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本报告为系列报告“大气中国：中国大气污染防治进程”的第七期，记录并分析 2020 年 337 个地级及以上城市的空气质量数据；回顾 2020 年我国在大气污染防治方面的政策和管理措施及实际进展情况；并对 168 个重点城市进行了空气质量管理综合评估和排名。此外，2020 年为《打赢蓝天保卫战三年行动计划》的收官之年，本报告相应设有专栏，简要总结其实施成果。

As the seventh edition of the China Air: Air Pollution Prevention and Control Progress in Chinese Cities series, this report records and analyzes air quality data from 337 cities at and above the prefecture level in 2020. It also provides a recap of China’s policies, measures, and implementation progress in air pollution prevention and control over the same year, as well as a comprehensive evaluation and ranking of 168 key cities in the management of air quality. Finally, this report includes a special column summarizing the achievements of the “Three-Year Action Plan for Winning the Blue Sky Defense Battle” (or simply the “Three-Year Action Plan”), which culminates in 2020.

本报告的编制秉承系列报告客观记录的原则，系统地收集了空气质量数据与政策信息，确保数据信息的准确性与全面性。本报告所使用的数据与信息均来自于政府主动公开发布与官方分享，具体来源包括：（1）空气质量数据：生态环境部、省厅、市局发布的环境质量状况公报与官方新闻；（2）政策信息：政府文件、领导讲话、会议报告、主流媒体引用官方来源的报道。

Every report in this series adheres to the core principle of objectivity. This report is based on air quality data and policy information released by the government and systematically collected to ensure accuracy and comprehensiveness. Specific sources include (i) air quality data from environmental quality reports and official news releases by the Ministry of Ecology and Environment (MEE) and its provincial and municipal bureaus and (ii) policy information from government documents, speeches by officials, meeting notes, and news reports by mainstream media citing official sources.

城市空气质量管理评估考虑了城市的空气质量改善情况、政策措施这两大类指标，强调城市治气的努力和成效同样重要。其中，空气质量改善情况的评价基于重点

污染物三年滑动平均改善幅度（即 2018-2020 三年平均相比 2017-2019 三年平均的改善，后同）和达标天数三年滑动平均改善幅度，评价形成“成效分”；而政策措施包含了固定源、移动源、面源的减排措施，以及能力建设和保障措施，评价形成“努力分”。“成效分”和“努力分”加总得到“综合评分”。

This report considers two indicators in its assessment of air quality management in the key cities: improvements in air quality and the relevant policy measures in place. This approach emphasizes that both the efforts made and the outcomes achieved are equally important for air pollution control. Improvements in air quality are assessed using the range of improvement in the three-year moving average of $PM_{2.5}$ concentrations (i.e., the range of improvement in average concentrations in 2018–2020 compared to 2017–2019) and the range of improvement in the three-year moving average of the number of attainment days. Policy measures assessed include control and reduction measures for emissions from stationary, mobile, and area sources, as well as capacity building and safeguarding measures. The assessment result for air quality improvement is the effect score, while the assessment result for policy measures is the effort score. The sum of the two scores makes the total score.

结论

Conclusion

空气质量

Air Quality

2020 年是“十三五”和《打赢蓝天保卫战三年行动计划》（《三年行动计划》）的收官之年，全国城市空气质量在持续改善的轨道上驶入第七年，取得了明显优于 2019 年的成绩，超额完成“十三五”约束性指标，其中，受新冠疫情爆发影响，第一季度改善幅度最大。2020 年全年平均达标天数比例升至 87.0%，260 个城市的优良天数比例大于 80%，重度及以上污染天数同比减少 621 天。

The year 2020 closed the 13th Five-Year Plan, the “Three-Year Action Plan,” and the seventh year of continuous air quality improvement in Chinese cities and saw more outstanding achievements than 2019. The obligatory targets of the 13th Five-Year Plan were exceeded. The most significant improvement happened in the first quarter of 2020,

with the implementation of government policies in response to the COVID-19 outbreak. Compared to 2019 figures, the average percentage of attainment days in 337 cities rose to 87%, and the number of cities with over 80% of attainment days reached 260. The number of heavy pollution days also decreased by 621.

