

Reduction of the Total Load of Major Pollutants

Basic Objectives

The objectives set for reducing the total load of major pollutants in 2012 are to reduce the total load of COD and SO₂ by 2% respectively and ammonia nitrogen by 1.5% from the 2011 baseline levels, and to manage zero growth in the total load of NO_x compared with the previous year.

Outcomes

In 2012, the total load of COD discharged throughout the country amounted to 24.237 million tons, down 3.05% from a year earlier; ammonia nitrogen 2.536 million tons, down 2.62%; SO₂ 21.176 million tons, down 4.52%; and NO_x 23.378 million tons, down 2.77%. The year-on-year total load of each of the four major pollutants went down.

Major Measures

In 2012, earnest efforts were made to implement the following plans, including Comprehensive Work Plan for Energy Conservation and Pollution Reduction during the 12th Five-Year Plan Period from 2011 to 2015, 12th Five-Year Plan for National Environmental Protection, and 12th Five-Year Plan for Energy Conservation and Pollution Reduction. Tough regulation was conducted on verifying the total load of major pollutants. Pollution reduction measures were carried out with the emphasis on municipal wastewater treatment plants, paper mills, livestock and poultry breeding farms, thermal power plants, iron and steel makers, cement plants, and vehicles. There were growing financial inputs into pollution reduction, and the long-term mechanism for pollution reduction was improved. **Reduction of COD and ammonia nitrogen:** the municipal wastewater treatment

capacity (including that of designated towns and industrial parks) grew by 12.94 million tons/day, and the municipal wastewater recycling capacity was up by 3.01 million tons. Advanced treatment/recycling processes through chemical oxidation approach were introduced in 315 paper mills and printing and dyeing companies. Inefficient paper making facilities were phased out with combined capacity of 7.35 million tons, so were inefficient printing and dyeing facilities with combined capacity of 3 billion meters. The wastewater and solid waste disposal facilities were upgraded in 8,630 large-scale livestock and poultry breeding farms (plots), and the efficiency for removing COD and ammonia nitrogen was up by 9 and 28 percentage points respectively. **Reduction of SO₂:** new power generating units with installed capacity up to 47.25 million kW were equipped with desulfurization facilities and put into operation this year. As a result, the total installed capacity of power generating units with desulfurization facilities added up to 718 million kW, accounting for 92% of the combined capacity of thermal power generating units. The flue gas bypasses were dismantled from 289 in-service power generating units whose combined capacity amounted to 127 million kW, so the comprehensive desulfurization rate was up to over 90% from 85% before. There were 97 new sintering machines installed with flue gas desulfurization facilities, and the sintering area amounted to 18,000 m². **Reduction of NO_x:** denitrification facilities were installed onto 250 sets of thermal power generating units with combined installed capacity of 96.7 million kW this year, adding the installed capacity of the units with denitrification facilities up to 226 million kW, which accounted for 27.6% of the installed capacity of thermal power generating units, up from 16.9% in the previous year. Denitrification facilities were also installed on 148 new type dry-process cement production lines, whose production capacities totaled 523,000 tons/day. Moreover, 1.32 million yellow-labeled vehicles were banned from the street. By the end of the year, the denitrification efficiency of the power generating units all over the country had averaged at 48%, up 18 percentage points compared the same period last year. The power generating units with denitrification facilities in 14 pilot provinces (which introduced the pricing policy

for power generated by such units) took up two thirds of the national total in terms of installed capacity; the denitrification efficiency of the pilot provinces averaged at 51.6%, 11 percentage points higher than that of the rest provinces. The pricing policy set for the electricity generated by power

generating units with denitrification facilities had mobilized the enthusiasm of thermal power companies to build and operate the denitrification facilities. As a result, the NO_x emitted from the power industry dropped by 7.1%.

