CleanSYS

Contents

1 Overview of CleanSYS

What is CleanSYS?

Air Pollutant Monitoring System for Stationary Sources in real-time(24hour), by on-line.

Befor CleanSYS

Manual sampling & analysis

Time wasting & ineffective

Air quality becomes WORSEN

ET + ICT

Advanced air quality management

After CleanSYS

Remote monitor in Real-time

Prevent illegal emission & excessive emission

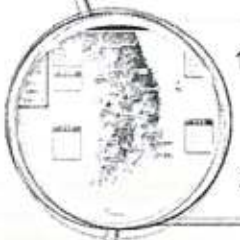
Improve Air quality

1 Overview of CleanSYS

Brief History

In the early 1990s : Air environmental threat by Industrialization

⇒ **Launched Pilot Project**



1997~2002 : Constructed control centers **(Cover Nationwide)**

-4 regional control centers

Homan('98), Youngnam('99), Sudo('01), Jungbu('02)

2002. 2 ~ : Utilizing as administrative data

2008 : Enforce **Total Emission Cap** management system

2007 : Obtain **ISO 9001** and **patent**

2012 : **Digital** analyzer telecommunication **Q**uality **A**ssurance program

2013 : Won **the Green Apple Award** (international part)

2 Operating System

Clean SYS

Target facility of CleanSYS

- Clean Air Conservation law
- Targets business :
  - Discharge air pollutant more than 10 ton/y
  - Specific condition for each industry fields

Chemical manufacturer, cement facility	Incineration	Power plant
		
10,000 ㎥/h	0.4~1 ton/h	50Mwh

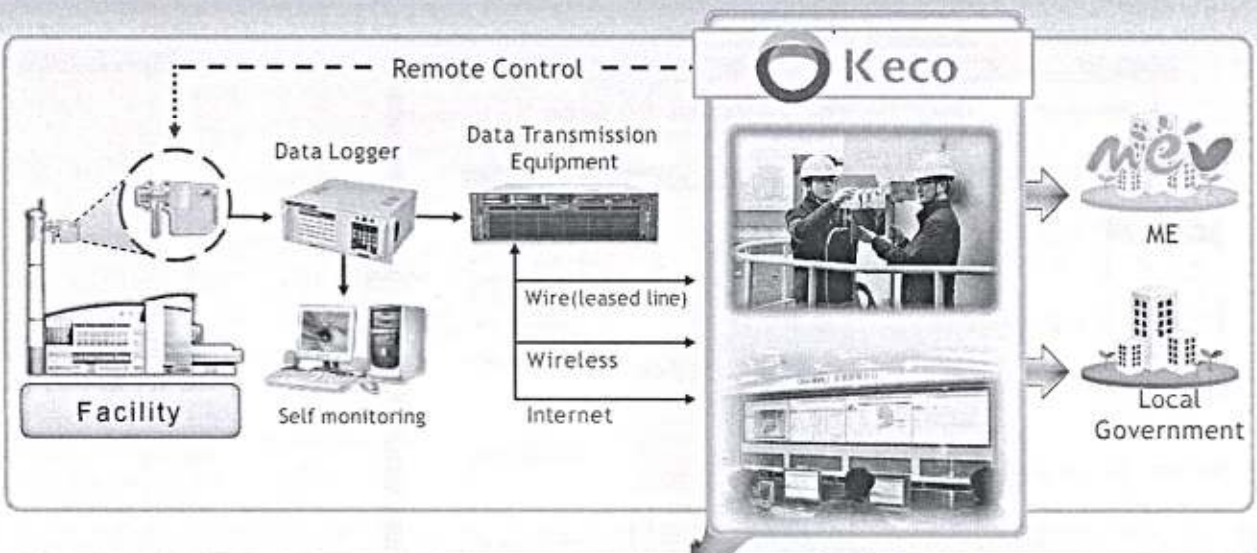
- Measuring Items
  - 7 pollutants : Dust, SO_X, NO_X, HCl, HF, NH_3, CO
  - 3 other items : O_2, Flow rate, Temperature

- Targets Business
  - 1,517 stacks of 573 companies, at 2015. 5

2 Operating System

Clean SYS

CleanSYS Configuration



Facility	CleanSYS Control Center	Government Agency
Instal & Operate analyzer Maintenance cost for analyzer, data logger	Provides technical support Data colection & analysis Sharing data for administrative purpose	Facility supervision Developing air quality management policy

