PART III. NATIONAL REPORTING GUIDELINES FOR CSD-14/15 THEMATIC AREAS

A. ATMOSPHERE/AIR POLLUTION

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Ministry of Environment

A. ATMOSPHERE/AIR POLLUTION

Decision-Making

Air Quality Status

The National Institute of Environmental Research (NIER) calculates and announces CO, NOx, SOx, TSP, PM10, VOC annual emissions classified by region/source, using the Clean Air Policy Support System (CAPSS). Recently announced nationwide emissions trends are as shown in Table 1. The results show that most pollutant emissions with the exception of SOx has increased, the main reasons being the surge in energy consumption in the industry and transportation fields due to economic growth and increase in the supply of automobiles. On the other hand, fuel quality improvements and clean fuel replacement of traditional fuels resulted in a fall in SOx emissions.

<Table 1> Air Pollutant Emission Calculations

Unit: Tons/Year

	CO	NOx	Sox	PM_{10}	VOC
1999	805,666	974,760	545,729	69,158	643,953
2000	825,193	1,003,958	531,059	67,515	664,852
2001	837,568	1,050,997	552,173	66,881	712,230

2002	860,584	1,106,269	501,753	68,890	723,857

Source: CAPSS, NIER

Major Policies

Trends in pollutant emissions during the past four years for each pollutant in the mega-city Seoul are as illustrated in Table 2. SO2, O3 and CO are below national environmental standards and are gradually improving, but NO2 and PM10 satisfy national environmental standards, albeit declining slightly. Although a wide variety of air conservation policies have been used, including the strengthening of emission standards, fuel quality improvement and alternative fuel use, pollution levels have not dramatically improved. The reasons for the above are that population density in the Seoul area is high, with a rapid increase in the number of cars.

<Table 2> Trends in Annual Pollutant Concentration in Seoul

	CO (ppm/8hrs)	NO_2 (ppm/yr)	SO_2 (ppm/yr)	PM10 ($\mu g/m^3$)	O_3 (ppm/8hrs)
2000	1.0	0.035	0.006	65	0.017
2001	0.9	0.037	0.005	71	0.015
2002	0.7	0.036	0.005	76	0.014
2003	0.6	0.038	0.005	69	0.014

Source: Ministry of Environment, *Environment White Paper*, 2004

Policy Objectives and Major Laws

The basic objective in atmosphere/air conservation policy is to maintain clean, clear air quality, thereby protecting public health and providing a pleasant living environment, as well as preventing environmental degradation from air pollution. To that end, national air quality standards have been set. To conform to the standards, facilities emitting air pollutants are required to designate and comply with emissions standards. Recently, air quality management policy has shifted to using economic incentives, among other various air quality policies.

Substances and level of standards set forth in the emissions standards have generally referred to WHO recommended levels, with domestic pollution status, effects on the human body and other factors considered in the designation process. The national emission standards that have been implemented since January 2001 are shown in Table 3. However, hydrocarbon (HC) pollution is not heavy, and ozone (O3) pollution levels are measured. Thus it is not necessary to measure its levels separately, resulting in its deletion from environmental standards.

<Table 3> National Emissions Standards (January 1, 2001)

	Standard	Measuring Method
SO_2	Annual average 0.02ppm and under 24-hour average 0.05ppm and under Hourly Average 0.15ppm and under	Pulse U.V. Fluorescence Method
CO	8-hour average 9ppm and under Hourly average 25ppm and under	Non-Dispersiveinfrared Method

NO_2	Annual average 0.05ppm and under 24-hour average 0.08ppm and under Hourly average 0.15ppm and under	Chemiluminescent Method
PM10	Annual average 70μg/m³ and under 24-hour average 150μg/m³ and under	ß-Ray Absorption Method
O_3	8-hour average 0.06ppm and under Hourly average 01.ppm and under	U.V. Photometric Method
Pb	Annual average 0.5μg/m³ and under	Atomic Absorption Spectrophotometry

Source: Ministry of Environment, *Environment White Paper*, 2004

Most air pollutants and greenhouse gases are emitted from the consumption of fossil fuels. If energy consumption efficiency is improved, and energy consumption itself falls, their emissions are reduced from the source. Therefore, air pollution and energy policies should be linked closely or integrated in their implementation. Currently in Korea, the Ministry of Environment (MoE) is responsible for air quality policy, with the Ministry of Commerce, Industry and Energy (MOCIE) responsible for energy policy. The two agencies are aware of the need for linkage or integration and are thus seeking ways to link or integrate air quality and energy policies.

