

Changes in Seoul's Air Quality Control Policy

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Introduction

Air pollution in urban areas is caused mostly by heating, industry, development, and transportation. The types of pollution continue to change as social and economic conditions themselves change. The various environmental issues Seoul faces today are ultimately connected with environmental quality, degradation of which stems from diverse, complex causes, making it difficult to reach an accurate understanding of the environmental issues. The severity of pollution too differs by the level of industrialization and urbanization as a result of rapid population growth concentrated in the cities, technological developments and economic growth, all of which are interconnected and act together in a complicated manner across society, affecting the urban ecosystem and human health.

Air pollution is a result of a complex reaction between pollutants from natural and artificial sources, making it difficult to identify exact sources, evaluate and predict air quality, and develop plans to reduce pollution. Seoul's air pollution patterns share the complexities of air pollution in large cities in and outside of South Korea, but in general, vehicle emissions are a major cause. This is not likely to change until there is a fundamental reduction at source (reduced car ownership, lower frequency of travel, etc.) and action is taken in connection with land use, energy, and other sectors that have direct and indirect impact on the growth of vehicle demand.

The following pages will touch upon the quantitative expansion and qualitative diversification of Seoul as well as changes in the city's air quality control policy.

1960 – 1977: Air Quality Control

In the 1950s following the Korean War and into the early 1960s before economic development plans had been implemented, there were few attempts to manage and control the air quality in South Korea. In 1962, the first 5-year Economic Development Plan was established, in accordance with various development projects undertaken. With it, urbanization began in earnest, followed by laws and institutional frameworks on air pollution and control.

In November 1963, the Pollution Prevention Act was passed to prevent harm to health or the environment from air pollution, water pollution, noise, or vibration, and thereby improve public health and create a healthier living environment. The Act defined air pollutants as substances such as exhaust, dust, gases, etc. that can contaminate the air. Yet the only subject of interest at the time was to escape national poverty, and there was almost no regard for what pollution might be created. The law existed, but there was no

organization responsible for administration, no budget allocated to enforce it, and no regulatory authorities. The Act was revised in January 1971 and provided for basic legislation at least, but there was little effort to use the Pollution Prevention Act to regulate air quality. This situation was frowned upon both in and outside Korea. According to a report by the Japan Environmental Council (JEC, 2000), South Korea's Pollution Prevention Act had no regulations on total emissions in place and with punitive measures so mild, it was not a Pollution Prevention Act but a Pollution Permission Act.

In the 1970s, measured air pollutants were mostly gases such as carbon monoxide (CO) and sulfur dioxide (SO₂). These measurements however were hotly debated over their veracity. The Smithsonian Institute in the US gathered research data from scholars and wrote in a report of its shock that in Seoul's rapid urbanization, the city was one of the most polluted in the world and that its citizens suffered from chronic respiratory ailments.

Most authority as per the Pollution Prevention Act was held by the central government. Local governments that were supposed to be the entities with primary responsibility ended up as bit players. Seoul was not equipped to resolve its own air pollution issues.

Because the Korean War had ravaged the forests, the nation was devoid of heating and cooking fuel, and coal briquettes surfaced as the main energy source. Their use is estimated to be the chief cause of air pollution in South Korea, especially in cities, at the time. In the early 1970s, a city gas plant was built in the south of Seoul to decrease pollution and modernize the demand for fuel, but it did not supply significant amounts of gas.

1977 – 1990: Air Quality Control

The economic development plans were successful, but a variety of pollution issues arose. The public gradually became more aware of pollution. Towards more aggressively and comprehensively addressing the environmental issues, the government introduced the Environment Conservation Act in December 1977. Judging that the Pollution Prevention Act alone could not ensure preservation of the environment, the new Act contained a wider scope of regulations and preventative measures. New systems were adopted in accordance with this Act, including environmental standards, environmental impact assessments, and regulation of total emissions. It also contained regulations on fuel use, sulfur content in fuel, automobile emission standards, fuel additives, and incineration of odorous substances.

In 1978, the first SO₂ standard was created, followed by standards on CO, NO₂, total suspended particles (TSP), and ozone (O₃) in 1983. The standards were then continually strengthened.

Back in 1978, 40,000 households in Seoul used LPG, but plans were made to increase this to 500,000 of the 800,000 total households in the city. The replacement of coal briquettes with cleaner fuel was considered one of the most important policies that helped reduce air pollution levels in Seoul. Since then, the government has implemented several policies to supply clean fuel: fuel with lower sulfur content in 1981;

restrictions on use of solid fuel in 1985; unleaded gasoline in 1987; and mandatory use of LNG in 1988. As a result, SO₂ and TSP levels began to improve in Seoul.

1990 – 2003: Air Quality Control

Since 1980, the Environment Conservation Act was revised a few times but abolished in the end to better respond to the diversifying environmental issues, leading to enactment of the Framework Act on Environmental Policy in 1990. It was based on this Framework Act that six other Acts were passed, including the Clean Air Conservation Act and the Water Quality Conservation Act.

The Clean Air Conservation Act is about revision of the emissions charge system and determines permissible emission standards, types of pollutants, emission period and volume, fuel use, standards for sulfur content in fuel, regulations on odor generation, automobile recalls, and strengthened regulations on installation and operation of emission facilities and pollution-prevention equipment. The Act was revised several times afterwards to increase punitive measures for unauthorized emissions facilities. In December 1995, revisions were included that allowed city mayors and provincial governors to push ahead with their own policies designed to improve air quality in their jurisdictions. It was then the era of local autonomy, which had begun in June that year, and the role of local governments was amplified in protection of air quality.