12th Five-Year Plan for Energy Conservation and Pollution Reduction

The State Council officially released 12th Five-Year Plan for Energy Conservation and Pollution Reduction (hereinafter referred to as the Plan) on August 6, 2012. The Plan is one of the specific plans approved by the State Council for the 12th Five-Year Plan period and is also a guideline in promoting energy conservation and pollution reduction during this period. This Plan is crucial for meeting the obligatory targets for energy conservation and pollution reduction. According to requirements of the Plan, the targets of reducing total discharge of major pollutants during the 12th Five-Year Plan period are 8% reduction of COD and SO₂ and 10% reduction of ammonia nitrogen and NO_x by 2015 compared with that of 2010.

The Plan has the following characteristics. First, the Plan is based on objective analysis of the reality and correct estimation of current situation. Second, the Plan has a practical guiding principle with emphasis on establishing target-driven mechanism, perfecting incentive and constraint mechanism, and forming work pattern for energy conservation and pollution reduction. The Plan's principles have set precise directions and a clear overall target, with specific reduction goals in key industrial areas, agriculture, etc. Third, the Plan has a focus on major tasks, which include optimizing industrial structure, improving energy efficiency, strengthening reductions of major pollutants, strengthening five subsequent tasks in reductions of major pollutants, strengthening construction of urban sewage treatment facilities, strengthening reductions of pollutants in key industries, launching the prevention and control of agricultural source pollution, controlling emissions from motor vehicles, and pushing forward the control of PM_{2.5}. Fourth, the Plan proposes with ten major projects in energy conservation and pollution reduction, six of which are closely related to pollution reduction, that is, construction of urban sewage treatment facilities, prevention and control of pollution of key basins, desulfurization and denitrification project, project of the prevention and control of pollution caused by livestock and poultry breeding farms, circular economy model projects, and capacity building project for energy conservation and pollution reduction. Fifth, the Plan proposes ten matching measures, utilizing legal, economical, technological and necessary administrative resources to guarantee the implementation of the Plan. Sixth, the Plan has further identified the responsibilities and functions of local governments at all levels as well as relevant departments.

Atmospheric Environment

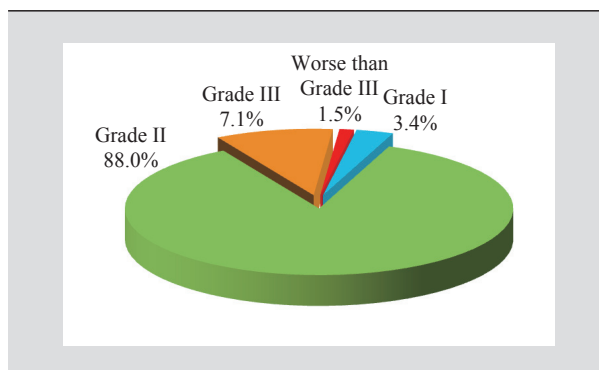
General Situation

Three major pollutants SO₂, NO₂ and PM₁₀ were evaluated in 325 cities at or above prefectural level (including some prefectures, autonomous prefectures, leagues, and province-governed cities) and 113 national key cities tasked with environmental protection, in accordance with Ambient Air Quality Standards (GB 3095-1996)*. The results indicated the ambient air quality was stable in cities nationwide throughout the year. The situation was also stable concerning acid rain pollution in the country, with still serious pollution, however.

Air Quality

Cities at or above prefectural level 91.4% of the cities at or above prefectural level met ambient air quality standards (at or better than Grade II standard) this year, up 2.4 percentage points from a year earlier. Among them, 11 cities including Haikou, Sanya, Xing'an, Meizhou, Heyuan, Yangjiang, Aba, Ganzi, Pu'er, Dali, and Altay, met Grade I air quality standard, while 8.6% failed to meet Grade I or Grade II standard.