Laws that form the foundation for air conservation policy in Korea are the Clean Air Conservation Act, Noise and Vibration Control Act, Indoor Air Quality Control in Public Use Facilities, etc. Act, Special Act on Metropolitan Air Quality Improvement, and the Foul Odor Prevention Act. The Clean Air Conservation Act regulates pollutant emissions from workplaces, and vehicles, being the most basic of air quality policies. Legislated in August 1990, it has been

revised numerous times to reach its current version. The Noise and Vibration Control Act regulates noise and vibration in the workplace, households and motor vehicles, which was legislated in August 1990. After the above laws were passed and implemented, indoor air quality, worsening of Seoul Metropolitan Area air pollution, and foul odor issues began to receive attention. To reinforce air quality management in such new areas, the Korean government in 2003 revised its Air Quality Control in Underground Locations Act, expanding and revising it into Indoor Air Quality Control in Public Use Facilities, etc. Act, and legislated the Special Act on Metropolitan Air Quality Improvement and the Foul Odor Prevention Act. Thus the Korean government is making utmost efforts to proactively respond to air pollution issues, the diversity and gravity of which are increasing by the day.

Major Policies

Strengthening of Hazardous Chemical Management

Recently, with lack of ventilation and the rise in sources of indoor air pollution due to increased indoor activities and chemical use in building material leading to deterioration of indoor air quality, public concerns are being exacerbated over new diseases including the Sick House Syndrome (SHS) and chemical hypersensitivity. With chemical use continuing to increase in industries and homes with the development of science and increase in income, environment-related diseases, such as asthma and atopic dermatitis, are also rising sharply. Therefore, there is an urgent need to protect the vulnerable -children, the elderly and infirm- from harmful substances in their living environments, such as polluted indoor air and hazardous chemicals.

In this context, the Korean government has taken the following measures to strengthen hazardous chemical management. First, in May 2003, it legislated the Indoor Air Quality Control in Public use facilities, etc. Act, which is an expansion/amendment of the previous Underground Air Quality Management Act, to meet new policy demands. The Act added medical facilities, libraries and performance venues to subway stations and underground shopping malls, places subject to indoor air quality management. Also, it set forth indoor air quality maintenance standards to the five substances of NO2, Rn, TVOC, asbestos and O3. If levels of the above exceeded standards, ventilation equipment installation was made mandatory. In addition, those who established public facilities were required to put in place air purifying and ventilation equipment, and the use of construction materials that emit more pollutants (TVOC, etc) than standards were limited.

The Korean government will inspect indoor air pollution levels for public use facilities and newly-built collective housing nationwide, continuing to implement the Mid and Long-term Comprehensive Measures for Indoor Air Quality Management (2004-2008), as well as carrying out a ten-year plan to contain environment-related diseases to systematically manage chemical hypersensitivity, atopic dermatitis and other such diseases.

Increased supply/use of low-sulfur fuel

To reduce the concentration of sulfurous acid gas in the Seoul Metropolitan Area and major cities, standards for sulfur concentration in fuel were strengthened and lower sulfur fuel was supplied from 1981 (B-C fuel: 4.0% -> 1.6% and under; diesel: 1.0% -> 0.4% and under). With the partial completion of desulfurization and refining facilities, sulfur concentration standards

were stepped up one level from 1993 (B-C fuel: 1.6% ->1.0% and under, diesel: 0.4%->0.2% and under) and such fuel use made mandatory. From 1996, sulfur concentration standards for low-sulfur fuel were made even more stringent (B-C fuel: 1.0%-> 0.5% from 1997, 0.3% from 2001; diesel 0.2%-> 0.1%).

As of 2001, diesel of 0.1% and under is required to be supplied and used throughout Korea, with 49 cities and counties such as Daejeon and Gwangju required to supply and use fuel oil of 0.5% and under (LSWR included). Seven major urban areas including Seoul are supplied fuel oil of 0.3% and under.