Accordingly, Seoul took action to pave the way for localized air quality management. It enacted the City of Seoul Framework Ordinance on the Environment to provide basic principles for the city's environmental policy and enacted/promulgated the Seoul Local Air Environment Standard (March 1998) – a step forward from the standards set up by the central government. In addition, it created an Air Conservation Department within its environment organization, creating its own foundation for air quality control. In the meantime, the Ministry of Environment designated Seoul, Incheon, and 15 other cities in Gyeonggi-do Province as air quality control areas on July 1, 1997, pursuant to the Clean Air Conservation Act (Ministry of Environment Announcement #97-51). Joint effort by local governments to protect air quality was now a legal concept.

The continued supply of clean fuel in Seoul helped decrease the primary air pollutants (SO₂, TSP, CO, and other substances directly from source) markedly below environmental requirements. Pollutants common in advanced nations – particulate matter (PM), ozone, and NO₂ formed through chemical or physical reactions in the air – were still above environmental requirements and did not improve much. Seoul belatedly realized that it had not come up with plans to reduce vehicle emissions, which were rapidly increasing. This shows that in relation to designation of air quality control areas, the city needs to pursue its own projects to keep its air clean and also work with the surrounding local governments and the central government to review and analyze their roles in such efforts. In the end, the primary focus of Seoul's efforts to improve its air and environment is on managing the sources of air pollution within the city but

collaboration with the central government and other local governments is also needed to reach the desired goals.

2003 – Today: Air Quality Control

In December 2003, the Special Act on the Improvement of the Air & Environment for Seoul Metropolitan Area (the “Special Act on the Air”) was enacted, aiming to improve air quality and overall environment of the Seoul metropolitan area, which at the time was one of the worst among OECD member country cities. The Act was mainly concerned with improving air quality, setting local permissible emissions, creating framework plans on improving the air and environment in the Seoul metropolitan area, managing total emissions at the workplace, using low emission vehicles, and strengthening controls on exhaust. Every decade, a Framework Plan On Air and Environmental Improvement in the Seoul metropolitan area is to be established to reduce the levels of nitrogen oxide compounds, sulfur oxide compounds, VOCs, and particulate matter pursuant to the Special Act on the Air. Phase 1 of the framework plan was scheduled for 2014, and focused on PM10 and NO₂ levels in the capital area. The Seoul Action Plan On The Air and Environment Improvement (2005 – 2014) was developed and adopted in accordance with the framework plan, and its strategy of “selection and concentration” visibly improved the environment and reduced particulate matter (PM10), the main culprit in poor visibility and incidence of respiratory disease. In 2001, PM levels in Seoul were at 71 $\mu\text{g}/\text{m}^3$; by 2012, this had fallen to 41 $\mu\text{g}/\text{m}^3$. PM levels, a major environmental indicator of the competitiveness of global cities, are still higher in Seoul than elsewhere. Further improvement is still an important demand.

Scheduled to start in 2015, Phase 2 of the Framework Plan on the Air and Environment Improvement targets more pollutants, in addition to PM10 and NO₂, to include PM2.5 and O₃. It seeks to minimize potential causes of air pollution and other threats to health.

During this latest period, a low emission vehicle program was introduced to the Seoul metropolitan area to minimize the emission of air pollutants by vehicles, and comprises projects on such issues as lowering emissions from diesel vehicles, increasing the number of “green” cars, and creating natural gas fill-up stations.

The Seoul Metropolitan Government (SMG) piloted an LPG engine retrofit program on 135 2.5-ton cleaning trucks used by local governments to pursue lower emissions from diesel vehicles, a project launched by both the city and the surrounding areas in 2003. From 2005, the project was expanded to cover city buses and business vehicles, introducing the installation of DPF and DOC devices, LPG engine retrofits, and early termination of vehicle registration for vehicles failing to meet the emissions requirements.

The SMG is also interested in encouraging the use of electric vehicles (EVs) as a fundamental solution to air pollution, and has distributed such “green” cars since 2009 and built charging stations to test-run for wider use of EVs. The city is a leader in “green” car projects, starting with electric bicycles, low-

speed/retrofitted/high-speed EVs, electric buses, hydrogen-powered cars, and online EVs, etc. Beginning in 2009, Seoul has built charging stations at City Hall, local district offices, parks and other public facilities, and developed a “smart payment” system to meet potential demand for easy payment.

To ensure air quality control is systematic, monitoring stations have been set up across the city. Following the ozone alert system in 1995, a particulate matter alert system was introduced in 2005 to help protect city residents.

The happiness of people in Seoul is directly connected to the health of the city. The importance of air quality control is receiving more emphasis than ever considering the potential impact of climate change on public health. To enhance the environment of a global city like Seoul and ensure that the conditions for good health are protected, the city needs to communicate with its residents on ideas as it sets itself on a path of transformation to a fresh air city (one of Seoul’s four main goals) and an international capital with a healthy environment. By 2018, the SMG proposes to reduce fine particulate matter, which directly impacts health, by 20%. Its policies, designed to stop emissions at source, include low emission projects for older diesel vehicles, reduction of nitrogen oxide compounds from heavy vehicles, introduction of EVs and hybrid CNG buses, etc., and fine-tuning of its strategies to meet the specific needs of the city and its people. At the same time, it plans to encourage more of the city’s people to participate in environmental efforts, by, for example, driving eco-friendly cars, while refining legal and institutional frameworks to promote the purchase and use of new low-emission vehicles.

Based on a comprehensive “diagnosis and prescription” tailored to the needs and characteristics of the city, the SMG is focused on identifying detailed action plans to achieve its goals and continue to improve air quality and the overall environment for the future.