全国城市 PM2.5 年均浓度迈入达标线，臭氧浓度首次下降

The annual mean concentration of $PM_{2.5}$ across Chinese cities reached the standard, and the concentration of O_3 decreased for the first time.

2020 年全面达到《环境空气质量标准》（GB3095-2012）的城市共 202 个。六项标准污染物的全国整体年评价浓度均同比下降，如图 1。其中 PM2.5 年均浓度降至 33μg/m³，首次低于年均浓度标准水平，从而使得六项污染物实现全面达标。O3 年评价浓度自 2013 年以来首次实现同比下降，达标城市数量也同比增加 47 个城市。三个重点区域的 O3 年评价浓度均实现全面下降，此外珠三角地区臭氧污染也改善明显，下降比例高达 15.9%。

In 2020, 202 cities fully met the "Ambient Air Quality Standards" (GB3095-2012). The overall concentration of the six criteria pollutants in the annual assessment in China decreased compared to the previous year, as shown in Figure 1. Specifically, the annual mean concentration of $PM_{2.5}$ dropped to 33 μg/m³, meeting the standard for the first time and enabling the concentrations of the six pollutants to also collectively reach the standard. There was a year-on-year decline in the annual mean concentration of O_3 for the first time since 2013. The number of attainment cities also increased by 47 on a year-on-year basis. Aside from the overall decline of the annual mean concentration of O_3 in the three key regions, the annual concentration in the Pearl River Delta (PRD) also improved significantly, decreasing by 15.9% compared to 2019.

图 1 2019 与 2020 年六项标准污染物全国整体年均浓度

Figure 1: Annual Mean Concentrations of Six Pollutants for the Country in 2019 and 2020

从各项污染物城市达标比例来看，SO2、CO 继续保持 100%城市达标；NO2 达标城市比例升至 98.2%，仅 6 城市未达标；O3、PM10 和 PM2.5 的达标城市比例也

分别升至 83.4%、76.8%和 62.9%，同比增加 30~47 个达标城市，如图 2。

In terms of major pollutants, all cities met the standards for SO_2 and CO levels. The percentage of cities that attained the standards for NO_2 levels rose to 98.2%, with only six cities failing. The percentage of cities that attained O_3, PM_{10}, and $PM_{2.5}$ standards increased to 83.4%, 76.8%, and 62.9% respectively, with a year-on-year increase from 30 to 47 cities meeting the standards, as shown in Figure 2.

图 2 2019 与 2020 年六项标准污染物达标城市比例

Figure 2: Percentage of Cities Meeting the Standards for Six Major Pollutants in 2019 and 2020

汾渭平原污染恶化趋势得以缓解，重点城市获三年以来最佳战绩

The trend of deteriorating pollution in the Fenwei Plain has reversed, with the key cities setting the best records in three years.

汾渭平原在 2018 年发布的《三年行动计划》中被确定为新的重点区域，然而其前两年治理效果并不乐观，特别是 2019 年汾渭平原的 PM2.5 年均浓度不降反升，重度及以上污染仍然高发且居全国各区域之首。2020 年，汾渭平原没有在全国空气质量改善的大趋势中掉队，六项标准污染物年评价浓度全面下降，PM2.5 年均浓度同比下降 12.7%，重度及以上污染天数同比减少一半，在重点区域中改善幅度最大。

The Fenwei Plain was designated a new key region in the “Three-Year Action Plan” released in 2018. For two years, however, the air quality improvement in the region was not encouraging. In particular, the annual mean concentration of $PM_{2.5}$ increased in 2019, and heavy pollution frequently occurred, with the region recording the highest number of heavy pollution days among key regions across the country. In 2020, the Fenwei Plain region did not fall behind in the general trend of air quality improvement in China. The annual mean concentration of the six criteria pollutants decreased, with the annual mean concentration of $PM_{2.5}$ dropping by 12.7%. The number of heavy pollution days also decreased by 50%, representing the most significant improvement range in the key regions.

2020 年，全国 168 个重点城市中，95%的城市 PM2.5 年均浓度同比改善或达标天数同比增长，实现了《三年行动计划》实施以来的最优战绩。

In 2020, 95% of the 168 key cities across China saw an improvement in the annual mean concentration of $PM_{2.5}$ or an increase in the attainment days on a year-on-year basis, achieving their best performance since the implementation of the "Three-Year Action Plan."

