The Air Quality Improvement Measures in Seoul Metropolitan Area

Ministry of Environment, Republic of Korea

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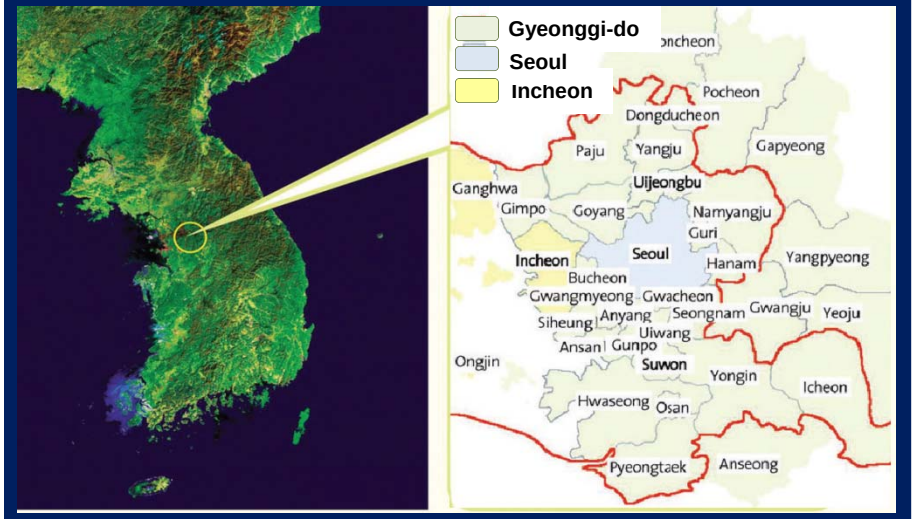
I. Air Quality Status in Seoul Metropolitan Area

1. Seoul Metropolitan Area(SMA)



- **SMA** is **the highest density area** in Korea
  - 47% of the total population and automobiles are concentrated in the SMA(only 11% of territory of Korea)

- People density : 17000/km^3
- Automobiles: 8.6million
- Energy consumption: 5,6 million TOE/year

2. Air Pollution status in SMA

- SMA was more serious than Non-SMA

✓ **Comparison of air pollution in the SMA and Non-SMA**

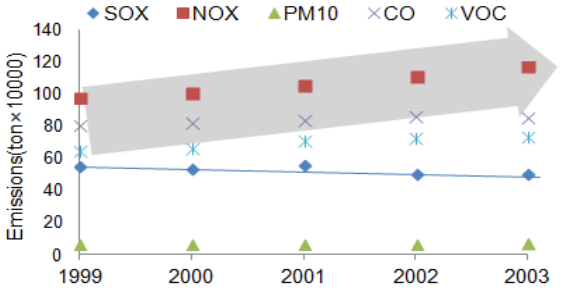
	Annual average in 2003	
	NO_2(ppb)	PM_{10}(μg/m^3)
SMA	34(38)	65(69)
Non-SMA	22	53

* () : the number for Seoul

✓ **Portion of pollutant emissions in 2003** Unit: %

	Areas	CO	NO_X	SO_X	PM_{10}	VOC
SMA	11	44.4	31.9	14.2	25.5	38.9
Non-SMA	89	55.6	68.1	85.8	74.5	61.1

✓ **Trend of pollutant emissions in the SMA**

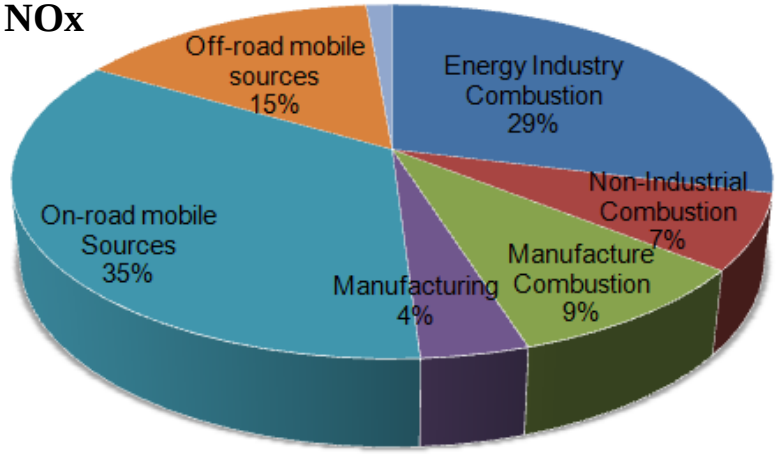


- Emission of Pollutants is Increasing except for SOx.