3 Main Function

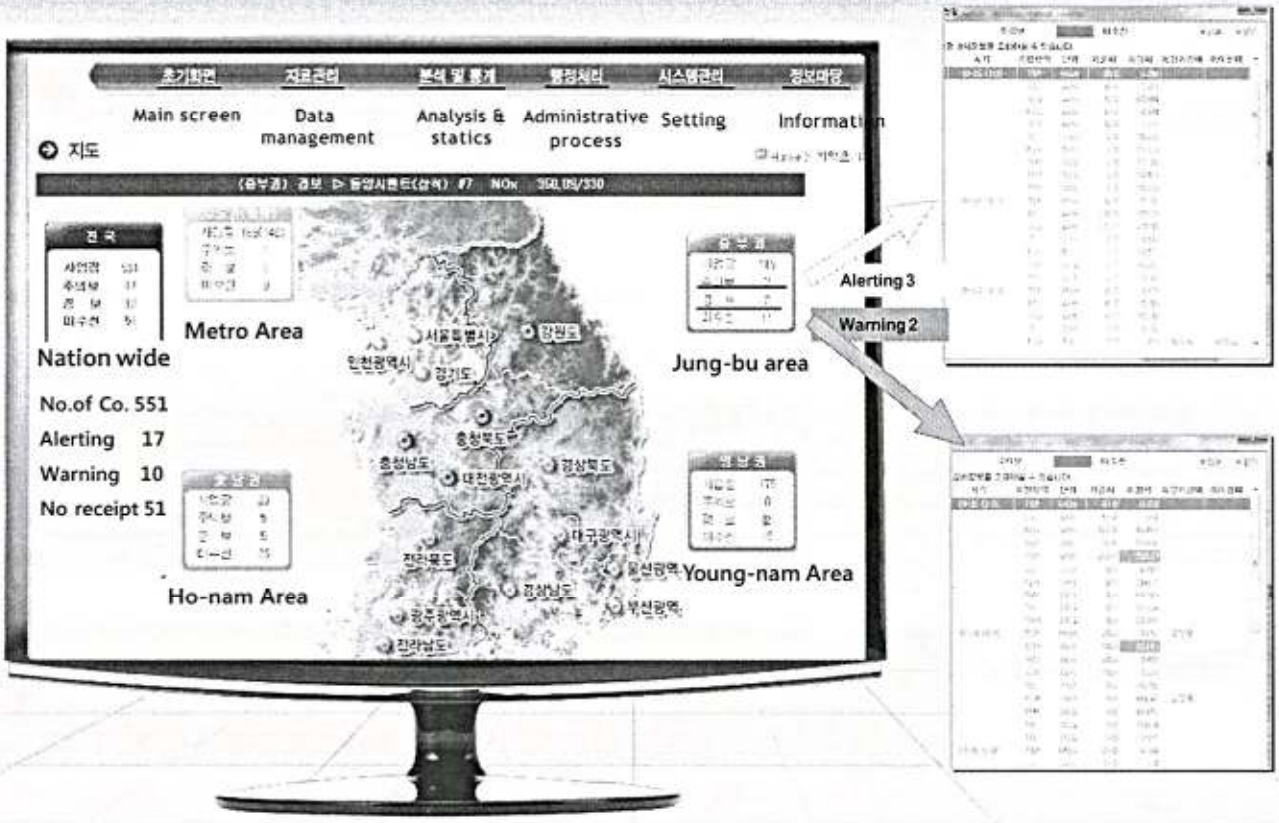
Clean SYS

Monitoring in Real-time

3 Main Function

Clean SYS

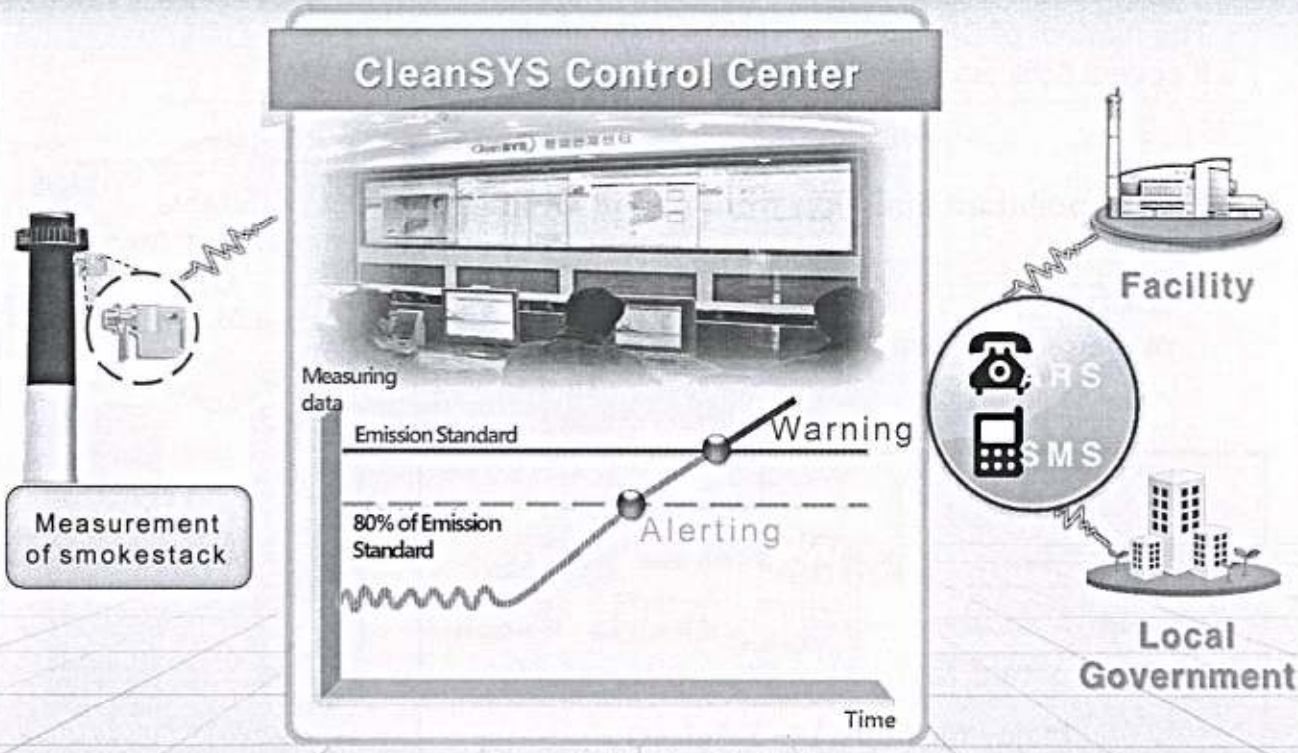
Monitoring in Real-time



3 Main Function

CleanSYS

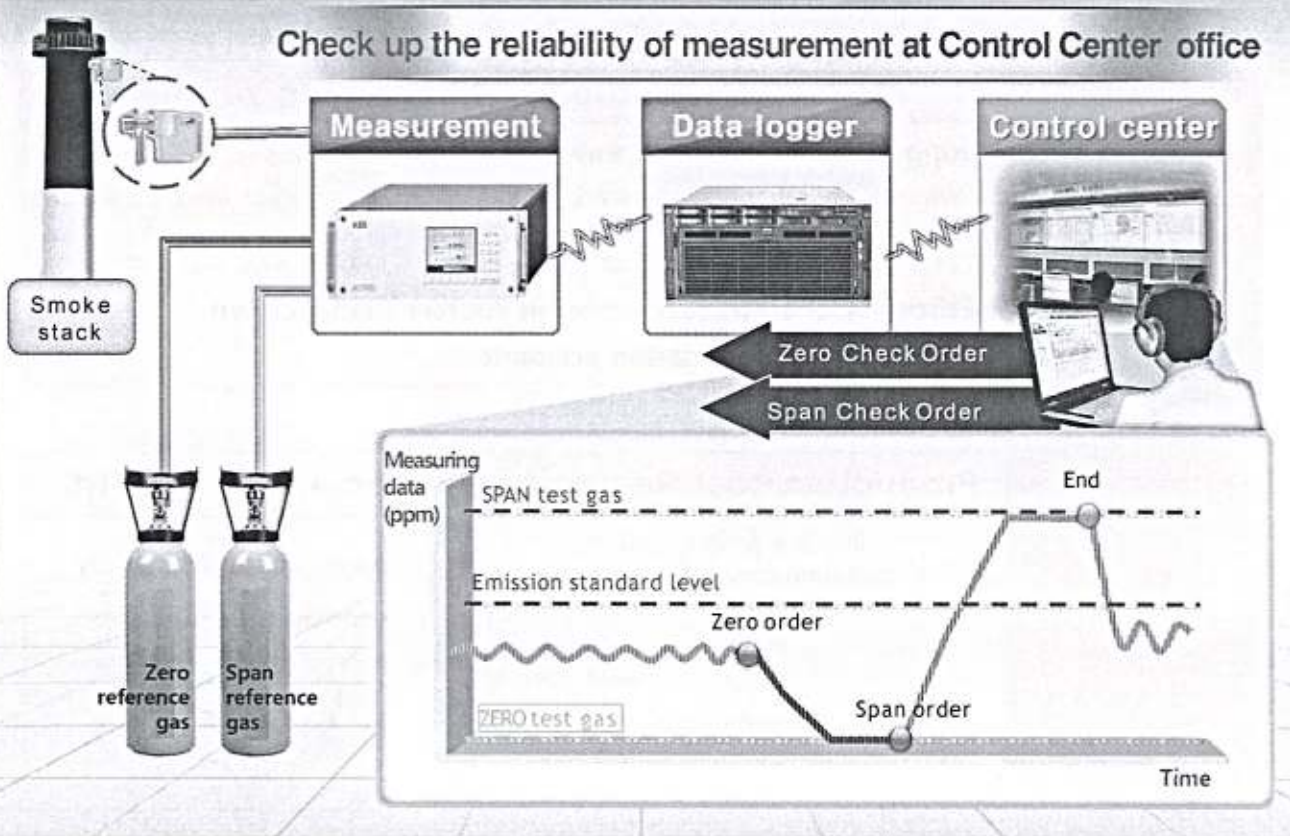
Alerting & Warning



3 Main Function

CleanSYS

On-line remote reliability check



4 Major Achievement

CleanSYS

Pivotal Management System

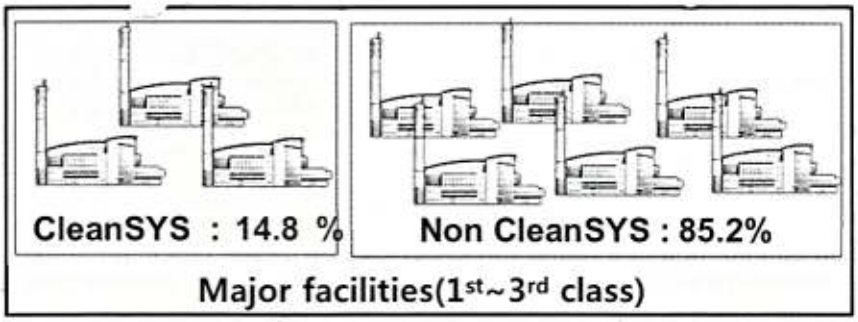
- The number of CleanSYS is 15% of major facility(1st~3rd Class)
- It covers 85% emission volume of all major facilities nationwide

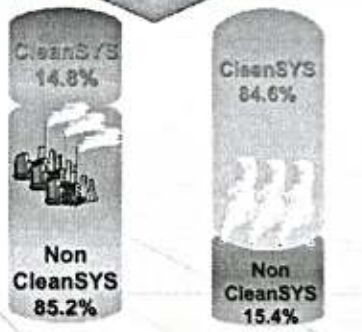
≪Air pollutant Emission from major Facilities≫

Effective Management Method Of National Air pollution

84.6%
managed by CleanSYS

15.4%





<Number of Facilities> <Emission volume>

4 Major Achievements

CleanSYS

Environmental & Economic Effect

Environmental Effects

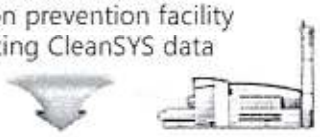
Pollutant reduction and Improving air quality

- **Suppressed air pollutant emission of facilities('04-'14)**
  - While the number of smokestack increased 89%, the average emission volume per smokestack emission decreased 57%(Major pollutants and CleanSYS)
  - Improving pollution degree of SO_2 **by 63%** in Ulsan('97 : 0.019 → '12 : 0.007ppm)
- **Efficiency of stationary emission sources management**
- **Prevent air contamination accident**

Economic Effects

Production cost Reduction

Improve process and air pollution prevention facility by utilizing CleanSYS data



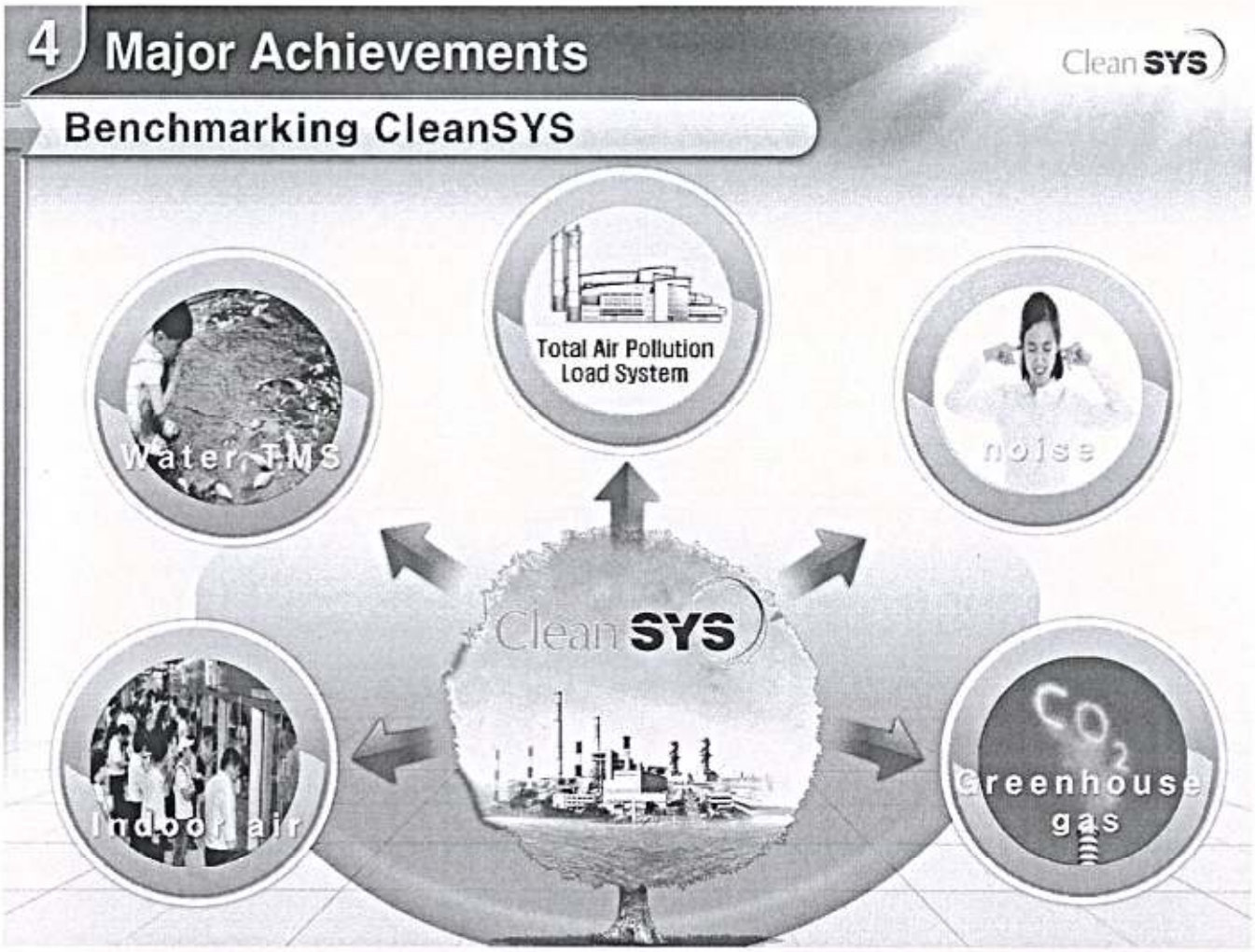
Reduce cost
for fuel, prevention facility, operation

