

Typical Air Pollution and Control Measures in China

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Abstract

At present, frequent air pollution is the most serious environmental problem in China. How to coordinate the reasonable and rapid development of the regional economy and prevent the deterioration of the atmospheric environment has become the focus of public attention, and it is also one of the issues that governments at all levels need to solve urgently. This article briefly summarizes the four typical types of air pollution in China, explains the main objective factors and internal causes of frequent atmospheric phenomena in our region, and combines the particularity of China's current air pollution problems to analyze the research on air pollution in China. The practical significance of economic and social development, climate and environmental change, human health and regional harmonious development. Finally, in the context of global climate change, the development trend of China's future air pollution is given.

Keywords

Air pollution; Causes; Hazards; Governance.

1. Preface

The atmosphere is an indispensable environment for human survival. However, due to the comprehensive development of industrialization, the atmosphere has been severely polluted and destroyed. There have been many problems such as temperature warming, acid rain, ozone layer holes, etc., which affect people's health and increase the burden on the earth at the same time [1]. Today, people have higher and higher requirements for the quality of the living environment, it is very important to explore feasible governance methods and create a clean and good living environment. As a serious type of urban pollution, air pollution causes serious harm. As the key elements of air pollution, sulfur dioxide, smoke and dust and nitrogen oxides make the air quality of cities continue to deteriorate [2]. Attaching great importance to urban air pollution, further understanding and understanding of urban air pollution is the current primary task, and it is necessary to continue to explore comprehensive scientific prevention and control measures. This article intends to put forward air pollution prevention and control strategies based on the analysis of several typical air pollution hazards and current status in my country.

2. The PM2.5 Pollution

Haze is a phenomenon in which a large number of extremely fine dry dust particles float uniformly in the air, making the air with a horizontal visibility less than 10 km generally turbid. The particles that make up the haze are so small that they cannot be distinguished by the naked eye. In recent decades, with the rapid economic and social development, my country's air pollution has become more and more serious, which is prominently manifested in the sharp decline in atmospheric visibility and frequent occurrences of heavy haze locking cities [3].

High-emission, low-environmental-friendly enterprises emit large amounts of industrial waste, causing haze to occur in china's industrially developed areas. The Beijing-Tianjin-Hebei region gathers a large number of high-polluting industries such as cement, steel, oil refining and petrochemicals, as well as unorganized and scattered high-hazard industries all over the country. They generate huge emissions of air pollutants, and the local topography and climate system are not conducive to pollution. As a result, severely polluted weather occurs as soon as winter arrives. Continuous high-intensity haze pollution weather usually causes a large number of flight delays, highway closures, and an increase in patients with respiratory diseases, and many other phenomena that affect the normal order of society [4].

The governance of PM2.5 must be managed from the source. First of all, relevant state departments should continue to formulate and improve corresponding policies and regulations to protect PM2.5 governance and make the law the beacon of PM2.5 air pollution governance. For existing enterprises that have caused serious environmental pollution, they need to be ordered to suspend production for rectification. For newly-built industrial and mining enterprises, strict project approval is required, and legal measures are used to strengthen supervision to implement air pollution control work. Second, strengthen the construction of urban greening. Green plants have strong dust retention, sterilization, and drug-taking effects. They can scientifically adjust the ratio of oxygen to carbon dioxide released into the atmosphere. Strengthening the construction of urban greening can improve urban air quality and is a key measure to prevent air pollution. Therefore, in the process of urban economic development, we should also choose urban greening trees with a suitable climate and reasonable price according to our own economic conditions, so that urban greening trees can exert their own purification effects, and strengthen the management and care of urban greening trees. Reduce mortality [5].

3. The Heavy Metal Pollution in the Atmosphere

With the rapid development of urban economy, the number of motor vehicles has increased sharply, and the amount of urban dustfall has increased significantly, which has an increasingly serious impact on air quality, especially the heavy metals it carries. PM10 is the main air pollutant in most cities in my country, and it has a strong ability to enrich and absorb heavy metals. Studies by Mohanraj et al. have shown that 70%-90% of heavy metals are distributed in atmospheric PM10, some of which can cause greater health hazards to the human body [6]; Frank et al.'s research in Hertz, Germany shows that the atmosphere is relatively high. The mass concentration of heavy metals can increase the incidence of digestive system diseases by 7% [7]; Wen Fei found that in Baiyin District, Gansu, 63.4% of residents exposed to atmospheric heavy metal pollution showed symptoms related to heavy metal pollution [8].

In recent years, a large number of studies have been carried out on the pollution level, pollution characteristics and sources of heavy metals in the atmosphere of my country's cities. Among all the sources of heavy metal pollution, atmospheric mercury pollution has been studied the most. Mercury in the atmosphere is mainly divided into three categories, namely gaseous elemental mercury, reactive gaseous mercury and particulate mercury [9]. Both anthropogenic activities and in vain processes release mercury into the atmosphere. The activities of man-made

emissions of mercury to the atmosphere mainly include: coal burning, garbage incineration, chlor-alkali production, metal smelting and processing, etc. The natural mercury discharge process includes the natural source mercury discharge process and the previously discharged mercury re-discharge process after it settles on the surface. The main natural source mercury discharge processes are: soil, water, vegetation, volcanic activity, forest fires and crustal degassing Emission of mercury to the atmosphere. The source, migration and transformation of atmospheric mercury has become an important theme of the global mercury cycle. China is the largest developing country. High-speed economic development has made China the world's largest energy consumer. In addition, cement production and metal smelting have made China It is also the largest emitter of man-made mercury. Based on current research and model calculations, China's atmospheric mercury emissions account for about 25%-40% of global mercury emissions. Therefore, China's mercury emissions play a vital role in the global mercury cycle.