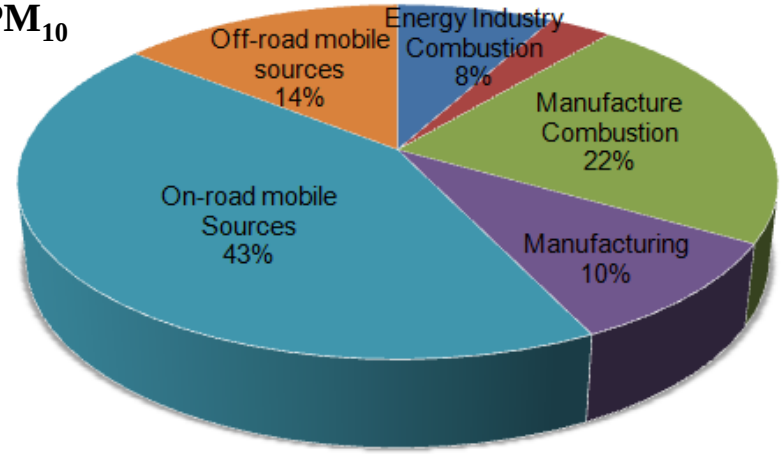
I. Air Quality Status in Seoul Metropolitan Area

3. The Major Sources contributing to Air Pollution in SMA (2003)

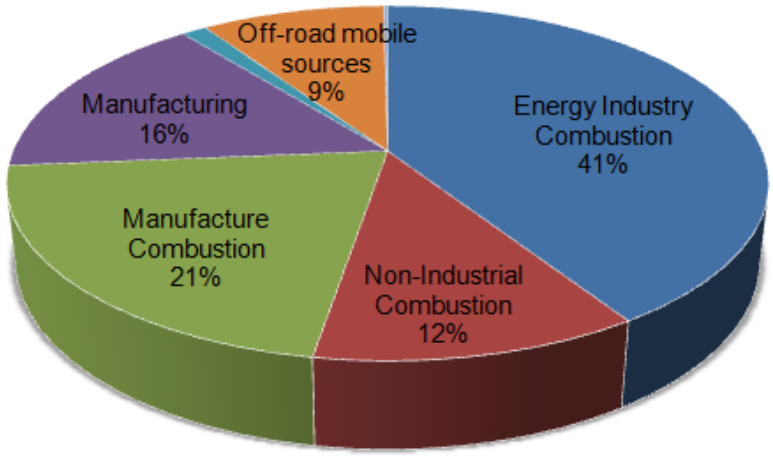
NOx



PM_{10}



SOx

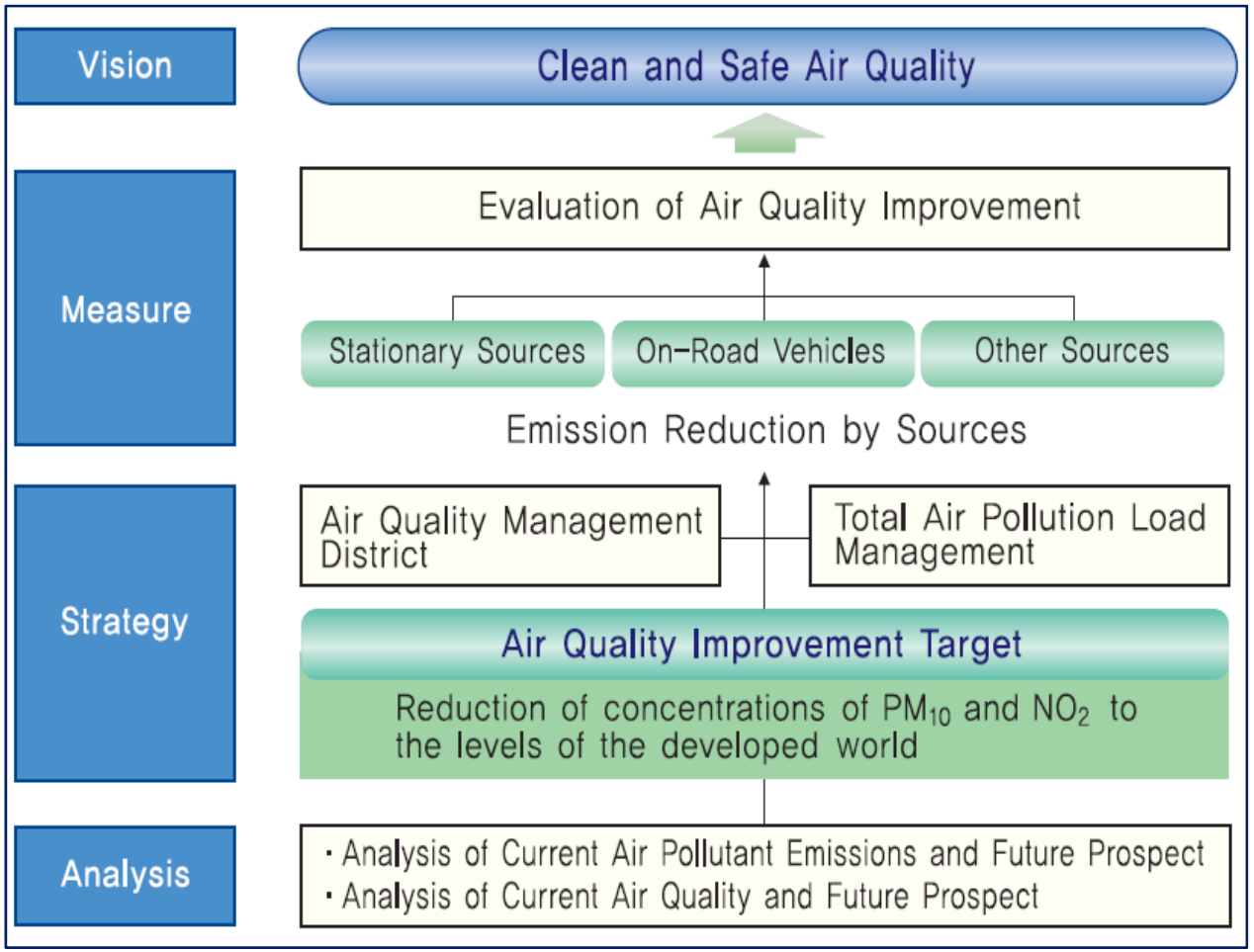


- ✓ Of the total amount of air pollutant emissions, 35% of NOx and 43% of PM_{10} are from **on-road mobile sources.**
- ✓ More than half of NOx and SOx are emitted from **Combustions sources.**

- 41% of SO_X and 29% of NO_X are from Energy Industry Comb.
- 21% of SO_X and 9% of NO_X are from Manufacture Comb.

II. Master Plans for the Metropolitan Air Quality Management

"Special Act on Seoul Metropolitan Air Quality Improvement"



- Adopted in 2003
- Implementation Period : 2005-2014

- Objectives
  - To Improve the air quality in SMA to the standards of cities in the developed world.

- Needed Emission Reduction ('01 ➡ '14)
  - 38.7% of PM_{10}
  - 53% of NO_X
  - 38.7% of SO_X
  - 38.7% VOCs

III. Implementation Measures

