (2017)

Lite Edition



CAAC Clean Air Management Report

This series applies CAAC management and evaluation tools to support Chinese provinces and cities to systematically evaluate their air quality management systems. The goal is to assist them in a sustainable manner to construct and ameliorate their quality management systems, and to select and implement efficient air quality management measures. This series of reports is compiled together by CAAC secretariat, CAAC member provinces and cities and CAAC experts.

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Executive Summary

The *Air Pollution Prevention and Control Action Plan (2013-2017)* (the *Ten Air Measures*) reached its 3rd anniversary in 2016, which was at the keystone stage of accomplishing the air quality goals by 2017. In 2016, the overall air quality in China continued to improve greatly. The number of cities whose PM_{2.5} concentration met China's Ambient Air Quality Standards (AAQS GB 3095-2012) increased from 12 in 2015 to 14 in 2016, among the 74 selected key cities. The annual average concentrations of PM_{2.5} in these 74 cities ranged from 21 µg/m³ to 99 µg/m³ with an average of 50 µg/m³ and a reduction of 9.1% compared to that of 2015. Days with substandard air quality in these 74 cities amounted to an average of 25.8% of a year and a decrease of 3.0% compared to 2015. Among all the 338 cities at prefectural level and above in China, 86 of them met the national air quality standard in 2016, accounting for 24.9%; The number of days with excellent and fairly good air quality in the 338 cities amounted to an average of 78.8% of a year, which was 2.1% better than that of 2015¹.

Continuous improvement of air quality requires strong support from effective scientific tools and system management. This report analyzes air

quality conditions, emission control efforts and environmental management progress, as well as various challenges in pollution control in 2016 across 30 provinces/cities in mainland China with the exception of Tibet (due to data availability). The report serves to provide information and references to help local provinces/cities government to improve air quality management strategies.

Major findings of this report include:

▲ **Air Quality:** China's air quality has significantly improved in 2016. However, PM_{2.5} pollution remained prominent in some areas, especially in Jing-Jin-Ji region during the heating season. Annual average PM₁₀ concentrations in some provinces increased in 2016 compared with 2015.

The annual average concentration of PM_{2.5} in 10 provinces/cities (Beijing, Tianjin, Hebei, Shandong, Shanxi, Shanghai, Jiangsu, Zhejiang, Pearl River Delta and Chongqing) located in the key areas of PM_{2.5} pollution control were generally reduced by an average of 7.8% in 2016. Nine provinces/cities (except Beijing) have already reached the 2017 reduction targets in the *Ten Measures Air* in advance.

PM_{2.5} pollution remained prominent. The area

1. *The Report on the State of Environment 2016.*

with the most serious PM_{2.5} pollution was Jing-Jin-Ji region, followed by the Yangtze River Delta, Hunan and Hubei, Chengdu and Chongqing region. Pearl River Delta has basically been the greatest attainment area. The PM_{2.5} pollution in Jing-Jin-Ji region was more serious during the heating season from 2013 to 2016, and the average concentration of PM_{2.5} in the 2016 heating season² in the "2+26" channel cities exceeded the national standards by more than two times.

Six provinces have reached the 2017 reduction targets for PM₁₀ concentration ahead of time, including Anhui, Sichuan, Jiangxi, Guangxi, Heilongjiang, and Guizhou but annual average PM₁₀ concentrations in Shanxi, Shaanxi, Jiangxi, and Xinjiang increased in 2016 compared to 2015.

▲ **Air Quality:** The overall NO₂ concentration in China decreased in 2016. Ozone pollution began to emerge. SO₂ concentration still exceeded standards in some areas.

