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The Influence of the Air Pollution Prevention Measures on the Ambient Air Quality and the Specific Strategy Analysis

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Abstract

With the development of society, environmental problems are becoming more and more prominent, and people pay more and more attention to them, which requires economic construction and development while considering environmental protection. Air pollution is one of the environmental problems. Only by preventing and controlling air pollution can we improve air quality and improve the quality of economic development. Various causes of environmental air quality pollution, industrial pollution emissions, construction, winter heating, motor vehicle exhaust will cause air pollution. In preventing and controlling air pollution, it is necessary to carefully analyze pollution sources, actively adjust and optimize the energy structure, and implement energy conservation and emission reduction measures, so as to truly improve air quality. This paper mainly starts with the analysis of the causes of air pollution, points out the problems existing in the current air pollution prevention and control, clarifies the importance of air pollution prevention and control, and then discusses the effective strategies to improve the air quality.

Keywords

Air pollution prevention and control; Air quality; Environmental engineering

In 2013, the State Council officially issued and implemented the "Action Plan for Air Pollution Prevention and Control." The Action Plan for Air Pollution Prevention and Control not only pointed out the causes of air pollution problems in China, but also made it clear that the task of improving ambient air quality is arduous and requires long-term and unremitting efforts to coordinate economic, social and environmental benefits.

1. Analysis of the Causes of Air Pollution

There are many causes of air pollution, and Figure 1 shows some of the more common causes.

1.1 Winter coal combustion emissions

During winter, due to the need for heating, most areas in northern China, especially rural areas, commonly use coal for heating, causing significant air pollution. Coal-fired boilers or small, scattered coal stoves are common heating methods in rural areas during winter, leading to an increase in the levels of sulfur dioxide and particulate matter in the air, thus polluting air quality.

Note: The article was originally published in *Advances in Resources and Environmental Science*, and this is an authorized translation of it.

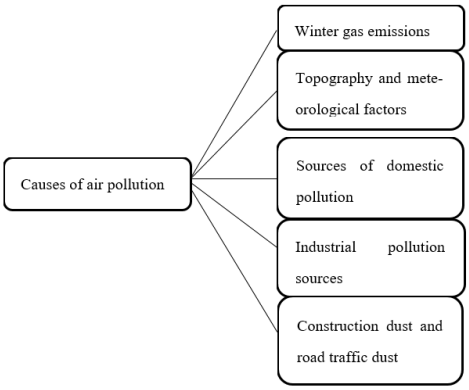

Figure 1. Causes of air pollution.

1.2 Construction and road traffic dust

Construction projects during urbanization generate dust, a significant source of particulate pollutants in cities. As the construction area increases, the area affected by dust pollution also grows. Furthermore, road traffic also generates dust, especially during sudden increases in traffic volume.

1.3 Industrial and domestic pollution sources

Industrial waste emissions are a significant and undeniable factor contributing to environmental pollution. With the rapid development of the Industrial Revolution, industrial growth has been booming, bringing economic benefits but also causing substantial environmental pollution. Besides industrial sources, domestic pollution sources also play a role. The indiscriminate emission of fumes from household coal-fired stoves and various catering establishments contributes to environmental pollution. The rampant burning of garbage and vegetation increases the concentration of particulate matter in the air, reducing air quality. Vehicle exhaust emissions increase the levels of nitrogen dioxide, carbon monoxide, and particulate matter in the air. This is especially true during rush hour, when a large number of vehicles share the burden, influenced by terrain and meteorological factors.

Some special terrain conditions may also cause severe weather. Under atmospheric conditions with little wind and a thick inversion layer, pollutants are difficult to disperse in time, which in turn causes severe weather problems. In addition, low precipitation will also reduce the degree of flushing of pollutants in the atmosphere, resulting in a high content of pollutants in the air. When nitrogen oxides (NOx) and volatile organic compounds (VOCs) in the air cannot disperse in time, they are easy to undergo photochemical reactions under high temperature and strong light, producing secondary pollutants such as ozone. In the natural environment with high temperature and strong light in summer, the probability of ozone generation increases significantly. In addition, low green vegetation coverage will also increase the degree of air pollution (Jiang, Xue, & Li, 2015).