疫情管控政策造成排放活动减少，第一季度空气质量同比改善幅度大

Emission activities decreased due to COVID-19 regulations. Compared with 2019, the first quarter of 2020 saw noticeable improvements in air quality.

2020 年受新冠疫情爆发影响，在政府一系列停工停产与出行限制政策下，第一季度城市空气污染得到不同程度的缓解。1-3 月，全国 337 个地级及以上城市的 PM2.5、PM10、SO2、NO2 的同比浓度下降幅度分别为 14.8%、20.5%、21.4%、25.0%，远大于全年降幅，这种影响在疫情爆发后的第一个月尤为明显。据国家大气污染防治攻关联合中心估算，疫情对全年 PM2.5 浓度影响为 2 μg/m³，对优良天数比率影响为 2.2 个百分点。

With the government suspending work and production and restricting travel in response to the COVID-19 outbreak in 2020, air pollution decreased in varying degrees in the first quarter of the year. From January to March, the concentrations of $PM_{2.5}$, PM_{10}, SO_2, and NO_2 in 337 cities at the prefectural level and above decreased by 14.8%, 20.5%, 21.4%, and 25% respectively. These improvements were far more significant than the whole-year decrease and were most pronounced in the first month after the outbreak. The National Joint Research Center for Tackling Key Problems in Air Pollution Control estimated that the annual $PM_{2.5}$ concentration decreased by 2 μg/m³ and the rate of attainment days by 2.2% because of the pandemic regulations in place.

政策措施

Policy Measures

我国在 2020 年继续施行了一系列大气污染防治政策措施，通过监测网络建设、

清单编制、源解析等进一步增强科技支撑，推进重点行业污染防控措施升级和“散乱污”治理，优化了能源、产业、交通结构。尤其是 2020 年 9 月，习近平主席在第 75 届联合国大会上提出，中国力争 2030 年前实现碳达峰，2060 年前实现碳中和，预计将在“十四五”和未来中长期产生积极的协同减排效果。但从 2020 年的政策实施进展来看，我国的大气污染防治工作挑战犹存，特别是能源与产业结构仍然偏重，结构调整目标尚未全面完成，“十四五”进一步改善空气质量依旧任重道远

China continued to implement a series of policy measures on air pollution prevention and control in 2020. These included further strengthening scientific and technological support through the construction of grid monitoring, inventory compilation, source apportionment, and other similar projects; upgrading pollution prevention and control measures in key industries; governing “scattered, unregulated, and high-polluting” enterprises; and optimizing energy, industry, and transportation structures. In September 2020, during the 75th Session of the United Nations General Assembly, President Xi Jinping announced that China will strive to peak carbon dioxide emissions before 2030 and achieve carbon neutrality before 2060. These plans were to be set in motion within the 14th Five-Year Plan period and over the medium and long term in the future. However, based on the progress of policy implementation in 2020, preventing and controlling air pollution in China remains challenging. There is still heavy dependence on coal as an energy source and heavy industry in the key regions, missing the targets for structural adjustment. The country still has a long way to go in further improving air quality within the period of the plan.

监测能力进一步提升，中长期监测规划纲要出台

Monitoring capacities have improved, and the medium- and long-term monitoring planning outlines have been launched.

2020 年开始，重点区域秋冬季大气污染综合治理攻坚行动方案要求各地重点评估交通污染，完成在主要港口和物流通道建设空气质量监测站，并首次提出加强冬季 PM 组分监测和 VOCs 物种监测，这些举措使得监测和污染特征分析的能力

进一步提升，但在达标评价指标和农村及工业监测和评价点位设置方面仍需优化。

Starting in 2020, the action plans on integrated air pollution prevention and control in autumn and winter in the key regions required local governments to focus on the assessment of traffic-related air pollution and complete the construction of air quality monitoring stations in major ports and logistics channels. In addition, these plans included proposals to strengthen for the first time the component monitoring of particulate matter (PM) and the species monitoring of volatile organic compounds (VOCs) in winter. All these measures have further enhanced monitoring capacities and the analysis of pollution characteristics. However, the evaluation index for the attainment and layout of rural and industrial monitoring and evaluation stations still needs to be optimized.