According to my country's specific national conditions, and proceeding from reality, there are mainly the following measures that can be used to control atmospheric heavy metal pollution. First, strengthen the development and utilization of new energy, promote the use of clean and high-efficiency energy, and improve energy utilization efficiency. For example, replacing fuel with more environmentally friendly ethanol can greatly reduce atmospheric lead pollution. In addition, before the pollutants enter the atmosphere, some of the pollutants in the exhaust gas are eliminated by using dust and smoke technology, condensation technology, and liquid absorption technology. For high-emission industries, the site selection, chimney design, urban and industrial planning should be reasonable, not to be highly concentrated in large emitters, so as to avoid overlapping pollution; further reduce chemical, coal-fired power plants and other enterprises, and shut down heavy polluting enterprises. Strengthen the prevention and control of the exhaust pollution of motor vehicles, reduce the pollution of the atmosphere by automobile exhaust; strengthen the management of urban construction and control the emission of building dust. Finally, raise citizens' awareness of environmental protection, expand the green area, strengthen the construction and management of the green belts on both sides of the road, and further reduce the bare ground in the urban area. In addition, a sound social supervision mechanism should be established to mobilize the enthusiasm of the people and ensure the smooth progress of environmental protection work [10].

4. The Atmospheric Nitrogen Oxide Pollution

Nitrogen oxides include a variety of compounds, such as N_2O , NO , NO_2 , N_2O_3 , N_2O_4 , and N_2O_5 , all of which have varying degrees of toxicity. Except for nitrogen dioxide, other nitrogen oxides are extremely unstable. When exposed to light, humidity or heat, they become nitrogen dioxide and nitrogen monoxide, and nitrogen monoxide becomes nitrogen dioxide again. Therefore, the atmospheric environment is exposed to several gas mixtures, often called smoke (gas), mainly nitrogen monoxide and nitrogen dioxide, and nitrogen dioxide is the main one.

Nitrogen oxides in the atmosphere mainly come from the combustion of nitrogen-containing compounds, factory exhaust emissions and automobile exhaust emissions. In addition, the large-scale use of nitrogen fertilizers in agricultural production is also one of the main sources of atmospheric nitrogen oxide pollution. Chemical fertilizers can pass directly through the soil. Or enter the atmosphere under the action of soil microorganisms, increase the content of nitrogen oxides in the atmosphere, and accelerate the concentration of nitrogen oxide pollution in the atmosphere. Nitrogen dioxide in nitrogen oxides is highly toxic, and is mainly harmful to the human respiratory tract. Nitrogen oxide is a pollution source that produces photochemical smog and acid rain; it has corrosive damage to buildings and historical sites [11].

The nitrogen oxide pollutants in the atmosphere mainly come from fuel combustion. Therefore, the prevention and control technology of nitrogen oxide pollutants is designed according to the characteristics of the combustion process. There are currently three measures to reduce nitrogen oxide emissions in use, namely, pre-combustion treatment, combustion technology improvement, and post-combustion treatment. . Pre-combustion treatment refers to reducing the nitrogen content in the fuel through denitrification, thereby reducing the amount of nitrogen oxides generated during the combustion process; the improvement of combustion technology is currently in the research and development stage in various countries around the world, and has not yet entered the full practical stage. The reason is combustion The improvement of the method usually leads to a reduction in combustion efficiency and the reduction rate of nitrogen oxides is not high. In my country, the consumption of coal is increasing year by year, and the emission of nitrogen oxides will inevitably increase. Nitrogen oxides are one of the important factors contributing to the increasing severity of acid rain pollution in my country. The improvement of combustion methods has become a development direction for my country to control the production of nitrogen oxides. The improvement of combustion technology has the following forms: one is low-oxygen combustion, the other is exhaust gas cycle combustion, the third is steam or water injection, the fourth is secondary combustion, the fifth is staged combustion, the sixth is to reduce the air ratio, and the seventh is to reduce the air ratio. Concentration burning. Among them, the two-stage combustion and the concentration combustion are the most effective. Post-combustion treatment refers to post-combustion treatment, which is to denitrify the flue gas produced after combustion, and is sometimes called flue gas denitrification. Flue gas denitrification is currently the most important method in the treatment of nitrogen oxides. At present, exhaust gas denitration technologies are divided into two categories: dry method and wet method. Dry method includes catalytic reduction method, adsorption method and electron beam irradiation method, while catalytic reduction method is divided into selective catalytic reduction method and selective non-catalytic reduction method; wet method includes direct absorption method, complex absorption method, and oxidation absorption method , Liquid phase reduction and microbial purification methods, etc.

5. Conclusion

The hazard of air pollution is essentially the impact of air pollutants on human health and the human living environment. The theoretical framework combed in this article and the realization of core scientific issues will play a fundamental role in identifying the source of pollution, realizing targeted governance, and promoting the construction of ecological civilization. The human society has a full understanding of the harmfulness and degree of air pollution, and has developed more mature emission source lists, air environment monitoring and control technology and control methods, and other theories, technologies, methods and standards, which play an important role in the effective control of air pollution. Played a key role. However, due to air pollution and prevention and control of physical processes, chemical processes, and biological processes and their mathematical description methods are extremely complex and interlocking influence constraints, the dynamic inversion and generation of source lists, particle toxicity identification, chemical process data assimilation, health risk forecast and early warning, emergency response Theories, technologies, and methods in terms of source analysis and dynamic optimization control are still immature, and there is no health risk indicator system directly related to the toxicity of air pollutants, which leads to the optimization of air pollution emergency control and industrial structure, energy structure, and heavy pollution source layout. The optimization problem lacks scientific and technological support, and the theories, technologies, methods, and standards in this area need to be continuously developed.

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