In 2012, 98.8% of the cities at or above prefectural level recorded the annual average level of SO₂ at or better than Grade

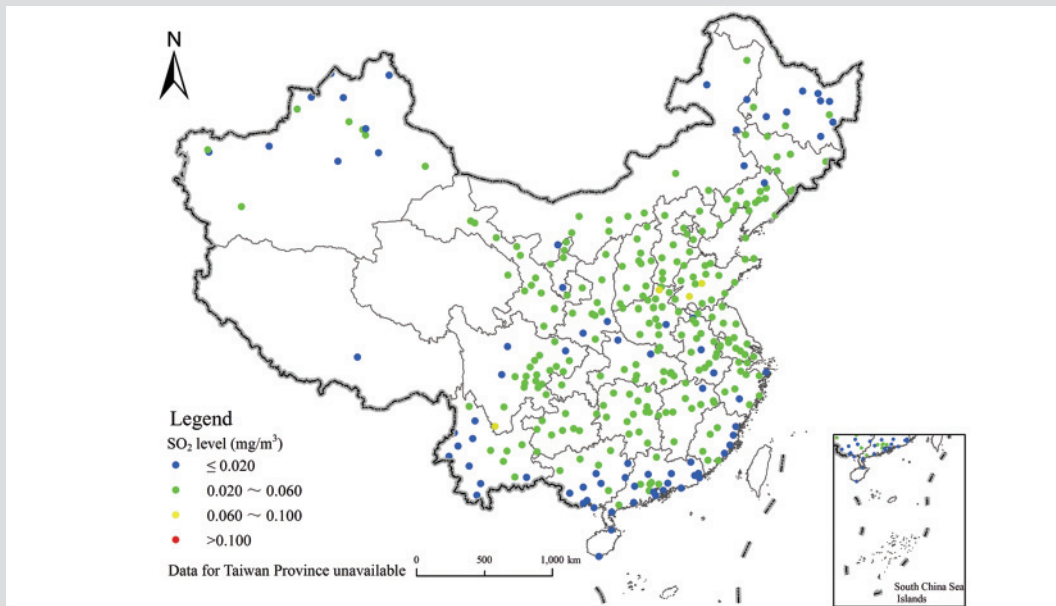


Percentage of graded ambient air quality in cities at or above prefectural level in 2012

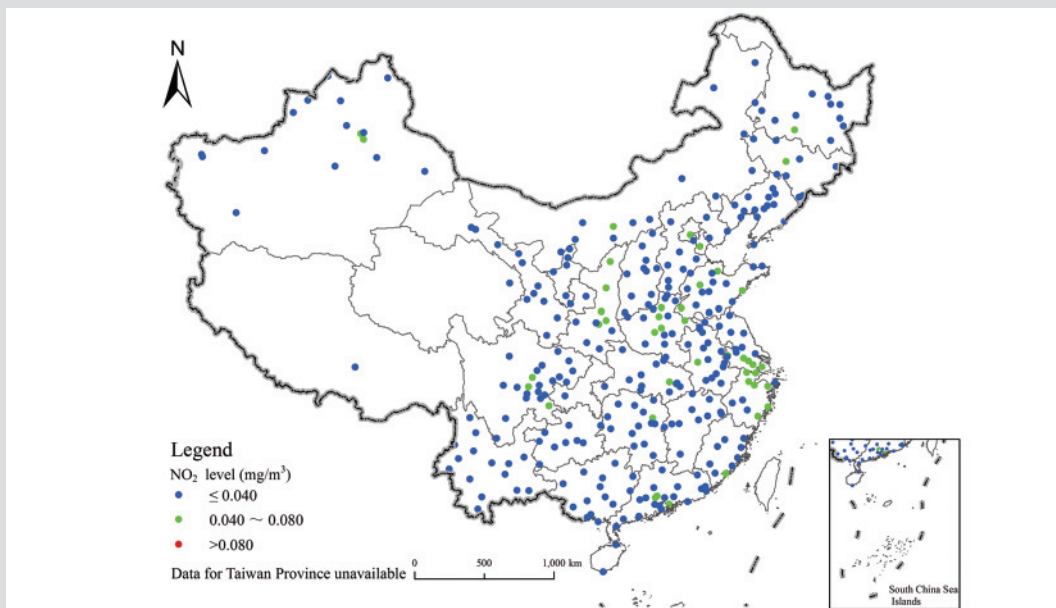
II standard, and no cities recorded it worse than Grade III standard. The annual average level of SO₂ ranged between 0.004 mg/m³ and 0.087 mg/m³, mainly from 0.020 mg/m³ to 0.050 mg/m³.