2. Current Problems in Air Pollution Prevention and Control

Although my country has made some progress in air pollution control, the problems shown in Figure 2 still cannot be ignored.

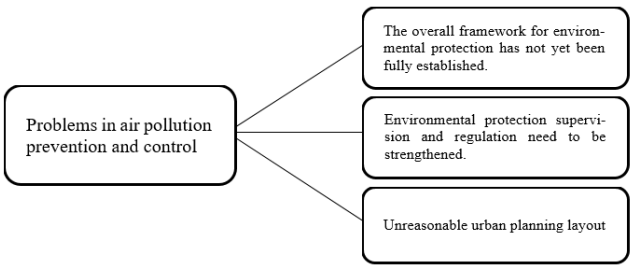

Figure 2. Problems in air pollution prevention and control.

2.1 The overall framework for environmental protection work has not yet been fully established

Compared to the past, China has paid more attention to environmental protection. However, overall, the national environmental awareness still needs strengthening, and a comprehensive environmental protection framework has not yet been truly established. The work often suffers from a disconnect between higher and lower levels, increasing the difficulty of improving air quality. Specifically, the collaborative mechanisms among various departments are not yet perfect, and the coordination between development and environmental awareness is inadequate, often resulting in neglecting one aspect for another and failing to truly achieve simultaneous progress in development and environmental protection, or equal emphasis on production and pollution control. As the leading departments responsible for air pollution control, environmental protection bureaus at all levels need to cooperate closely with other environmental protection departments. However, in practice, due to differing perspectives among departments, the desired collaborative governance effect has not been achieved. For existing pollution activities, environmental protection departments may not be able to directly stop or intervene, preventing some air pollution problems from being fundamentally eliminated.

2.2 The intensity of environmental protection supervision and inspection needs to be strengthened

In the course of environmental protection supervision and inspection, there are still problems such as insufficient analysis, imprecise grasp, and ineffective implementation. There is a lack of professional enforcement teams, and the supervision of air pollution control needs to be strengthened. Certain blind spots still exist in the daily supervision work, and the handling of illegal cases is difficult to standardize, showing a somewhat immature approach. There is also a lack of supervision and implementation of the rectification of environmental pollution violations in the later stages. The professional capabilities of some environmental inspectors need to be improved; they have not been able to manage, report, or urge rectification of environmental pollution problems within their jurisdiction in a timely manner, and sometimes their work enthusiasm is low.

2.3 Unreasonable urban planning layout

layout. Especially with the continuous outward expansion of cities, if the old layout structure is followed, with industrial and residential areas overlapping, it becomes difficult to address pollution sources effectively, and this can even affect the health and well-being of residents.

3. The Importance of Carrying Out Air Pollution Prevention and Control Work

3.1 It is conducive to promoting green development

The prevention and control of air pollution requires active adjustment and continuous optimization of the industrial structure to improve the green level of development. my country has issued the “Guiding Guidelines for Industrial Structure Adjustment,” which can be used as a reference when adjusting the industrial structure, eliminating outdated production capacity and high-energy-consuming industries, strengthening the comprehensive management of scattered, disorderly, and polluting enterprises, and improving the dynamic level of management.

3.2 It is conducive to building a green energy system and promoting the control of non-point source pollution

Actively carrying out air pollution prevention and control work requires controlling the total coal consumption, adhering to the principle of clean energy utilization to reduce non-power coal consumption, strengthening the management of scattered coal use, actively promoting the use of new energy sources, and emphasizing the utilization of renewable energy. In addition, during the process of air pollution control, it is necessary to actively construct windbreak and soil stabilization greening projects, appropriately promote the conversion of farmland back to forest and grassland, and advance the control of non-point source pollution through adjustments to land use structure.