Measures for Mobile Sources

Adopted Stricter standards for vehicles

- ✓ Diesel : Euro 5 (2009)
  (* Beginning with Euro 6 in 2015)
- ✓ Petrol • Natural gas: ULEV (2009)
- ✓ Non-road:
  Tier-1(2004), Tier-2(2005), Tier-3(2009)

Replace Zero-Emission Vehicles

➡ **Supplied 14,000 Vehicles**

- 89% of Diesel Buses in SMA has been replaced to ULEV

Refuel Cleaner Fuels
- Set Stricter SOx Limit in Fuel

Unit: ppm

	2006		2009
Gasoline	50	→	10
Diesel	30	→	10
LPG	100	→	40

Retrofit Emission Filters/ Catalysts

➡ **Supplied 300,000 Vehicles**

50% of PM_{10} and 20% of NOx reduced from Mobile Sources.

III. Implementation Measures

Measures for Stationary Sources (Cap and Trading program)

- **Adopted Cap and Trading program in 2007**

  ✓ **Control pollutants: NOx , SOx**

  ✓ **Target : Large industries for emissions**

  - Electricity sector(72%), Manufacturing(17%)

	NOx	SO_2
Step 1 ('07.7.1~)	Over 30 tons/yr	Over 20 tons/yr
Step 2('09.7.1~)	Over 4 tons/yr	Over 4 tons/yr