The annual average level of NO₂ met Grade I or Grade II standard in all of the cities at or above prefectural level; and 86.8% of them met Grade I standard this year. The annual average level of NO₂ ranged between 0.005 mg/m³ and 0.068 mg/m³, mainly from 0.015 mg/m³ to 0.045 mg/m³.

* According to validity, Ambient Air Quality Standard (GB3095-1996) was still valid in 2012 and the evaluations were carried out accordingly, except otherwise specified.



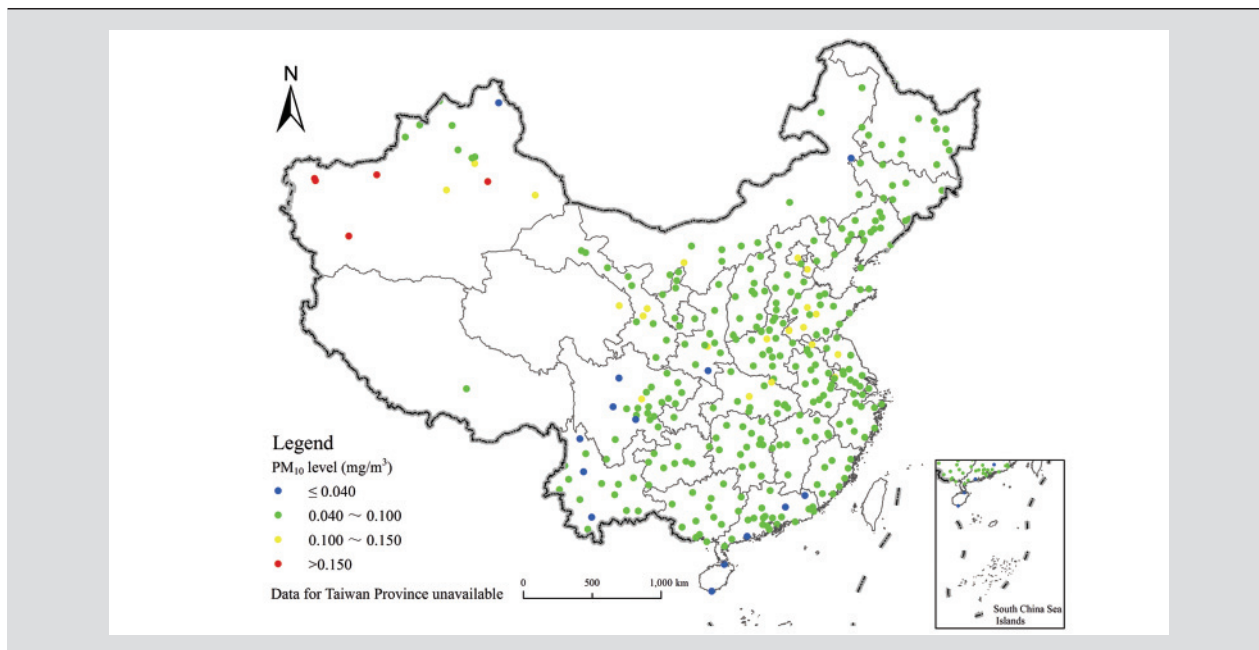
Annual average level of SO₂ in cities at or above prefectural level in 2012



Annual average level of NO₂ in cities at or above prefectural level in 2012

The annual average level of PM₁₀ met or was better than Grade II standard in 92.0% of the cities at or above prefectural level, and was worse than Grade III standard

in 1.5% of them. The annual average level of PM₁₀ ranged between 0.021mg/m³ and 0.262 mg/m³, mainly from 0.060 mg/m³ to 0.100 mg/m³.