<Table 4> Status of increase in low-sulfur fuel supply

	1981	1993	1994	1995	1996	1997	1999	2001
B-C	Seoul (1.6%)	18cities, counties (1.6%) 20 cities, counties (1.0%)	17 cities, counties (1.6%) 21 cities, counties (1.0%)	19 cities, countries (1.6%) 22 cities, counties (1.0%)	42 cities, counties (1.0%)	37 cities, countries (1.0%) 24 cities, counties (0.5%)	Nationwide excluding regions required to use 0.5% (1.0%) 56 cities, countries (0.5%)	Nationwide excluding regions required to use 0.5% (1.0%) 49 cities, counties (0.5%) 7 cities (0.3%)
	Seoul	38 cities,	38 cities,	41 cities,	63 cities,	Nationwide	Nationwide	Nationwide

Diesel	(0.4%)	counties (0.2%)	counties (0.2%)	counties (0.2%)	counties (0.1%)	(0.1%)	(0.1%)	(0.1%)

Note) Inside ( ) is sulfur concentration

Regulation of lead concentration in gasoline

Article 103 of manufacture standards of car fuel and additives of the Clean Air Conservation Regulation has the lead content of gasoline for motor vehicles at 0.013g/l and under. As can be seen from the above, Korea has designated maximum concentration standards for lead in motor vehicle gasoline and allows only gasoline that meets such standards to be produced/sold.

Special Measures for Metropolitan Air Quality Improvement[3]

The air pollution level in the Seoul Metropolitan Area, in which 46% of the Korean population and motor vehicles are concentrated in an area that only accounts for 12% of the national territory, is about 1.8-3.5 times those of major cities in advanced nations. In particular, PM and NOx pollution levels are among the most serious in OECD member states. Moreover, social losses from air pollution in the Seoul Metropolitan Area are estimated at 10 trillion Korean Won annually, with early deaths at about 10,000 a year (2003, Gyeonggi Research Institute). Furthermore, the number of motor vehicles is expected to increase 40% and energy use 29% in ten years, and thus air pollution in the Seoul Metropolitan Area has potential to be a serious social problem.

[3] Details are in the case study

However, despite the phased in strengthening of air pollution-emitting facilities and motor vehicle exhaust emission standards, air quality has deteriorated from the increase in motor vehicles and energy use. Thus policies based on end-of-pipe concentration regulations were unlikely to improve air quality.

As a result, the MoE recognized that improvement in air quality in the Seoul Metropolitan Area was an urgent national task, legislating the Special Act on Seoul Metropolitan Air Quality Improvement in December 2003. Based on the latter, is implementing the Special Measures for Metropolitan Air Quality Improvement over 10 years from 2005 to 2014.

The Special Measures consist of the following:

First, regions in the Seoul Metropolitan Area the air pollution in which is acknowledged to be serious, and regions the air pollutant emissions from which are recognized as having a great influence on the air quality in the Seoul Metropolitan Area were designated as Air Quality Management Areas (AQMA) and subject to special management. Second, the Minister of Environment was given the responsibility of devising the Air Quality Improvement Plan for the Seoul Metropolitan Area (10 years), which included targets to improve air quality, give quotas for total allowable emission load for each area and plans to reduce such emissions to improve air quality in the Seoul Metropolitan Area. Mayors and Governors of cities and provinces were charged with the formulation of implementation plans that followed the Plan. Third, workplaces that emitted more than a certain quantity of NOx, SOx and dust were given quotas of the total allowed emissions of pollutants in a year. When such quotas were exceeded, the Total Air Pollution Load Management system was introduced, in which an emissions charge was levied.

Fourth, emission gas management regulations were strengthened. Sellers of motor vehicles were required to come up with and implement low-emission vehicle (LEV) supply plans, and administrative and public institutions were required to buy over a certain proportion LEV among its motor vehicle purchases. Lastly, exhaust emission reduction system installation on automobiles whose emission gas warranty had expired or their conversion into/replacement with low-emission engines were made mandatory.

To facilitate the implementation of the Special Measures, the MoE in 2004 legislated special subordinate laws. In 2005, the MoE plans to announce the Air Quality Improvement Plan for the Seoul Metropolitan Area (2005-2014), setting air quality improvement targets, emission standards, and LEV supply plans. When the basic plan is in place, the local governments of Seoul Metropolitan City, Incheon Metropolitan City and Gyeonggi Province will devise implementation plans within 1 year, obtain approval from the MoE and pursue total pollution load management systems for the workplace, emission gas management for vehicles in operation and the supply of LEVs. However, total load management for the workplace will go through a pilot phase for 2.5 years from 2005 to ensure even more careful preparation, and will be implemented full-scale from July 1, 2007.