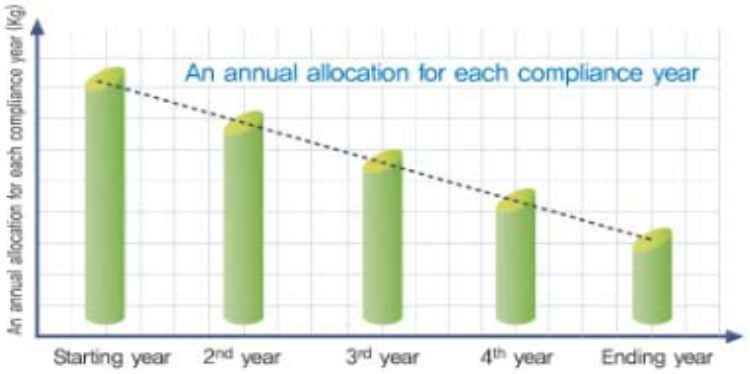
- Allocation and Supervising : by Korean Ministry of Environment
- Data collection and monitoring from each emitter : using Tele-Monitoring System(TMS)
- Incentives for the firms: free from the given emission charge(SO2) and fuel limitation

- **Allocations**

Annual allocations for each compliance year
= Air pollutant allocation factor × activity
- factors: types of industry, fuel/raw materials

• The annual allocations set at every 5yrs

- The first year allocations:
  Average emissions for the past 6 yrs.
- The final year allocations:
  Possible emissions if installing BACT



III. Implementation Measures

Measures for Stationary Sources (Cap and Trading program)

- **Management**
  - ✓ Penalty : Charge for excess emissions
  - ✓ Control :
    - Can use the unused permit for the next year
    - Can trade to other firms
      (No limitation for trade amount)

- **Tools**
  - ✓ The Emission Management System
    - www. n-sky.or.kr
  - ✓ The Emission Trade System
    - www. emissiontrade.go.kr

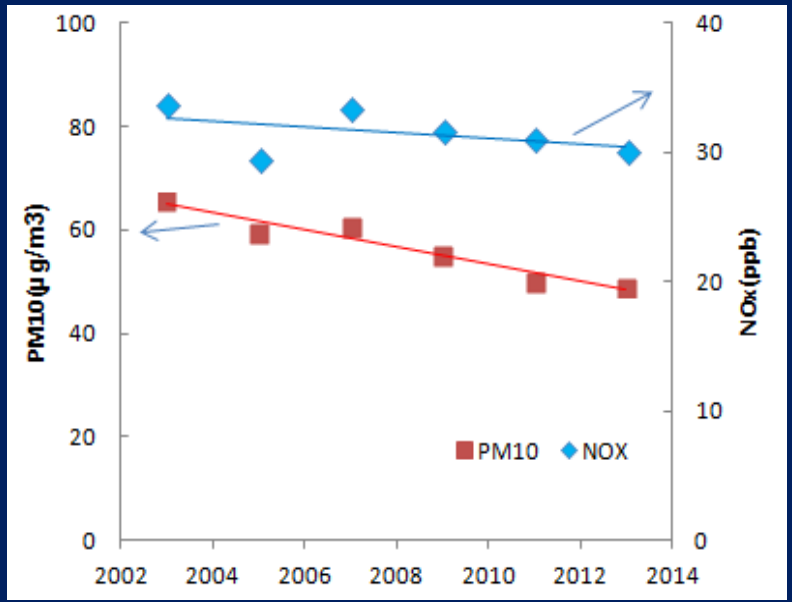
43% of NO_x and 14% of SOx emissions are reduced by the Cap and Trade system.

IV. Achievements

Improvement of air quality in metropolitan area

- Both PM_{10} and NO_x concentrations have decreased.

Annual Concentrations of PM_{10} and NOx in SMA



NO_2(ppb)	2003	2013
SMA	34	30
Seoul	38	33
Incheon	30	28
Gyeonggi	33	29

PM_{10}(μg/m^3)	2003	2013
SMA	65	49
Seoul	69	44
Incheon	60	49
Gyeonggi	68	54

The Air quality in SMA has improved significantly between 2003 and 2013.

Thank you!

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Schedule to Establish the 2nd Stage Basic Plan

1st stage (2011~2012)

T/F Operation

↓

Set up the mid & long term direction

○**Analyze the result of the 1st stagecapitalareacountermeasures**
- Draw the problems and improvement measures while analyzing the reduction of the polluting materials and air quality improvement, and reviewing the suitability of the investment

○**Counter measure for the capital area air quality improvement, Set up of new future image**
- Adjustment of the existing management target materials (PM_{10}, NOx, SOx, VOCs)
- Review the suitability of the air quality management area and prepare the modified plan.
- Review the management plan for the not regulated emission sources (scattered dust of road materials, biotic combustion facility, construction machines, aviation, port, vessel fuel, use of wasted energy etc).
- Collect the opinions of specialists and civilians for the mid & long term plan of the 2nd capital area counter measures