Annual average level of PM₁₀ in cities at or above prefectural level in 2012

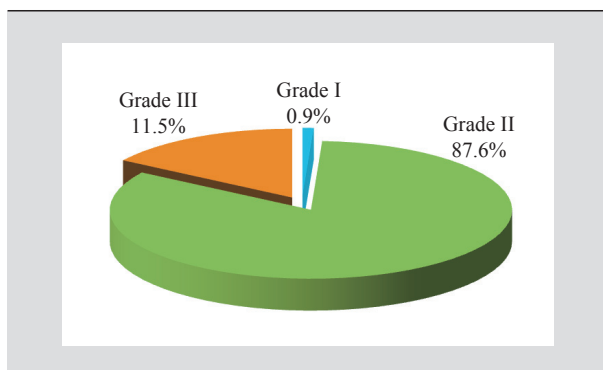
National major cities tasked with environmental protection 88.5% of the national major cities tasked with environmental protection met ambient air quality standards this year, up 4.4 percentage points from a year earlier.

The annual average level of SO₂, NO₂, and PM₁₀ in the ambient air of major cities tasked with environmental protection was 0.037, 0.035, and 0.083 mg/m³ respectively. The annual average level of SO₂ declined by 9.8% and PM₁₀ by 2.4% from a year earlier, and NO₂ was at the same level with last year.

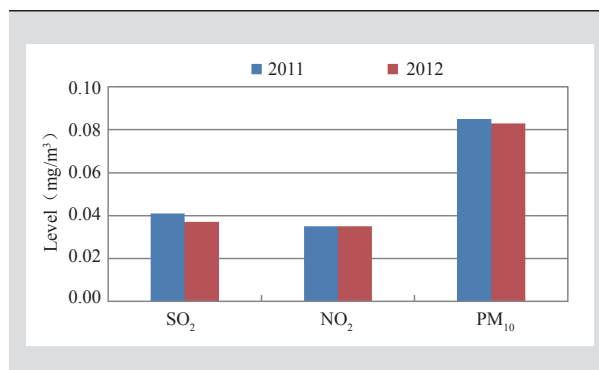
Note: Ambient Air Quality Standard (GB 3095-2012) was officially released in February 2012 and set to be enforced throughout the country as of January 1, 2016. Seventy-four

cities had established the monitoring network conforming to new ambient air quality standard and begun monitoring accordingly by the end of this year. Those cities included cities in key regions-Beijing-Tianjin-Hebei region, Yangtze River Delta, and Pearl River Delta; municipalities directly under the Central Government; provincial capital cities; and cities specifically designated in the State plans. The evaluation results of SO₂, NO₂, and PM₁₀ in accordance with the new standard indicated 40.9% of cities at or above prefectural level met air quality standards, down 50.5 percentage points; and 23.9% of major cities tasked with environmental protection met standards, down 64.6 percentage points.

Among cities at or above prefectural level, the annual



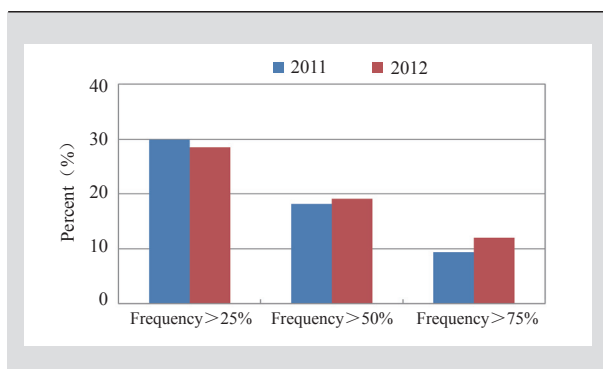
Percentage of graded air quality in national major cities tasked with environmental protection in 2012



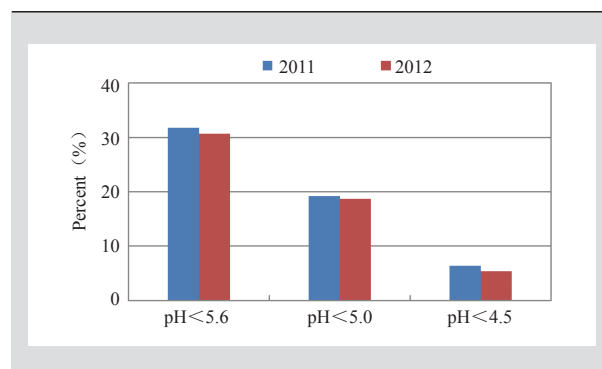
Year-on-year change of air pollutants in major cities tasked with environmental protection