Social cost benefit

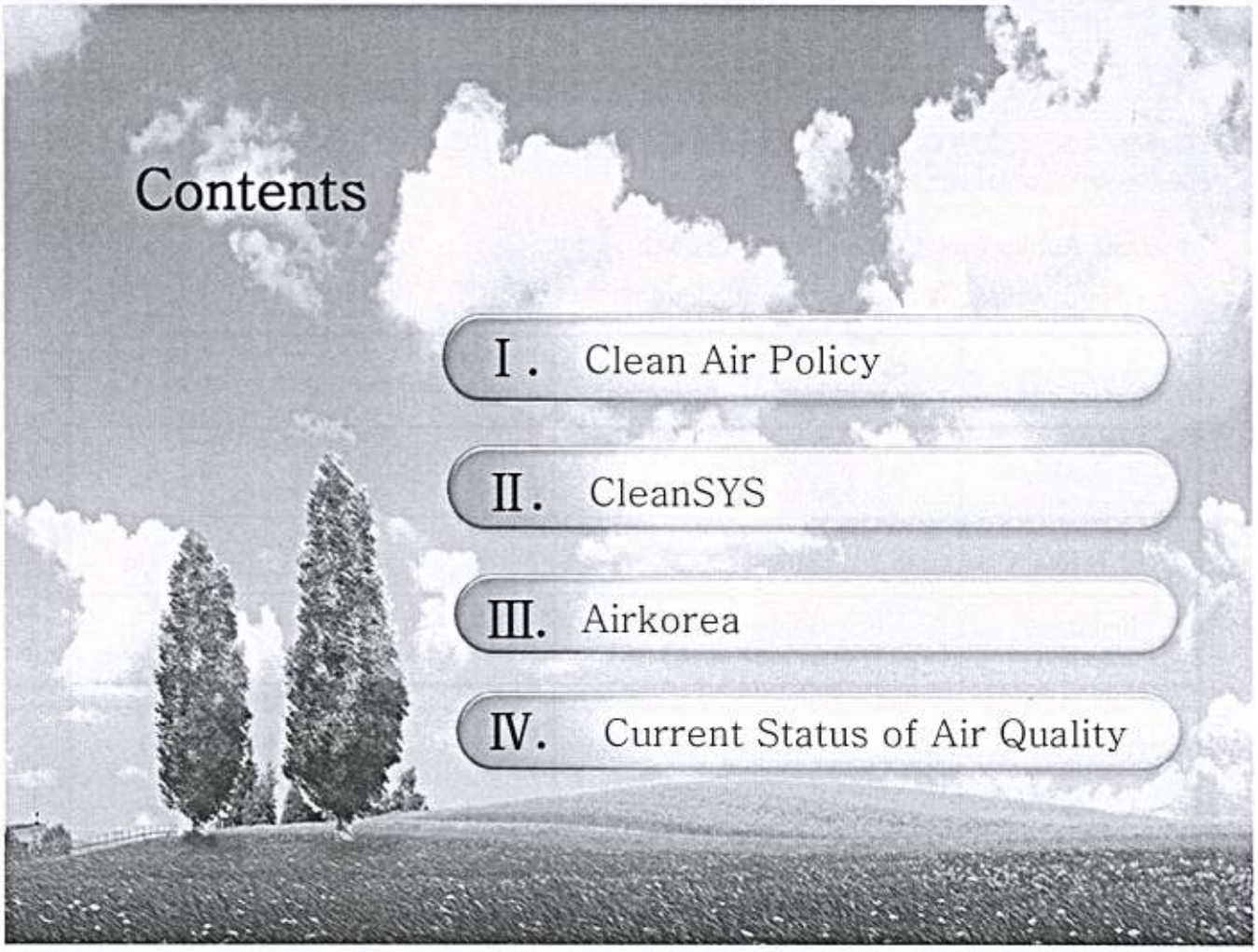
Social cost-benefits by reducing air pollutant

4 Major Achievements

Benchmarking CleanSYS




Keco
CleanSYS
Airkorea
Ambient Air Management Team
Chun Byeong Yeon
2014.05.20.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Ⅲ. Airkorea
Ⅳ. Current Status of Air Quality

I . Clean Air Policy

Source of air pollution

◆ Source

Nature		Volcano, Thunderstroke, The activity of bacteria
Artificiality	Transfer	Vehicle
		Fugitive Dust
	Stationary	Factory (Power Plant, Incineration Plant • • •)

◆ Creation Type

Primary Pollutant	SOx, NOx, CO, HCl, VOC, Dioxine • • •
Secondary Pollutant	O_3, Smog, PAN, PM_{10}, $PM_{2.5}$ • • •

I . Clean Air Policy

Law & System

◆ **Basic Act on Low Carbon Green Growth**

- Green House Gas Management System

	GHG Target Management System	Emission Trade System
Regulation	Direct (command & control)	Market Mechanism (market price)
Term	Annuality	Long Years (3 or 5 years)
Reduction Method	Reduction (The only mean)	External Reduction (reduction, purchase)
Incentive	X	Sale or Save
Target Item	Green House Gas (CO_2, CH_4, N_2O • • •)	

I . Clean Air Policy

Law & System

◆ **Clean Air Conservation Act**
- Emission concentration management system (CleanSYS)

◆ **Special Act on Seoul Metropolitan Air Quality Improvement**
- Total emission management system

◆ **Basic Environment Act**
- Ambient air quality monitoring system (Airkorea)

	TotaL Emission Management System		Emission concentration management System
Area	Seoul metropolitan		All over the country
Background	Air pollution Higher Environmental capacity		Prevention of air pollution
Revision Period	Every 10 Year Plan 1st Step Plan : 2005~2014 2nd Step Plan : 2015~2024		Every 5 Year Plan Now vision : 2011~2015 Recent Plan : 2015~2020
Target Item	1st Step	PM_{10}, NOx, SOx, VOC	TSP, SOx, NOx, CO, HCl, VOC, Dioxine • • •
	2nd Step	PM_{10}, NOx, SOx, VOC, $PM_{2.5}$, O_3	

I . Clean Air Policy

Law & System

◆ **Measuring Method of Total Emission & Emission Concentration**

	Total Emission Management System		Emission concentration management System
	1st Step	2nd Step	
Manual Sampling Emission Factor	1st ~ 3rd class Facility	1st ~ 2nd class Facility	1st ~ 5th class Facility
Measuring Analyzer (CleanSYS)	1st ~ 2nd class Facility		1st ~ 3rd class Facility

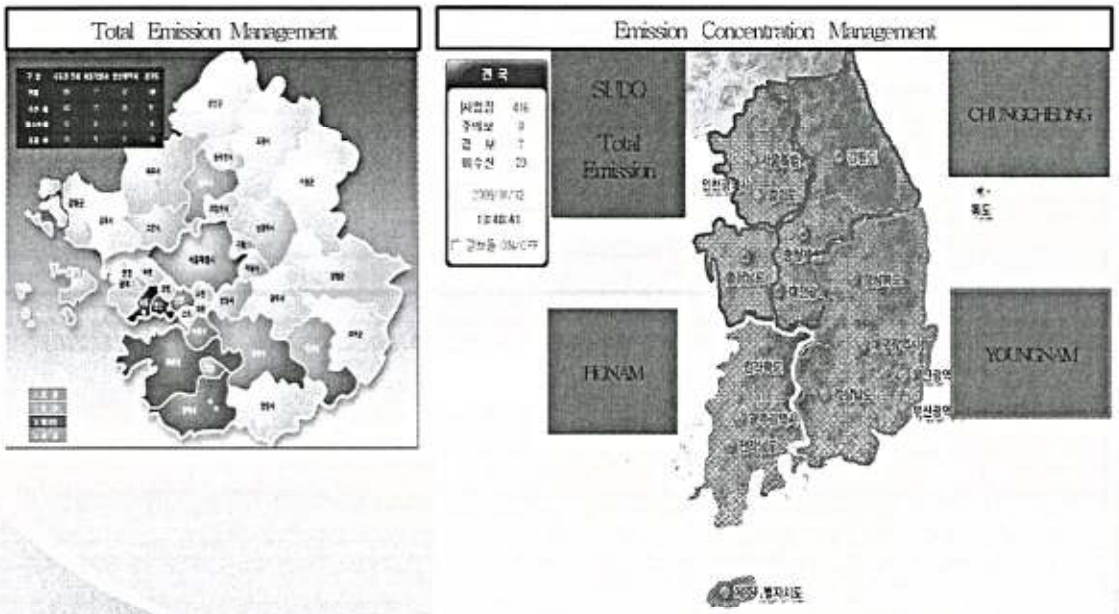
◆ **Classification standards for facilities**