The overall NO₂ concentration decreased and the average annual NO₂ concentration in six provinces/cities including Beijing, Hebei, Shanghai, Chongqing, Tianjin, and Henan did not meet the standards in 2016. Compared with 2015, the annual average concentration of NO₂ in 10 provinces/cities, namely, Hebei, Tianjin, Chongqing, Henan, Shaanxi, Shanxi, Anhui, Xinjiang, Guizhou, and Ningxia, continued to increase, with Anhui and Tianjin recording the greatest raise. O₃ pollution began to emerge in

China. In 2016, O₃ concentration in Beijing, Jiangsu, Shanghai, Hebei, and Henan exceeded the standards while in 2015 it was only Beijing, Jiangsu and Shanghai. Furthermore, 14 provinces/cities recorded higher O₃ concentrations than 2015. Among the "2+26" channel cities located in Jing-Jin-Ji and the surrounding region, 19 of them obtained O₃ levels exceeded the national standards and 21 of them experienced O₃ concentration increases comparing to the previous year.. Among 26 cities located in the Yangtze River Delta, O₃ levels exceeded the standards in 9 cities and increased in 16 cities, and O₃ pollution in 8 cities in Anhui province increased substantially. The overall state of O₃ levels in the Pearl River Delta was better than that of Jing-Jin-Ji and the Yangtze River Delta regions, with Jiangmen and Dongguan the only two substandard cities. In 2016, the annual average SO₂ concentration in 29 provinces/cities reached the standard set except for Shanxi.

▲ **Pollutant Emission Control:** The reduction of various pollutant emissions experienced prominent improvements. Adequate progress was made in cutting SO₂ and NO_x emissions. VOCs emission has become the new focus of air pollution control in China. The control of NH₃ emissions has increasingly drawn broad attention. Progress has also been made in GHGs co-control. Nevertheless, it requires more efforts to control disseminated pollutant sources (such as disaggregated coal and disqualified companies), and motor vehicle pollution, as well as to further readjust energy and industrial structures..

2. Data comes mainly from the historical data of PM_{2.5} Zhenqi.com, the heating season in the report is from November to March of the following year.

The control of SO₂ emissions was effective, as national SO₂ emissions in 2016 were cut by 30.5% from the 2006 peak value. The cap control of NO_x still achieved certain progress, despite the fact that it started several years later than SO₂ control. Besides fuel combustion, mobile sources are one of the main contributors to NO_x emissions. In 2015, on-road vehicle emissions resulted in 584.99 million tonnes of NO_x, accounting for 31.6% of the total emissions in China. Different government departments should collaborate with each other, starting from key areas and industries, to push forward the control of NO_x pollution.

VOCs emission is estimated to be 25 million tonnes in China, which urges the acceleration for total control and prevention of VOCs. . Many regulations and emission standards have been released by central and local authorities to promote the control of VOCs emissions.

The total emission of ammonia is about 10 million tonnes in China, 90% of which is due to agriculture and livestock breeding. Over the past few years, the control of ammonia emissions has drawn broad attention, but the lack of fundamental research and effective strategies indicates a long way to go for ammonia emission control.

Control of coal consumption, particulate pollution, straw burning, and elimination of “yellow-label” vehicles /high emission vehicles also greatly promoted GHGs co-control.

▲ Air Quality Management Progress: Nine major air quality management methods were introduced and analyzed, including discharge

permits, air quality attainment plans, emergency systems for heavy air pollution, environmental law enforcement and inspection, air quality monitoring, joint prevention and control in Jing-Jin-Ji region, clean heating system, economic policy and information publication. Advanced cases in air quality management were introduced as well.

The General Office of the State Council published *Plan for Control of Pollutant Discharge Permit System* on Nov. 21th, 2016. The Ministry of Environmental Protection then published *Interim Provisions on the Administration of Pollutant Discharge License*, which stipulates the permit to be the only administrative license for pollutant emissions.

In 2016, there were only 84 cities that met the ambient air quality standards out of 338 cities in China, which means the rest 254 cities need to prepare an air quality attainment plan according to the requirements of the new *Law on Air Pollution Prevention and Control*. The *Air Quality Attainment Planning Manual* and the several related case studies in the United States and Shenzhen are useful tools for the development of such air quality attainment plans.

Heavy air pollution emergency management has improved. Suggestions have been made to upgrade the existing emergency plans, as well as measures assuring air quality during major events..

The most strict environmental protection inspection action was carried out in 2016. A total of 28,728 legal cases have been inspected and handled by two central inspection groups , 8,897 companies

have been fined with an overall penalty of 298 million yuan, and 575 people were detained. The inspection groups have also held 6,543 persons accountable and questioned another 6,842.