average level of SO_2 exceeded standards in four cities, accounting for 1.2%; the annual average level of NO_2 was higher than the upper limit set by the standards in 43 cities, accounting for 13.2%; and the annual average level of PM_{10} was beyond the upper limit of the standards in 186 cities, accounting for 57.2%. Among the major cities tasked with

environmental protection, two cities recorded the annual average level of SO_2 to be higher than the standards, accounting for 1.8%; 31 cities observed the annual average level of NO_2 to be higher than the standards, accounting for 27.4%; and 83 cities recorded the annual average level of PM_{10} to be higher than the standards, accounting for 73.4%.



Year-on-year change of the percentage of cities (counties) with varied acid rain frequencies



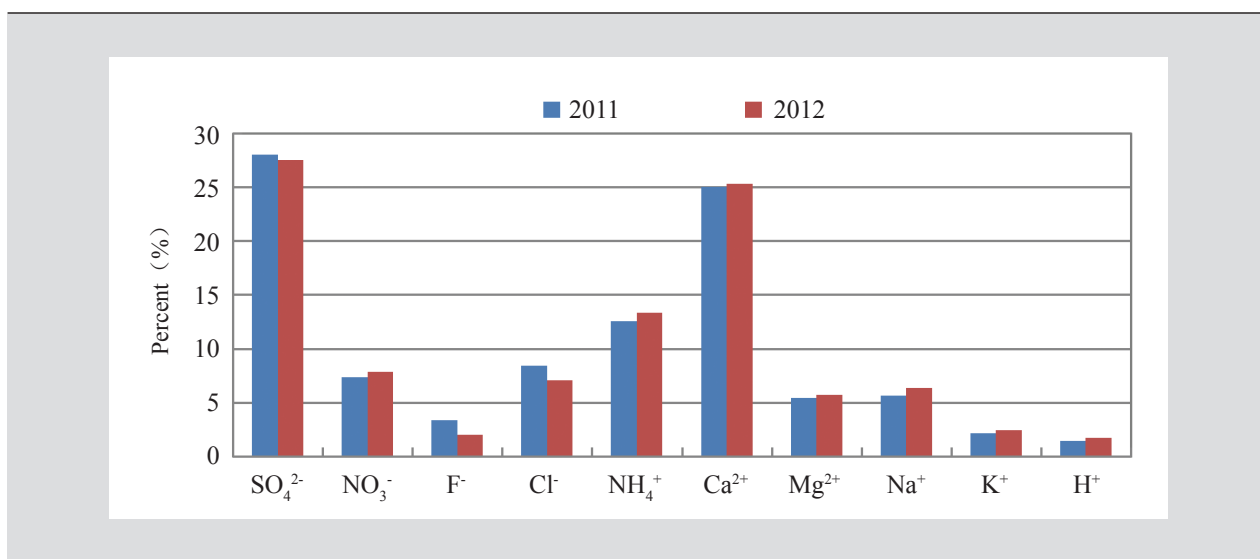
Year-on-year change of the percentage of cities (counties) with varied annual average pH values

Acid Rain

Acid rain frequency 215 out of the 466 monitored cities (counties) had acid rain records, taking up 46.1%. The acid rain frequency of 133 cities was over 25%, accounting for 28.5% of the monitored cities (counties); and the acid rain frequency of 56 cities was over 75%, accounting for

12.0%.