Classification	Total pollutant emission
1st class Facility	Total air pollutant emission greater than 80 ton per year
2nd class Facility	Total air pollutant emission between 20 ~ 80 ton per year
3rd class Facility	Total air pollutant emission between 10 ~ 20 ton per year
4th class Facility	Total air pollutant emission between 2 ~ 10 ton per year
5th class Facility	Total air pollutant emission less than 2 ton per year

I . Clean Air Policy

Law & System

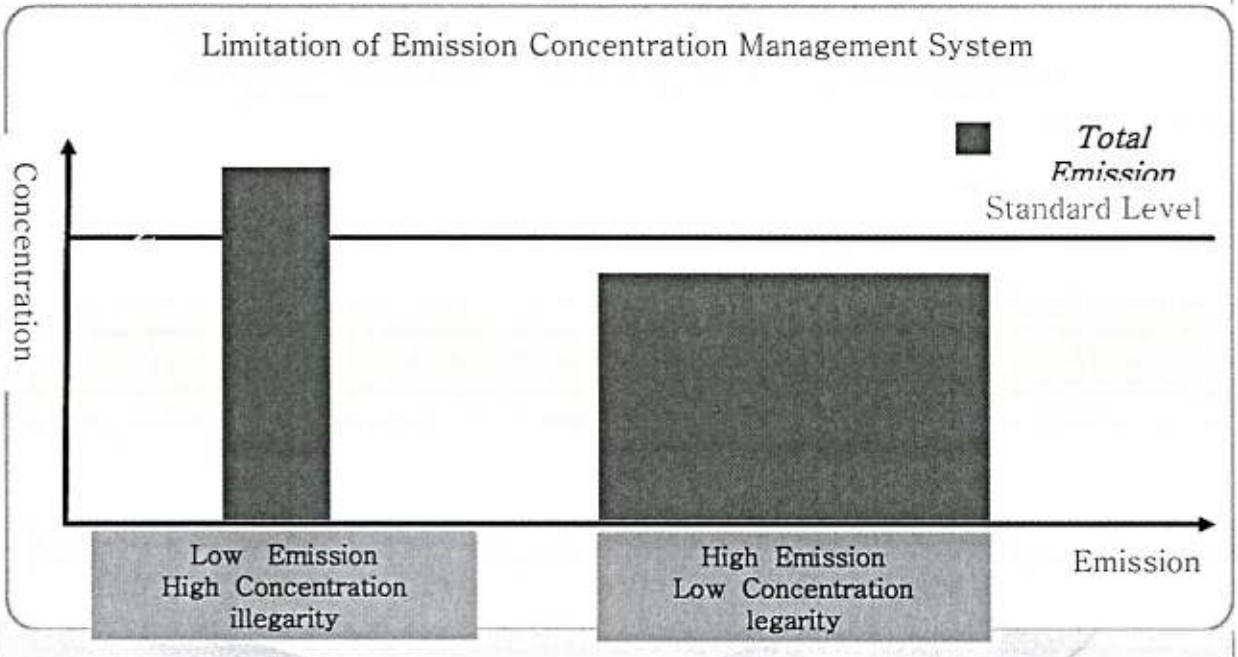
◆ Total Emission & Emission concentration Management System



I . Clean Air Policy

Law & System

◆ Total Emission & Emission concentration Management System



Ⅰ. Clean Air Policy

Countermeasure

◆ **Basic Act on Low Carbon Green Growth**

- Any facility that discharges air pollutants from smokestacks must install CleanSYS

Source	Major Countermeasure	
Vehicle	Strengthen emission standard of Production Car & Fuel	
	Low-Emission Vehicle	
	Low-Emission Reduction Technology	On-Board Diagnostics
		Diesel Particulate Filter
		Diesel Oxidantion Catalyst
		Tree way Catalyst Conversion System
	Test operation of Remote Sensing Device	
Factory	Strengthen emission standard of Smokestack & Fuel	
	Regulation System (Basic Dues and Exceed Dues)	Total emission management
		GHG target management
		Emission Trade
Surface Source (Gas Station, House)	Gas station : Recovery equipment of Hazardous Vapors House : Low-NOx Burner	
Fugitive Dust	Roadside : Vacuum removal vehicle, Water sprinkler vehicle Construction site : Dust portection net, Water sprinkler	

Ⅱ. CleanSYS

What is CleanSYS?

◆ Motive : Clean + System

◆ Meaning : Management and operation system keeping the environment fresh and clean (Continuous Emission Measuring System)

◆ Purposes

Preventing air pollution	Promptly coping with air pollution accidents	Systematic management of monitored emission data	Sharing real-time emission data with public institutions

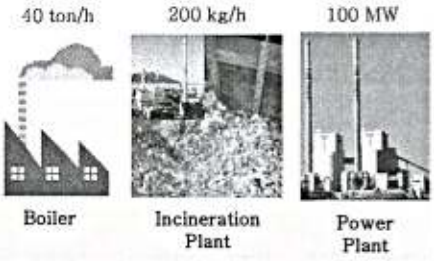
◆ Development stages

Source Monitoring System (Manual sampling) → Telemetry System (Real time monitoring) → Tele Monitoring & Process Control System (Real time & remote monitoring)

Ⅱ. CleanSYS

CleanSYS Targets

- Target Facilities
  - 28 different types of facilities
- Items Measured
  - 7 pollutants : Dust, SO_2, NO_X, HCl, HF, NH_3, CO
  - 3 non-pollutants : O_2, Temperature, Flow rate
- **Targets business :**
  - **Emission volume more than 10 ton/year**
  - **Specific condition for each industry fields**



Control Center		Facilities	Smokestacks	Target Items measured
Emission Concentration Management	Sudo	24	32	230
	Youngnam	177	412	2.232
	Honam	93	233	1.338
	Chungcheong	120	359	1.902
Total Emissions Management		155	440	2.321
Total		569	1.476	8.023

(2013. 12.)

Ⅱ. CleanSYS

CleanSYS Configuration

Measurement

-7 pollutants and 3 non pollutant items are measured

Ensuring the reliability of measured data

- Compliance Test
- System suitability Test
- Relative-accuracy Test

Creating data

-Transmitted analog signals from the analyzer are converted into digital values, which are averaged for 5 and 30 minutes

-Function of D/L (Data Logger)

- Memory : The measured data must be saved per second
- Cpu : Calculation of the average data for 5 and 30 minutes
- Disk : The average data for 5 and 30 minutes must be saved for more than 6 and 7 days, respectively

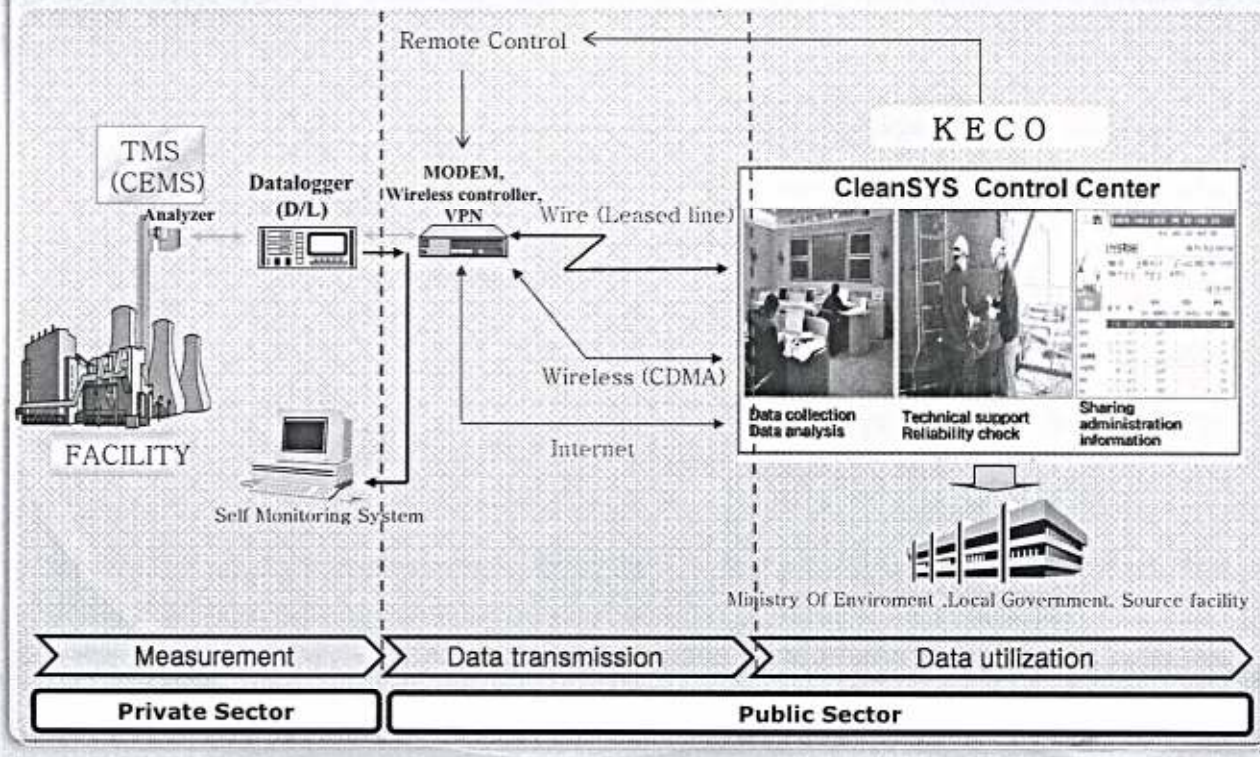
- Function of FEP (Front End Process)
  - Integrates data which is transmitted from 2 or more D/Ls