Measures for the reduction of traffic pollution

* Natural Gas Vehicle supply

Korea completed development of Natural Gas Vehicle (NGV) buses from 1991 to 1997 and their pilot operation from July 1998, currently providing NGV buses to major cities around Korea. The

Korean government plans to replace all buses in the nation (about 20,000 units) with NGV buses by 2007.

<Table 6> Targets for NGV bus and refueling station supply

	2000-2003	2004	2005-2007	Total
NGV Bus (unit)	5,000	2,400	12,600	20,000
Refueling Station (No.)	148	35	217	400

To replace diesel buses with NGV (natural gas) buses, the Korean government provided financial support measures such as support for bus purchasing expenses, loans for refueling station installation, with tax credits. Also, relevant laws and decrees, such as the Building Act, National Land Planning and Utilization Act, and High-Pressure Gas Safety Control Act were supplemented to support infrastructure to supply NGV buses, such as providing refueling stations.

As a result, 4,312 NGV buses are operating throughout Korea as of 2003, with 43 refueling stations and 116 refueling equipment in operation.

* Strengthening of emission standards for motor vehicles produced in Korea

The Korean government is strengthening emission standards for motor vehicles produced in Korea to be close to levels in advanced countries by 2006. Phase 1 includes pulling up standards to be applied between October 2000 and 2005 to be on the level currently applied in

advanced countries. Phase 2 will be for gasoline vehicles to meet Ultra Low-Emission Vehicle (ULEV) standards that the US will be applying after 2004 and for diesel vehicles to meet EURO 4 standards that Europe will be applying after 2005.

<Table 7> Strengthening of emission standards for motor vehicles produced in Korea

Type	Pollutant	2002 and Before	Current	2006 and After
Gasoline	NOx (g/km)	0.25	0.12	0.031
	HC (g/km)	0.16	0.056	0.05
Large Diesel	NOx (g/kwh)	6.0	5.0	3.5
	Particulate Pollutant (g/kwh)	0.15	0.1	0.02

* Emissions reduction projects for diesel vehicles currently in operation

As part of the Special Measures for Metropolitan Air Quality Improvement, certain diesel vehicles the emissions gas warranty period of which have expired and are being driven in the Seoul Metropolitan Area are subject to inspection with strict emission standards applied. If the vehicles do not meet the above standard, installation of DPF or DOC, or conversion into a LEV that uses LPG or CNG will be required, or the vehicle is to be scrapped. In the above three cases, the Korean government is providing subsidies.

* Auto/Oil Program

Since for motor vehicles and fuel it is necessary to analyze their mutual effects on air quality and manage them in an integrated way rather than regulate individually, the Korean government

is implementing an Auto/Oil Program that can optimize cuts in emission from motor vehicles and fuel. Korean authorities are also designating targets for vehicle emission cuts and analyzing the interrelation between and risks from motor engines and fuel, thereby using them to come up with reasonable regulations.

* Quality improvement in fuel for motor vehicles

In Korea, the only substances emitted by motor vehicles regulated until 1992 were lead and phosphorus, which have a direct impact on the human body. From 1993 however, removing lead was attempted, as well as regulations strengthened step by step on aromatic compounds and benzene, which have direct and indirect influences on the human body and air quality.

Regulation of diesel began from 1993, when sulfur concentration was set at 0.2% and under, 0.1% and under from 1996, 0.05% and under for April 1998, 0.043% and under from January 2002, and 0.003% and under from 2006.

Adjustment of transportation fuel price structure

NOx and PM emitted from diesel vehicles are threatening mega-cities, in particular the Seoul Metropolitan Area. Diesel is cheaper compared to gasoline, which has led to demand for diesel vehicles to increase recently. From 2005, diesel passenger cars will be marketed, with exacerbation of pollution from PM and NOx expected.