Acidity of precipitation The annual average pH value of rainfalls was below 5.6 (acid rain) in 30.7% of the cities (counties), below 5.0 (relatively serious acid rain) in 18.7% of the cities, and below 4.5 (serious acid rain) in 5.4% of the cities. The percentage of cities (counties) experiencing acid rain, relatively serious acid rain, and serious acid rain this year

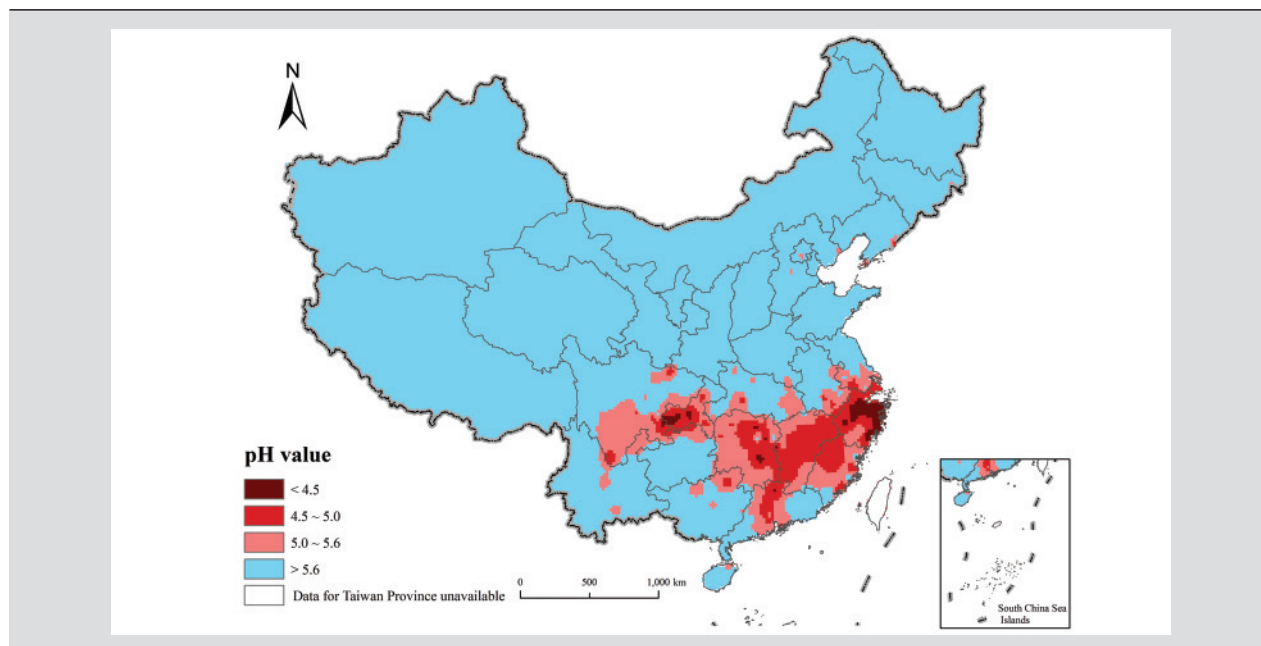


Year-on-year change of the normality of major ions in precipitation

was down 1.1 percentage points, 0.5 percentage point, and 1.0 percentage point respectively from the previous year.

Chemical composition The major positive ions in the precipitation were Ca^{2+} and NH_4^+ , which accounted for 25.4%

and 13.4% respectively of the total ion equivalent. The major negative ion was SO_4^{2-} , accounting for 27.6% of the total ion equivalent, while NO_3^- took up 7.9%. Sulphate was the primary acid-causing substance.



Isoline of the annual average pH value of rainfalls in China in 2012

Geographical distribution of acid rain In 2012, the acid rain in China mainly covered the region along and south of the mainstream of Yangtze River and east of Qinghai-Tibet Plateau. The coverage included Zhejiang Province, Jiangxi Province, Fujian Province, Hunan Province, and the majority of Chongqing Municipality, as well as Yangtze River Delta, Pearl River Delta, southeast of Sichuan Province, and northern Guangxi Autonomous Region. It was around 12.2% of the

national land area.

Total Load of Major Pollutants in Waste Gas

The total load of SO_2 emitted this year amounted to 21.176 million tons, down 4.52% from a year earlier; and the total load of NO_x 23.378 million tons, down 2.77% from a year earlier.