Transmission

- Data are transmitted through cable (9.6K leased line with modem) or wireless (14.4K wireless controller) and internet (VPN)

Ⅱ. CleanSYS

CleanSYS Configuration



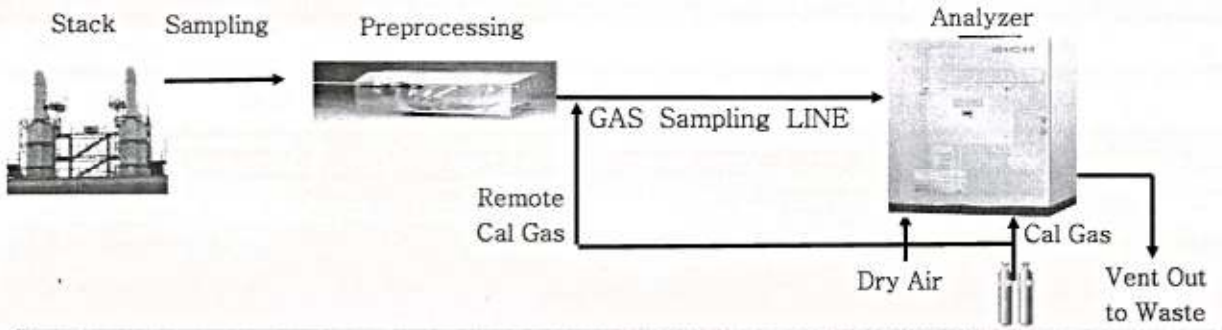
Ⅱ. CleanSYS

CleanSYS Configuration

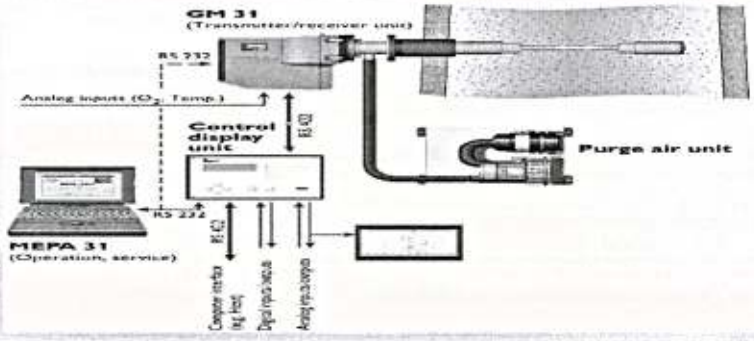
Ⅱ. CleanSYS

Analyzer Type

- Sampling Type



- In-situ Type



Ⅱ. CleanSYS

Roles of Organizations

Ministry Of Environment

- Establishing air quality management policy
- Enacting and amending laws & regulations

Local Government

- Ordering facilities to install CleanSYS
- Enforcing regulations

KECO (Control Center)

Establishing & Managing Control Center

- Data collection and analysis
- Report to government offices

Providing technical help to source facilities

- Compliance Test
- System suitability Test
- Relative accuracy Test
- Other technical help

Source facility

Installing CleanSYS

- Clean Air Conservation Act, Article 32
- Clean Air Conservation Act, Ordinance 17

Transmitting data

- Managing CleanSYS analyzers

Ⅱ. CleanSYS

Brief History

~1992
-Air environmental threat by Industrialization

1992
- CleanSYS pilot project
1997~2001
- Nationwide Management (4control center

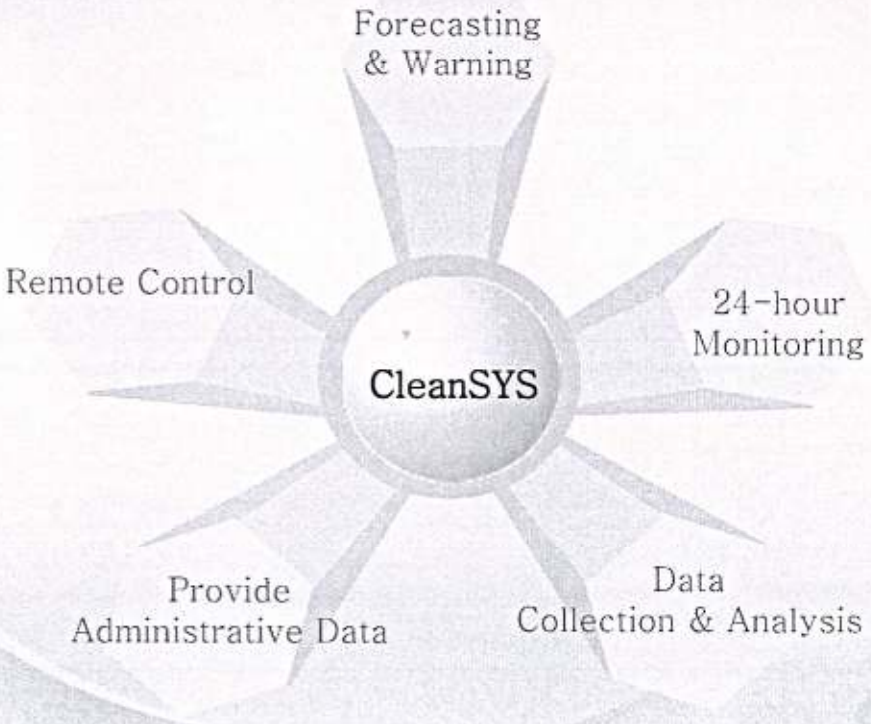
- Covering nation wide
- Administrative data (CleanSYS data)

2008
- Total emission cap management system

- Digital analyzer Telecommunication

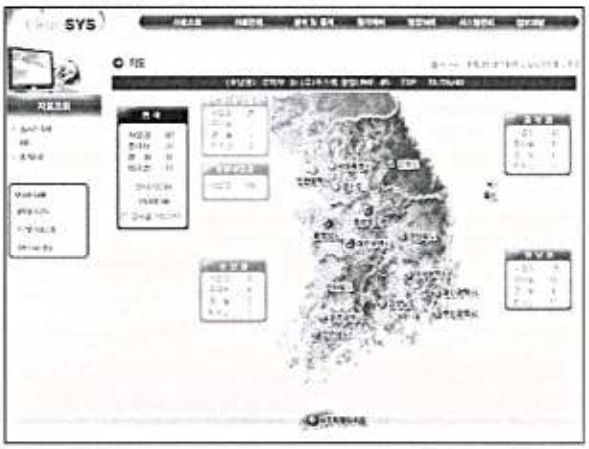
Ⅱ. CleanSYS

Main Functions



Ⅱ. CleanSYS

24-hour Monitoring



- Monitoring the status of all stacks
  - Stack locations are indicated on the map
  - Visual representation from analyzed data

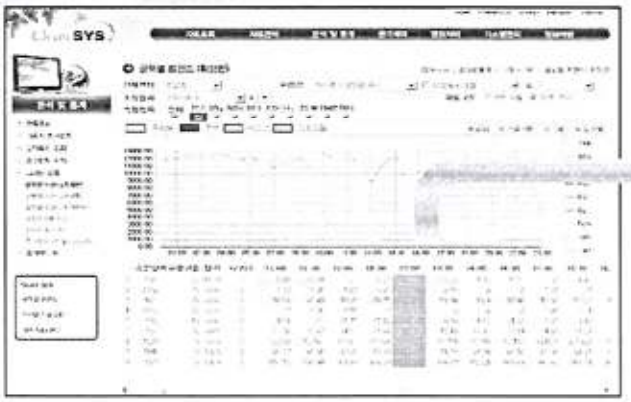
Normal : black　　Forecasting : yellow

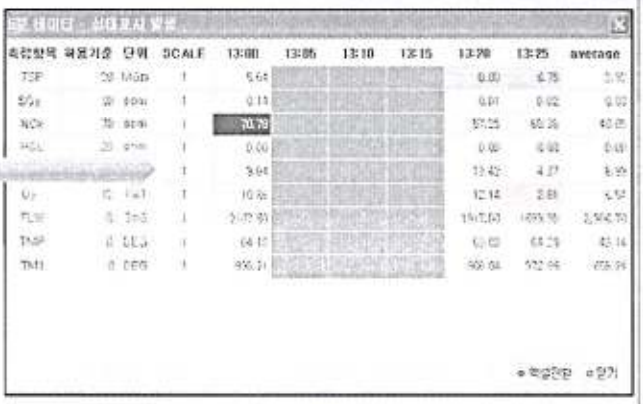
Warning : red　　No data : blue

- Monitoring data from all stacks
  - The trend of the emission concentrations

Ⅱ. CleanSYS

Data Collection, Search and Analysis





- Real-time data collection
  - 5 minute and 30 minute data
  - 336 data for each stack per day
- Manual DUMP for missing data (Remote control : DUMP)
  - 5 minute data : should be saved for more than 6 days
  - 30 minute data : should be saved for more than 7 days
- Collected data retention time
  - 5 minute and 30 minute data retained for at least 3 years
  - Data for exceeded emission standard level retained for at least 5 years