To prevent demand for gasoline and LPG vehicles to rapidly shift to demand for diesel vehicles, and also to fundamentally resolve the worsening of air pollution from diesel motor vehicles, the

Korean government has decided to overhaul the price structure for gasoline, diesel and LPG. Thus the Korean government has decided on the following modification on relative energy pricing. Prices relative to other fuels, which were 100:70:53 for gasoline:diesel:LPG as of 2004, will go through three steps of taxation adjustment on such fuels for three years from July 2005, to reach 100:85:50 by July 2007. In other words, taxation on gasoline is left at its current level, LPG taxation slightly lowered, while taxation for diesel is to be raised three times over three years, leading to the above price structure by July 2007.

The reason taxation is used to adjust price ratios for transportation fuel is due to the externality from fuel use, or the internalization of the social cost of air pollution. Despite the social cost of air pollution caused by diesel vehicle emissions, their external costs were not internalized in prices. As a result, diesel became cheaper than other fuels, with a rapid increase in demand for diesel vehicles becoming a matter of concern. Aware of the issue, the Korean government has thus decided to gradually internalize the social cost from the use of diesel to adjust demand for transportation fuel to socially optimal levels.

<Table 8> Price structure adjustment for transportation fuel

	Gasoline	Diesel	LPG
December 2004	100	70	53
July 2005	100	75	50
July 2006	100	80	50
July 2007	100	85	50

Capacity-Building

Environmental education in Korea can be classified into school and social education. The MoE recognizes the importance of environmental education in schools, and is actively encouraging the choice of the environment subject in schools to enable more systematic environmental education. Also, the MoE provides educational opportunities through field trips in regular education for youths to enable them to experience the environment in a wide variety of ways. Moreover, the MoE operates the "Environment Class" wherein environmental education experts teach at elementary and secondary schools to enhance environmental awareness that is put into practice through eliciting voluntary environmental club formation and its activities. With recent high social interest in specialized environmental education, environment-related departments have been established in 205 universities as of July 2003, and are on the rise. Furthermore, environmental education is being implemented through electives at universities.

Professional education for civil servants in air quality-related work and environmental professionals are provided by NIER and Korea Environmental Preservation Association (KEPA), etc. The NIER educates engineers that work in prevention facilities and civil servants who work in air quality fields to foster expert knowledge and capacity for air conservation. The KEPA educates air quality managers in corporations.

Information

Information on the variety of environmental policies in Korea is available on the MoE Web site (http://www.me.go.kr). Diverse information relevant to air quality can be found on the NIER Web

site (http://nier.go.kr). The National Environmental Technology Center (KONETIC) under the MoE provides information related to environmental technology on its Web site http://www.konetic.or.kr. Information on environmental impact assessment, environmental economics and air conservation policies are available on the Korea Environment Institute Web site (http://www.kei.re.kr). The MOCIE Web site, http://www.mocie.go.kr and Korea Energy Economics Institute Web site (http://www.keei.re.kr) have information on climate change and energy. The monitoring network for air pollution from motor vehicles measures seven types of air pollutants, including TSP, SO2, NO2, CO and O3.

Research and Development

The MoE is implementing the Eco-Technopia 21 (ET21) project for ten years from 2001 to foster the environmental industry into a national strategic industry and to raise the quality of life through the resolution of new environmental issues such as hazardous chemicals. For the systematic implementation of the ET21, the MoE has established the Master Plan for ET 21, with phased targets and strategies, and is pursuing full-scale technological development, drawing up a Technology Road Map.

<Table 9> Phased Targets for ET21

Phase 1(2001-2003)	Phase 2 (2004-2007)	Phase 3 (2008-2010)
Development of pollution control technology	Development of mid- & long-term strategic technology	Environmental technology development for future generations

The ET21 project consists of 12 units. Among them are two air quality-related projects, “clean, safe air” and “creating a pleasant living environment.” For the former, the technological development focus is on PM pollution alleviation, ozone and smog pollution alleviation and harmful air pollutant management technologies. For the latter, focus is on noise/vibration emission characteristics, noise and vibration evaluation technology, noise/vibration control/reduction technology, and sound and vibration arresting technology.

Financing

The MoE budget was at 1449.2 billion Korean Won in 2004, accounting for about 1% of the entire governmental budget, among which the amount earmarked for air conservation was about 104.2 billion Korean Won, accounting for about 7.2% of the MoE budget. However, from 2006, when Special Measures for Metropolitan Air Quality Improvement is implemented full-scale, MoE and air conservation budgets are due to increase by a large margin.