There are more than 5,000 monitoring sites all over China, including 1,436 national auto-monitoring sites whose management rights have been given back to the central government. The grid monitoring system based on Internet +, big data, and cloud computing has become the new tool for accurate smog control.

The joint prevention and control of Jing-Jin-Ji region have made great progress. A collaboration group for air pollution control in Jing-Jin-Ji and the surrounding area has been assembled. After three years of collaborative governance, the level of four main air pollutants have all decreased in Jing-Jin-Ji region.

The control of disaggregated coal burning pollution has attracted the attention of the central government. In 2016, the Ministry of Environmental Protection compiled *A Technical Guide for Compiling the Air Pollution Emission List of the Civil Disaggregated Coal* and *A Technical Guide for Comprehensive Management of Disaggregated Coal Burning Pollution in Rural Areas*. ICCS and Beijing Municipal Research Institute of Environmental Protection compiled *Guidance on Disaggregated Coal Control and Clean Energy for Heating Supply*. These documents aim to give instructions for control of disaggregated coal-burning pollution.

The first PRC Environmental Protection Tax Law has been approved and discharge fees will be

replaced by such tax. The cement industry began to implement a stepwise tariff. The government has applied the system of guaranteeing the purchasing of electricity generated by using wind and photovoltaic power, and has defined purchase thresholds. Across the nation, 138,000 illegal environmental cases have been investigated and recorded, which increased by 34% compared to 2015. Total fines increased by 56% to 6.63 billion yuan.

As for information disclosure, greater progress has been made in 2016 compared to 2015. The assessment report for annual work scheme implementation has been made open to public in more provinces/cities. New social media outlets has been created to improve information disclosure and interaction in more provinces/cities, and public participation has been expanded as a result.

▲ **Challenges in Air Pollution Control:** There are obvious discrepancies among regions when facing upcoming challenges in air quality control. Industrial structure, energy consumption, and vehicle emissions are facing increasing reform pressures, despite the continuous progress in the former two aspects.

The differences of self-purification capacity among different regions are obvious. The areas with such high capacity are often to suffer less air pollution.. In 2016, the proportion of secondary and tertiary industry decreased in the 30 provinces/cities, with the exception of Guizhou. The average proportion of secondary and tertiary industry was 0.891, which was 9.7% less than that of 2015. The heavy pollution industries accounted for over 50% of the total industrial outputs in Qinghai and Gansu. As

for energy structure, coal took up more than 80% of primary energy in Inner Mongolia, Shanxi, Ningxia, Guizhou, Shaanxi, Anhui and Hebei. Significant differences lied in the amount of coal consumption per unit of area and primary energy consumption per 10,000 RMB of GDP among different provinces/cities. In 2016, coal accounted for 62% of the total energy consumption in China and further adjustments are still needed. In 2016, the car parc in China

reached 184 million, which is a increase of 13.6% compared to 2015. Private car ownership per 1000 people in the rest 28 provinces/cities (excluding Beijing and Tianjin) in 2015 grew by more than 9% compared to 2014. The pressure of vehicle pollution control is unprecedented.

Clean Air Alliance of China (CAAC)

To address the air pollution challenge in China, ten leading Chinese technical institutions in the air quality field joined hands to launch the Clean Air Alliance of China (CAAC). It is envisioned that CAAC will provide an integrated platform for provinces and cities to access the international experience, tools and practices on the one hand; and facilitate the communication and collaboration among provinces and cities on the other hand. The overarching goal is to improve air quality of Chinese provinces and cities and mitigate the negative impacts on public health due to air pollution. CAAC will be led and supervised by the alliance steering committee, and be managed by the alliance secretariat regarding general operation and coordination.

Ten Founding Members

Tsinghua University, Chinese Academy for Environmental Planning (CAEP), Appraisal Center for Environment & Engineering of MEP, Fudan University, Nanjing University, Beijing Normal University, Chinese Research Academy of Environmental Sciences (CRAES), Peking University, Vehicle Emission Control Center (VECC) of MEP, Renmin University of China



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