4. Discussion on Air Pollution Prevention and Control Measures to Improve Air Quality

4.1 Strengthen source control of pollution sources

Strengthening source control of pollution is key to air pollution control. Specifically, this can be achieved by

addressing the sources of pollution, including industrial production enterprises, construction dust, and vehicle exhaust. First, strengthen the control of air pollution sources from industrial production enterprises. Industrial waste emissions increase PM2.5 concentrations, necessitating strict control of industrial pollutant emissions. Simultaneously, it's crucial to crack down on the air pollution activities of illegal businesses. Second, strengthen the control of construction dust. Controlling construction dust requires implementing environmentally friendly construction regulations, clarifying specific strategies for dust generation at different stages of construction, and intensifying efforts to address irregular transportation and construction practices. Cities should also actively implement regular road watering systems and expand their coverage. Third, strengthen the control of vehicle exhaust emissions. Besides controlling the total number of vehicles used, attention must be paid to the supply of high-quality fuel, continuously improving the public transportation system, and actively promoting public transportation to reduce private car use, thereby lowering total vehicle exhaust emissions and achieving the goal of air pollution control. Fourth, residents' daily life will also generate certain gaseous pollutants, especially in winter. We should pay attention to residents' heating behavior and strengthen residents' awareness of air pollution control by increasing publicity on air pollution control (Liu, 2018).

4.2 Deepen industrial restructuring

Deepening industrial restructuring can effectively control the total amount of air pollutants; ultimately, improving ambient air quality requires reducing the total amount of pollutants in the atmosphere. First, clear management goals must be established, adhering to the principle of controlling total air pollutant emissions, and this should be achieved through actively adjusting the industrial structure to rationally control total pollution. Heavily polluting enterprises should be upgraded and restructured, increasing the proportion of high-tech industries. Second, the concept of a circular economy should be upheld. Given the strong development momentum across my country, energy conservation and emission reduction need to be incorporated into binding targets to fully embody the concept of a circular economy. Furthermore, to reduce coal consumption, alternative measures can be adopted, such as developing clean energy sources like wind and solar power.

4.3 Strengthen the monitoring and supervision of air pollutants.

Focus on establishing a sound air pollutant emission monitoring system, build an information platform through the use of information technology, promote information sharing, and enhance the public's enthusiasm for participating in environmental governance. At the same time, pay attention to the daily public disclosure of air quality status and give full play to the public's supervisory power over the atmospheric environment. Increase the supervision and enforcement of pollutant emissions, strictly conduct inspections in accordance with standards, clarify tasks, implement responsibilities, actively give full play to the guiding role of the leading department, and give full play to the supervisory and management role of full-time grid members. Violations that damage the atmospheric environment should be severely punished, and the crackdown on environmental violations should be intensified. Improve and implement environmental management policies, formulate reasonable standards for the collection of sewage discharge fees, and implement policies such as ultra-low emission environmental protection electricity prices. Relevant departments should also actively carry out macro-level research on air pollution prevention and control, strengthen top-level involvement, give full play to the positive role of experts, and improve air quality with more comprehensive supervision and management policies (Zhang, 2014).

4.4 Further increase the greening rate in urban and rural areas

Increasing green space can effectively improve the urban microclimate; however, it must be integrated with urban development planning to ensure the normal use of other functional areas while expanding urban green ecological space. Improving the green coverage rate in urban and rural areas is not something that can be achieved overnight; it requires the development of afforestation plans and programs at various stages, strengthening green construction from a holistic perspective. Furthermore, it is important to strengthen clean production audits of heavily polluting industries to encourage these enterprises to reduce pollutant emissions, thereby improving air quality.

5. Conclusion

Environmental protection and economic development are not entirely contradictory; we need to uphold air pollution control while pursuing development, and seek economic progress while protecting the environment. Furthermore,

environmental protection tasks and responsibilities need to be concretely implemented, strengthening joint prevention and control cooperation in air pollution control across regions, and accelerating the improvement of the air pollution monitoring, early warning, and emergency response system.

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