Cooperation

Recently in East Asia, interest is rising in long-range transboundary air pollution. Joint research projects between the neighboring nations of Korea, China and Japan are being implemented. Such regional cooperation is facilitating joint research and efforts such as the installation of an information exchange system.

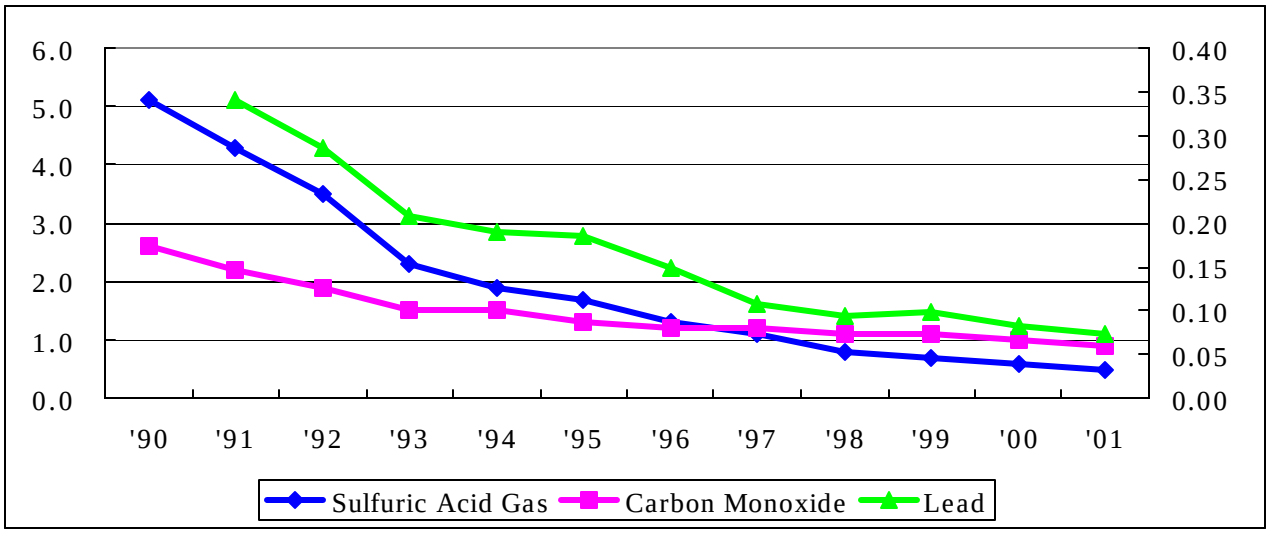
Korea is participating in EANET(Acid Deposition Monitoring Network in East Asia) – started by Japan -with 12 East Asian countries since 1993

Korea ratified the UNFCCC in 1993 and signed the Kyoto Protocol in 1998. The Korean government was ready to constructively participate in international efforts to implement the Kyoto Protocol by 2002. With the recommendation of the Convention, Korea is preparing a National Report on greenhouse gas emissions, and is supporting research to reduce greenhouse gas emissions. Moreover, Korea has acceded to the Vienna Convention, Montreal Protocol, London Amendment on the Montreal Protocol as of December 1992. Korea has as a result joined the Copenhagen Amendment as well as the Montreal Amendment in February 1994 and August 1998 respectively. Korea is thus successfully implementing domestic measures to eliminate ozone layer-depleting substances required by the Convention, Protocols and Amendments.

CASE STUDY : A SUCCESSFUL NATIONAL ATMOSPHERE/AIR POLLUTION PROGRAM/STRATEGY

1. The problem or issue addressed

With the Korean government's proactive air pollution measures, such as low-sulfur fuel provision, mandatory clean fuel use, primary pollutant concentrations, including sulfuric acid gas and carbon monoxide and lead, have markedly improved, but increased industrial activity and surge in the number of vehicles have led to continued worsening of the concentrations of secondary pollutants, PM, NO2 and ozone (O3).