Ⅱ. CleanSYS

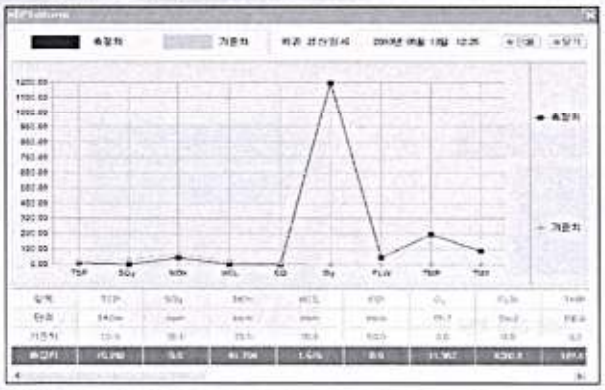
Data Collection, Search and Analysis

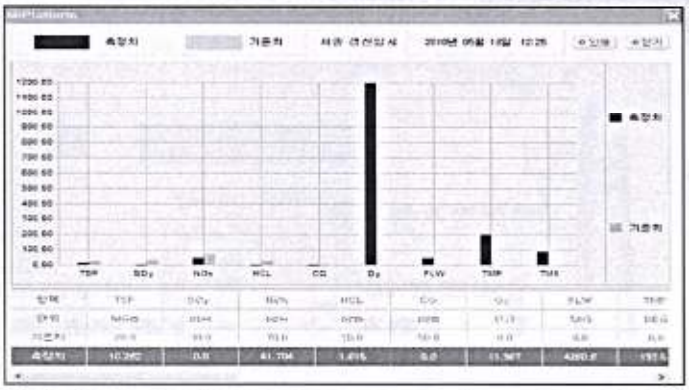
- The state of D/L : background color
  - Abnormal : Sky_blue
  - Power cut : Gray
- The state of analyzer : figure color
  - Calibration : Red
  - Malfunction : Blue
  - Power cut : Dark green
  - Maintenance : Pink
- The state of data : background color
  - Forecasting : Yellow
  - Warning : Red
  - Air ratio over (*3) : Dark khaki

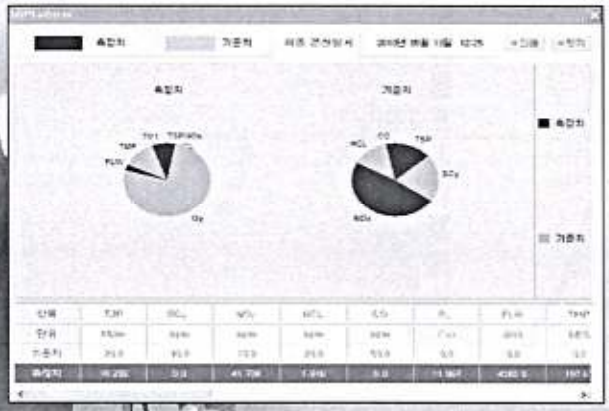
- Validation of data and calculation of the emission charge
  - Provides various data analysis tools to check the reliability of the data from analyzers
- Helps users to understand data through various graphs e.g. broken line, bar and pie graphs
- Provides various statistical data
  - Emission concentration and emission charge for each stack
  - Provide data to establish policies

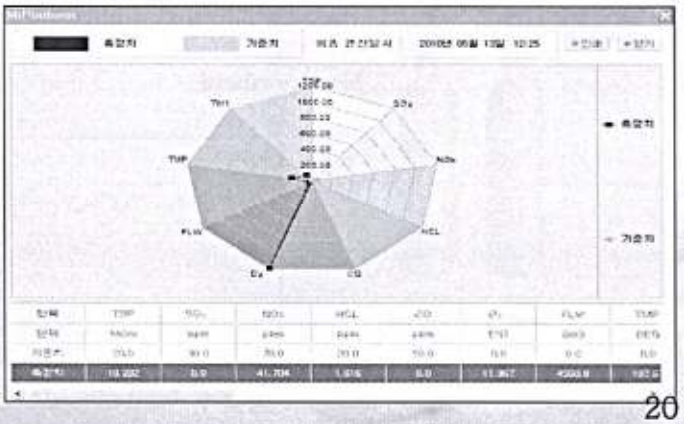
Ⅱ. CleanSYS

Data Collection, Search and Analysis









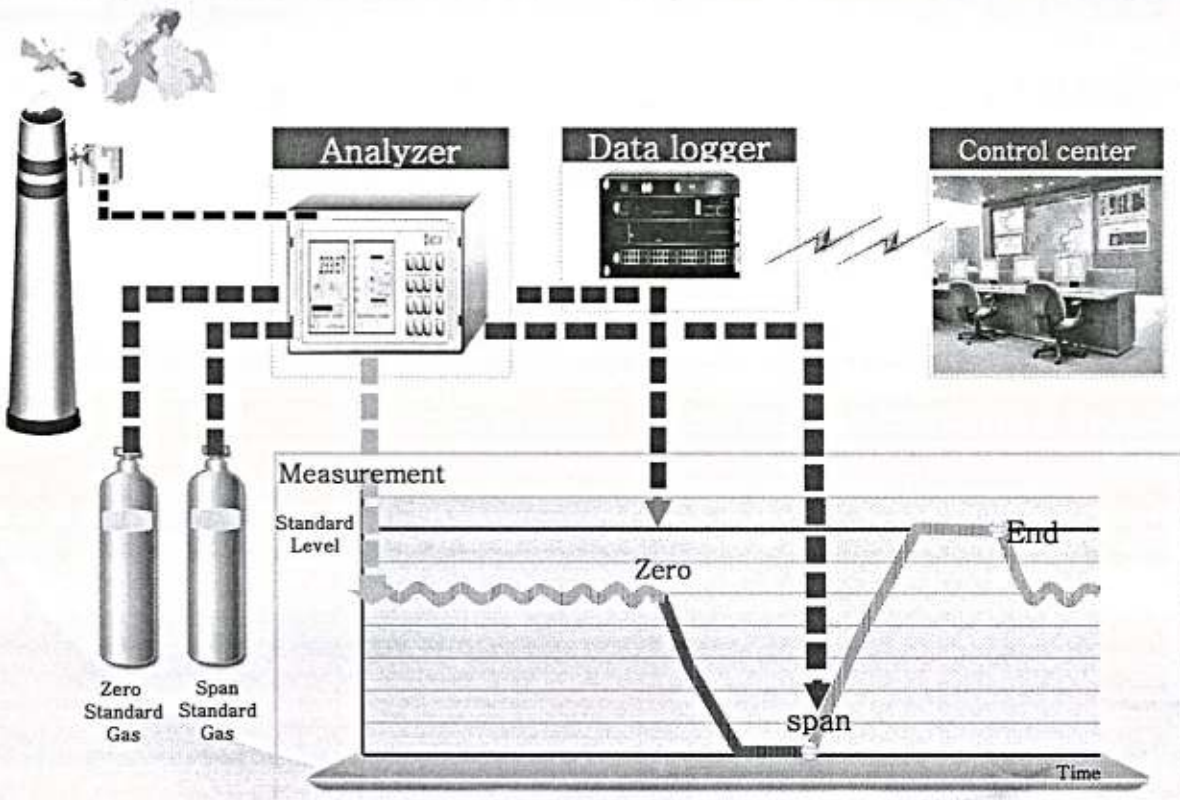
Ⅱ. CleanSYS

Provide Administrative Data

- Provide data on the amount of emissions
  - Default and excess charges of each facility and stack for administrative purposes
- Provide other administrative data
  - list of stacks exceeding the emission standard level and the reason
  - list of stacks having missing data
  - Abnormal operating data such as analyzer status data

Ⅱ. Operation(remote check)