Total load of major pollutants in waste gas in China in 2012

SO ₂ (10,000 t)				NO _x (10,000 t)				
Total	Industry	Domestic	Centralized	Total	Industry	Domestic	Vehicle	Centralized
2117.6	1911.7	205.6	0.3	2337.8	1658.1	39.3	640.0	0.4

Measures and Actions

【Twelfth Five-Year Plan for Prevention and Control of Atmospheric Pollution in Key Regions officially adopted and enforced】 The Twelfth Five-Year Plan for Prevention and Control of Atmospheric Pollution in Key Regions (hereinafter referred to as the Plan) was officially adopted in September 2012, which involves 13 key regions including Beijing-Tianjin-Hebei region, Yangtze River Delta, and Pearl River Delta, covering 117 cities at or above prefectural level in 19 local provinces. The Plan identifies the targets of cutting down the annual average level of PM₁₀, SO₂, NO₂, and PM_{2.5} in the ambient air by 10%, 10%, 7%, and 5% respectively by the year 2015. The Plan also specifies the road map and major tasks for PM_{2.5} control, and enhances the regional cooperation on atmospheric environment management. It is the first comprehensive plan for air pollution control, which marks the change of China's air pollution control model from aiming at total pollutant load control to improvement of environmental quality. The Plan is of great significance to implementing the guidelines of 18th National Congress of the CPC, substantially promoting ecological progress, accelerating the development of a beautiful country, and improving the atmospheric environmental quality.

【Stalk burning ban in the summer and autumn】 MEP monitored the stalk burning situation in the entire country as well as in major regions (major crop farming areas) through remote sensing technology using environment satellites and meteorological satellites at intervals every day between May 20 and July 20, and between September 20 and November 20. The monitoring became more frequent during the high peak period, and monitoring reports were released on the Ministry's official website on a daily basis. Standards were set for removing the flame sites misjudged as stalk burning sites from the monitoring list. Information was shared with local provincial environmental protection departments in a timely fashion, and the rewards and punishment measures were also specified. To tighten the stalk burning ban helped promote the comprehensive utilization of stalk and improve the air quality.

【Announcement of relevant environmental standards】 MEP announced Ambient Air Quality Standards (GB 3095-2012) and its matching document Technical Regulation on Ambient Air Quality Index (on trial) (HJ 633-2012) this year, for the purpose of further identifying the national ambient air management goals. MEP also introduced eight emission standards for the iron and steel and coking industry, as well as matching specifications concerning environmental monitoring and management, for the purpose of setting tougher requirements for the control of air pollutants in key industries and sectors. The eight standards included Emission Standard of Pollutants for Mining and Mineral Processing Industry (GB 28661-2012), Emission Standard of Pollutants for Sintering and Pelletizing of Iron and Steel (GB 28662-2012), Emission Standard of Air Pollutants for Iron Smelt Industry (GB 28663-2012), Emission Standard of Air Pollutants for Steel Smelt Industry (GB 28664-2012), Emission Standard of Air Pollutants for Steel Rolling Industry (GB 28665-2012), Emission Standard of Pollutants for Ferroalloy Smelt Industry (GB 28666-2012), Discharge Standard of Water Pollutants for Iron and Steel Industry (GB 13456-2012), and Emission Standard of Pollutants for Coking Chemical Industry (GB 16171-2012).

【Thorough and comprehensive treatment of coal-fired boiler pollution】 In 2012, the Central Government offered 1.09 billion yuan of subsidies to support the projects on comprehensive treatment of coal-fired boilers in 15 major cities specified in the Twelfth Five-Year Plan for Prevention and Control of Atmospheric Pollution in Key Regions. The combined capacity of upgraded coal-fired boilers amounted to 28,997 steam tons; among them, 15,406 steam tons were through upgrading dust removal facilities and 13,591 steam tons through replacing coals with clean energy. The ambient air quality has been substantially improved in cities concerned since the projects were implemented.

【Substantial improvement of vehicle emission control system】 Regulatory documents were drafted and circulated, including guidelines on strengthening vehicle emission control and facilitating PM_{2.5} treatment process. Management measures were enhanced in such fields as new-vehicle checks and in-service vehicle inspections to address bottleneck issues, and to guide and promote local efforts in this regard.