ozone

Region	City	89	90	91	92	93	94	95	96	97
Seoul		0.008	0.009	0.012	0.014	0.013	0.014	0.013	0.015	0.016
Busan		0.012	0.017	0.014	0.015	0.014	0.014	0.016	0.020	0.019
Daegu		0.009	0.008	0.010	0.013	0.013	0.015	0.017	0.015	0.015
Incheon		0.011	0.008	0.013	0.016	0.012	0.014	0.013	0.011	0.016
Gwangju		0.007	0.010	0.013	0.017	0.015	0.015	0.016	0.017	0.021
Daejeon		0.014	0.009	0.009	0.010	0.011	0.014	0.015	0.017	0.018
Ulsan		0.015	0.011	0.013	0.012	0.014	0.013	0.015	0.015	0.015
Gyeongg	Suwon	0.012	0.010	0.012	0.012	0.013	0.014	0.014	0.015	0.017
	Anyang	0.014	0.009	0.013	0.011	0.015	0.015	0.014	0.013	0.016

Currently, air pollution in Seoul has 1.8-3.5 times higher PM and 1.2-1.7 times higher NO2 compared to major cities in advanced countries.

Sulfuric Acid Gas	0.15/1hr	'96	'97	'98	'99	'00	'01
	Seoul	19	8	0	0	0	0
	Incheon	0	0	0	1	0	0
	Gyeonggi	26	2	2	7	2	0
Sulfuric Acid Gas	0.05/24hr	'96	'97	'98	'99	'00	'01
	Seoul	34	11	1	0	0	0
	Incheon	4	0	0	0	0	0
	Gyeonggi	44	24	0	8	4	1

NO2	0.15/1hr	'96	'97	'98	'99	'00	'01
	Seoul	3	19	2	9	34	67
	Incheon	0	0	1	1	0	16
	Gyeonggi	22	137	11	9	6	87
NO2	0.08/24hr	'96	'97	'98	'99	'00	'01
	Seoul	11	39	13	38	40	121
	Incheon	1	0	2	1	1	24
	Gyeonggi	10	4	0	41	32	59
Ozone	0.1/1hr	'96	'97	'98	'99	'00	'01
	Seoul	179	199	290	296	334	128
	Incheon	0	0	18	39	57	68
	Gyeonggi	27	114	126	267	270	198
Ozone	0.05/8hr	'96	'97	'98	'99	'00	'01
	Seoul	285	316	407	652	461	282
	Incheon	4	0	30	82	102	161
	Gyeonggi	76	204	227	533	432	491
Particulate Matter	150/24hr	'96	'97	'98	'99	'00	'01

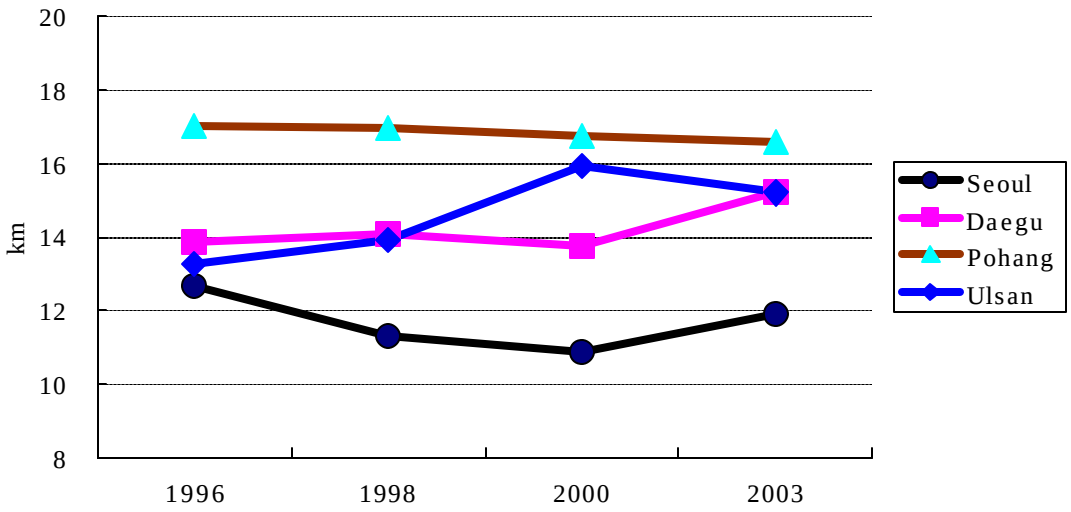
<Figure 2> Comparison in Air Pollution with Major Cities in Advanced Countries

The Seoul Metropolitan Area has 1.3-1.4 times higher NO2 and PM concentrations compared to other cities in Korea, and 57% of ozone warnings (over 0.12ppm/hour) in Korea are issued in the area.