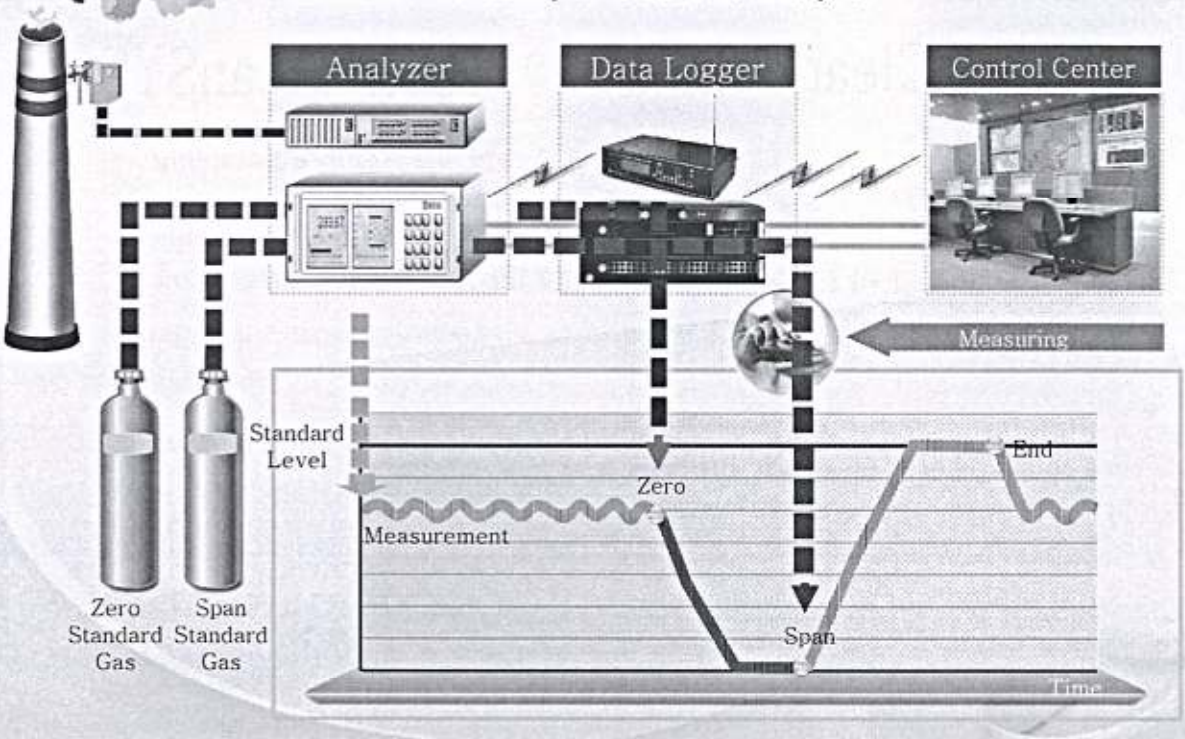
On line Remote Reliability System



Ⅱ. CleanSYS

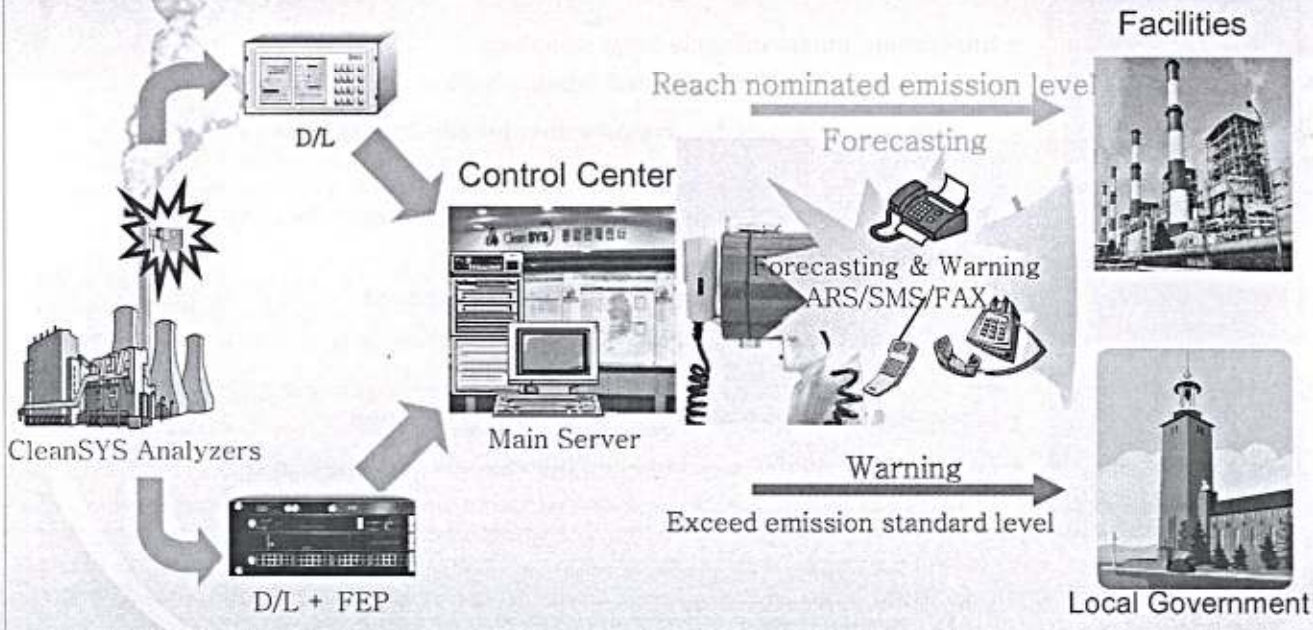
On line Remote Reliability System

Check the Reliability of CleanSYS Analyzer



Ⅱ. CleanSYS

Forecasting & Warning



Ⅱ. CleanSYS

Achievement

Before CleanSYS

- Manual Sampling
  - Potential safety concerns
  - Unscientific & inefficient
- Irregular sampling 1~4 times per year
  - Limitations of air quality management & aftercare
  - Difficult to identify problems
- Direct contact between public officers & operators
  - Concerns about irregularities

After CleanSYS

- Automatic·Remote Sampling
  - Overcome safety concerns
  - Scientific & efficient operation
- 24hr real-time management
  - Preventing air pollution accidents
  - Fast finding and solving of problems
- Public officials don't need to visit facilities
  - Transparent administrative measures

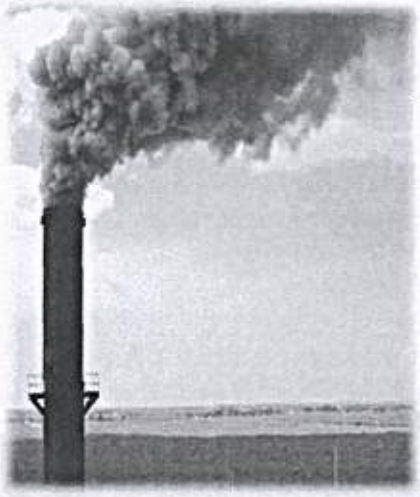
Ⅱ. CleanSYS

Achievement

Administrative Agencies	• Eliminating public officials from sampling • Transparency of environmental administration • Reduce opportunities for irregularities by eliminating direct contact
Businesses	• Instant management & prevention of violation of laws by continuous monitoring • Reducing emissions by improved data management • Relief of problems with local residents
Communities	• Improvement quality of life by reducing air pollution • Formation of confidence between businesses and communities by transparent management

Ⅱ. CleanSYS

Environmental & Economic Effects



- Manual sample collecting
- Excess Emission level
- Degradation of local air

55% Emission volume ('04 ->'12)

Emission Concentration Level of SO_2 & NO_X Decreased 20% ('04->'12)

- Real-time monitoring
- Promptly response
- Prevention against accident

Ⅱ. CleanSYS

Environmental & Economic Effects

Environmental effects

Improvement of air quality by reducing emission

- Reduced emissions : 40~70 % ↓
- Improved air quality : 50~80 % ↑
  - SO_2 (Yeosu Industrial Complex)
    139 ppm, 2001 → 56.7 ppm, 2009 : 59% ↓

Economic effects

Reduced operational & social costs

- Operational cost savings for prevention facilities : 0.7 trillion won a year
- 318 companies, 2004 → 379 companies, 2006
  - Pollutant emissions : 21%↓
  - The total social cost has reduced by 1 trillion won per year

Ⅲ. AirKOREA

What is AirKOREA?

◆ Meaning : National Ambient Air Monitoring Information System

AirKOREA : The public website open(release) ambient air quality data in real time

◆ Purposes

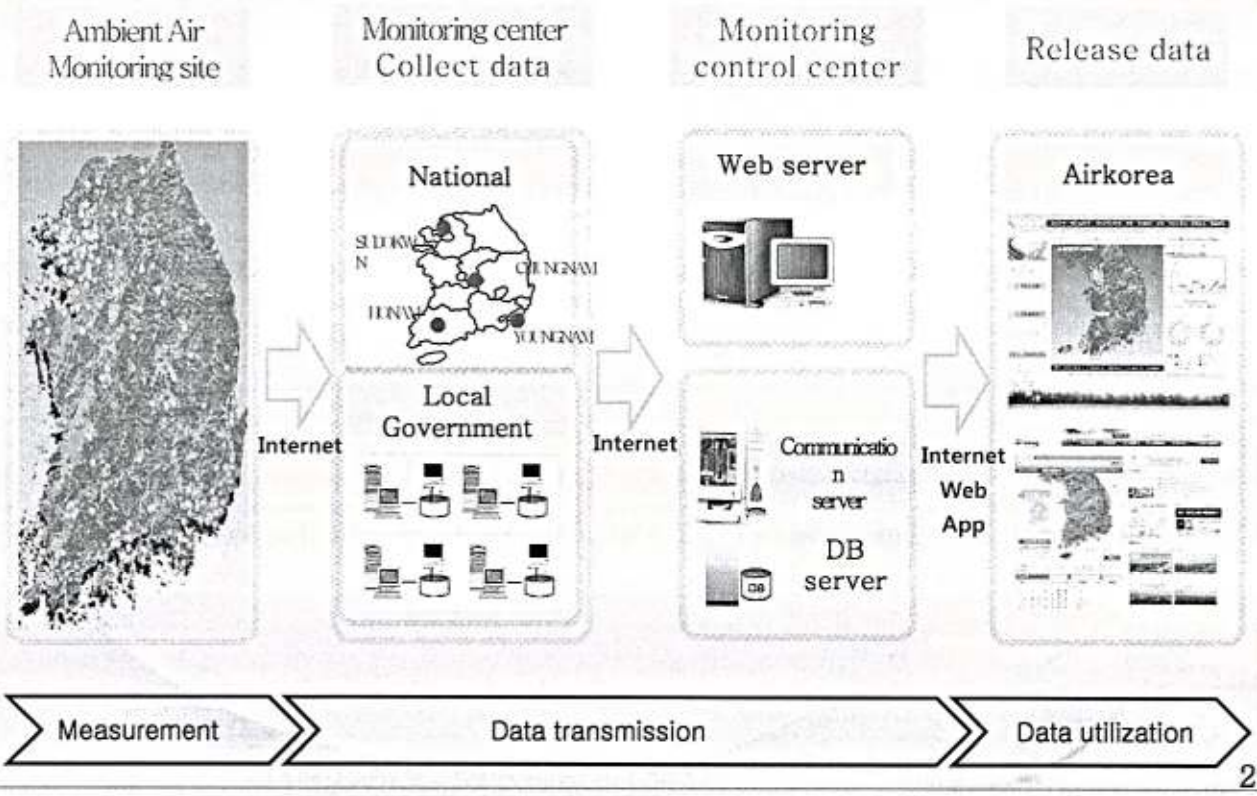
- Air quality standards
- Current air pollution Situation
- Long-range transport of pollutants Effect
- Reliable and up-to-date information on air pollution