○**Establishment and supplement for the basic data of air quality policies.**
- Standardization of the air quality modeling, promotion of air pollutants inventory supplement.
- Long distance movement of $PM_{2.5}$, Promote the Korea, China and Japan joint research

2nd stage (2013)

Modify the Laws and decide the basic plans

○**Modification of Special Act on Seoul Metropolitan Air Quality Improvement**
- Promote the adjustment of the air quality management area and change of management target pollutants

○**Research for the establishment of the 2nd stage(2015~2024)basicplan**
- Analyze the emission amount of the pollutants of the basic year
- Set up the goal of the air quality improvement and allocate the total allowable emission amount by local area
- Estimate the predicted emission amount and reduction target
- Develop the new air quality improvement policy, research the budget investment

○**Determination of the 2nd stage(2015~2024)basicplans**
- Practical consultation between the departments concerned for the 2ndbasicplans
- Deliberation, Determination and Notification of Capital area air environmental management committee

3rd stage (2014)

Determination of enforcement plan

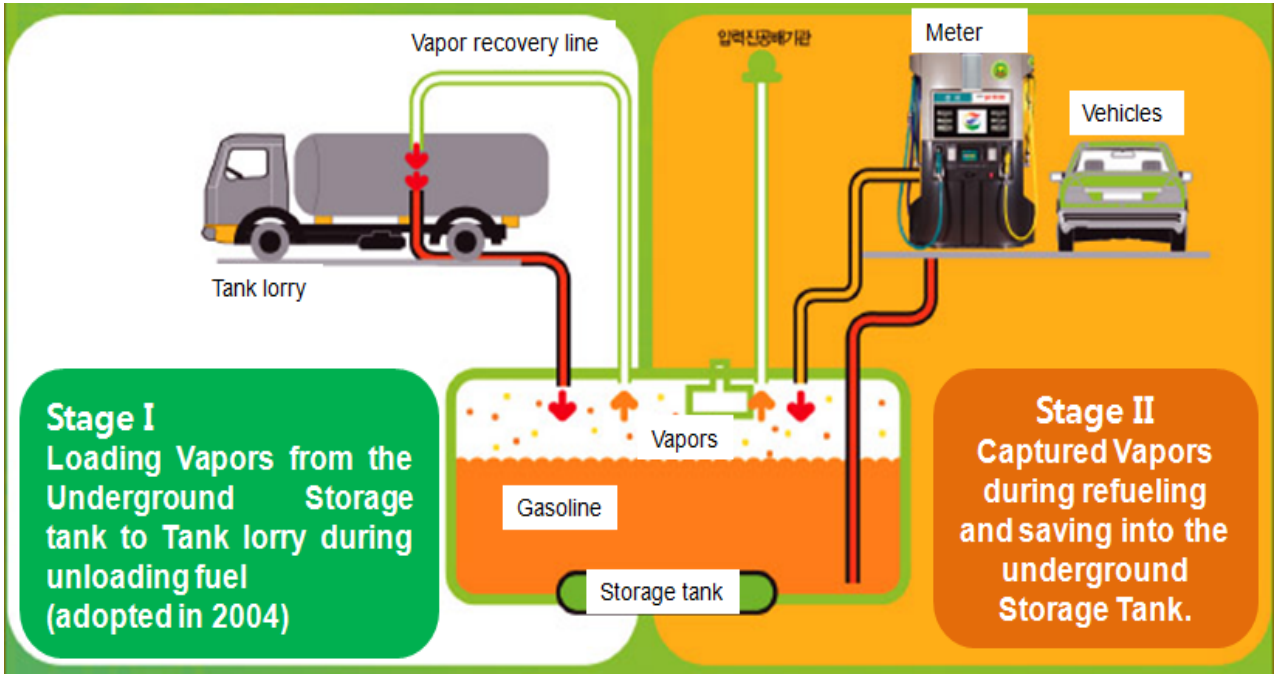
○**Determination of 2nd stage (2015~2024) enforcementplan**
- Establish the enforcement plan based on the decided 3 cities & Do basic plan
- Deliberation, Determination and Notification of Capital area air environmental management committee

Implementation Measures of the Master Plan

Measures for Other Sources

VOCs reduction from the Gas station

- Adopted Stage II for all gas stations in SMA
- Financial Support for the stations installed Station II before the limited date.



Dropped More than 85% o f VOCs from Gas station.