<Table 1> Comparison in Air Pollution Between Seoul and Other Areas

Category	2001			2002		
	NO_2 (ppb)	O_3 Warnings	PM_{10} (? /?)	NO_2 (ppb)	O_3 Warnings	PM_{10} (? /?)
Seoul Area	31(37)	24(5) times	67(71)	31(38)	27(2) times	67(69)
Other	22	5 times	53	22	21 times	53

With the deterioration of air quality as shown above, the average annual visible distance has likewise continued to decrease – distance visible in Seoul (12.6km in 1996->11.9km in 2003) is about 40% shorter than the industrial cities of Ulsan (15.2km) and Pohang (16.6km).



The reason for such deterioration of air quality is because emission sources are concentrated in the Seoul Metropolitan Area, which accounts for just 12% of the national territory: 46% of the Korean population and motor vehicles and 27% of Korean energy use are in the area. Considering the findings of research that the adequate carrying capacity of Seoul is 1 million

motor vehicles and about 5 million people, the carrying capacity in Seoul has already been exceeded.

The Seoul Metropolitan City is a basin shaped like a bottomless square, surrounded by mountains such as Mt. Bukhan, and thus its geography makes air pollutant dispersion difficult. Because of that, the air quality management conditions are environmentally less favorable than Tokyo, Paris and New York, etc, the topography of which are flat. Moreover, Seoul is located east of northeastern China, which heavily emits pollutants, resulting in the exacerbation of pollution from long-range transboundary air pollution from China.

Despite that, fundamentally responding to air pollutants that continue to increase is impossible using conventional methods, which depend on end-of-pipe regulation. With the carrying capacity exceeded 2-3 times, gradually stepping up emissions standards of plants and motor vehicles cannot prevent the increase in pollutants. Thus a shift to development methods that take into account the carrying capacity of the air is needed. Also, the existing method of management by different local governments has its limits in managing air pollutants that impact a large area. The Seoul Metropolitan Area forms a single region that is impacted similarly due to topographical and meteorological characteristics (pollutant movement influences 20%-40% on one another region), and therefore only reducing emissions from each local government will not greatly improve air quality. The level of pollution in Seoul is caused by not only pollutants from Seoul but also by the latter's combination with long-distance transboundary pollutants from China.

Another problem is that policy integration is inadequate between relevant policies such as energy and industry policies and urban planning, which are closely related with air pollution. The MOCIE is responsible for energy supply and demand, demand management, alternative energy development/supply; the Ministry of Construction and Transportation for urban planning and transportation demand management; the MoE for energy and motor vehicle use and reduction of air pollution from urban development. Thus implementing effective measures under the system is difficult. To fundamentally resolve air pollution issues, energy policies, such as energy demand management and urban planning, and transportation demand management need to be linked with air policy.

The Special Measures for Metropolitan Air Quality Improvement was formulated and implemented to meet the demands in the above context.

2. Name of the programme :

   Special Measures for Metropolitan Air Quality Improvement

3. Timeframe: 10 years Year started: 2005

4. Status: ongoing

5. Main objectives

¦ To improve air quality in the Seoul Metropolitan area to advanced country levels by 2014.

- PM10 to Tokyo, Japan levels (40 ? /?), NO2 to Paris, France levels (22ppb)

- As a result enable the sea at Incheon Port be visible on a clear day from a mountain in central Seoul

< Table 2 > Air Quality Improvement Targets

	'03	'14
· PM_{10}(? /?)	69 ?	40(Tokyo Levels)
· NO_2(ppb)	38 ?	22(Paris Levels)

- To achieve the above, the Korean government plans to cut PM, NOx, aromatic compounds and SOx emissions 38.7%-53% compared to 2001 levels.

6. Implementation

To achieve the above, the MoE will establish the Master Plan on management of air quality in the Seoul Metropolitan Area, which includes emissions standards for pollutants, polluted level outlooks, air quality management targets, designation of impacted zones and total load regulations for workplaces and LEV supply. The local governments of Seoul Metropolitan Government, Incheon Metropolitan Government and Gyeonggi Province will establish and implement plans for the above Plan