◆ History

- Ministry of Environment Korea delegate to operate and manage Ambient Air Quality Monioring Management to KECO in 2000
- Establish and Manage Ambient air Monitoring System in 2004

Ⅲ. Airkorea

AirKOREA Configuration



Ⅲ. Airkorea

Status of Monitoring Network

	General Networks				Special Networks						Super site
Total	Urban	Suburban	National Background	Road side	Air Toxics	Heavy Metals	PAMS	Acid Deposition	Global Climate Change	PM-2.5	Super site
506	257	19	3	38	31	54	27	40	1	30	6
National (148)	-	19	3	-	31	-	18	40	1	30	6
Local (358)	257	-	-	38	-	54	9	-	-	-	-

Φεβ, 2014(Μοντηλψ Ρεπορτ)

Ⅲ. Airkorea

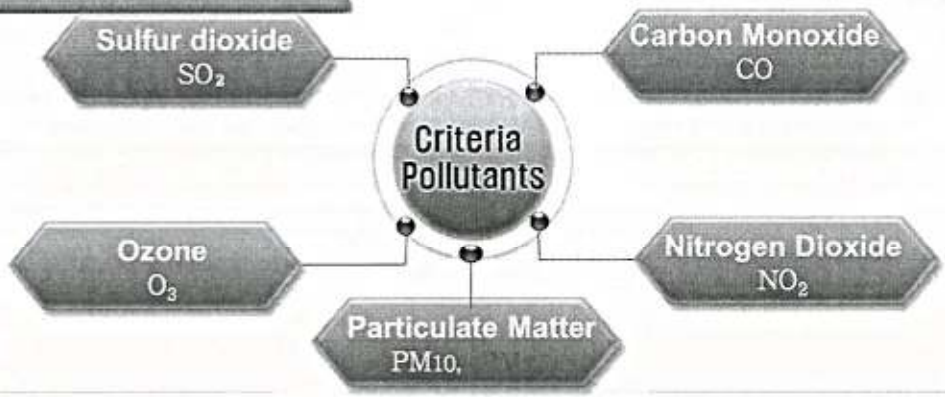
Target Items

General networks Specialized networks Super site

NATIONAL	Suburban	SO_2, CO, NO_X, O_3, PM-10, WD, WS, T, Hum
	National Background	SO_2, CO, NO_X, O_3, PM-10, PM-2.5, WD, WS, T, Hum
	Air Toxics	VOCs(13 type), PAHs(7 type)
	PAMS	NOx, NOy, O_3, PM-10, PM-2.5, Trace CO, VOCs(56 type)
	Acid	PM-2.5, Cation, Anion, PH, Hg (HgT, HgP, ..), Precipitation
	Global Climate	CO_2, CFC(-11,-12,-113), N_2O, CH_4
	PM-2.5	PM-2.5, Mass Con, Carbon(OC, EC), Ion, Heavy Metals
	Super Site	SO_2, CO, NO_X, O_3, PM-10, PM-2.5, Carbon, Ion, Heavy Metals
LOCAL Gov.	Urban	SO_2, CO, NO_X, PM-10, O_3, WD, WS, T, Hum
	Roadside	SO_2, CO, NO_X, PM-10, O_3, (If needed : Pb, PM-2.5, HC, Traffiic)
	Heavy Metals	Pb, Cd, Cr, Cu, Mn, Fe, Ni, As, Be(Asian Dust: Al, Ca, Mg...etc)

Ⅲ. Airkorea

Air Quality Standards



Pollutant	Method of Measurement	National ambient air quality standard			
		1 hour	8 hours	24 hours	Annual
SO_2	Pulse U.V. Fluorescence Method	**0.15**ppm	–	**0.05**ppm	**0.02**ppm
CO	Non-dispersive Infrared Method	**25**ppm	**9**ppm	–	–
NO_2	Chemiluminescent Method	**0.10**ppm	–	**0.06**ppm	**0.03**ppm
PM10	Beta Ray Absorption Method	–	–	**100**㎍/㎥	**50**㎍/㎥
PM2.5 (2015.1.1~)	Beta Ray Absorption Method	–		50㎍/㎥	25㎍/㎥
O_3	Ultra Violate Photometric Method	**0.1**ppm	**0.06**ppm	–	–
Benzene	Gas Chromatography	–	–	–	5㎍/㎥

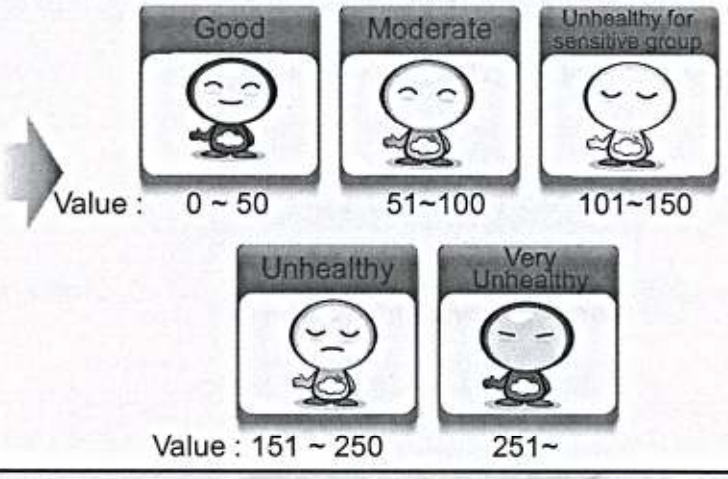
Ⅲ. Airkorea

AirKorea

Ⅲ. Airkorea

CAI(Comprehensive Air-Quality Index)

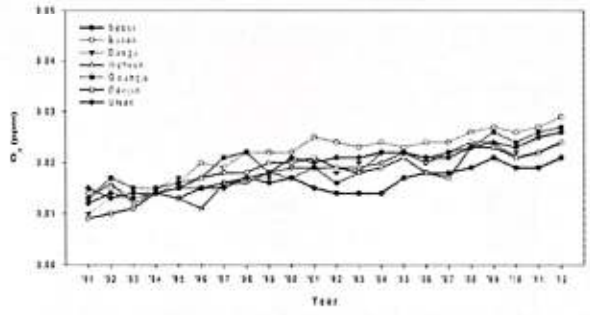
- The data is difficult for the general people
- Easy understand
- CAI is classified into 5 degrees
- Provide what to do according to CAI air quality level



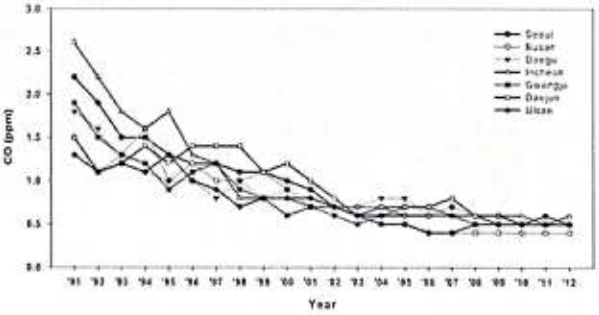
Ⅳ. Current Status of Air Quality

Annual Trend

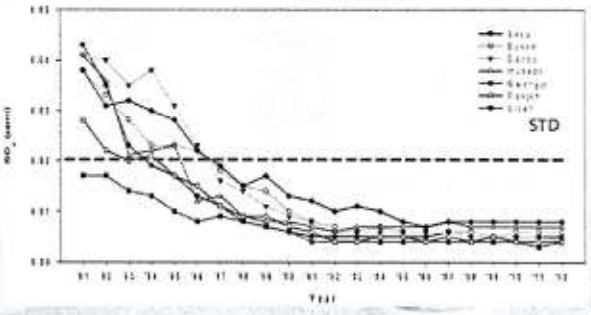
O_3



CO



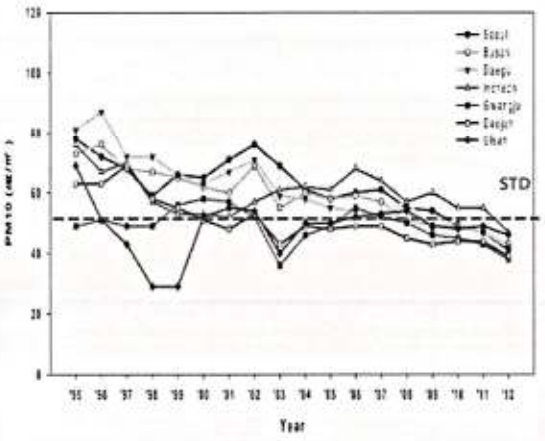
SO_2



Ⅳ. Current Status of Air Quality

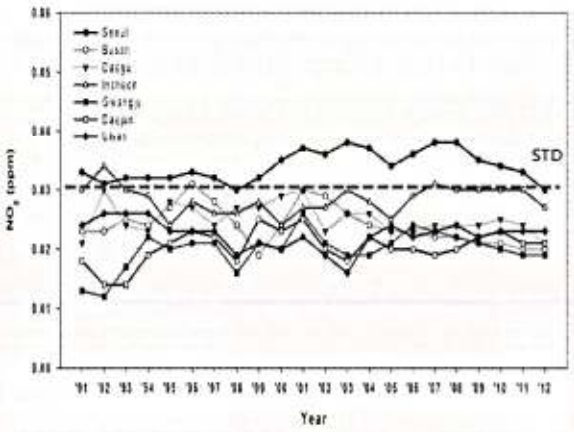
Annual Trend

PM-10



Totally decrease, but over annual STD(50 ㎍/㎥) - 78 ㎍/㎥ (1995) → 41 ㎍/㎥(2012) in Seoul

NO_2

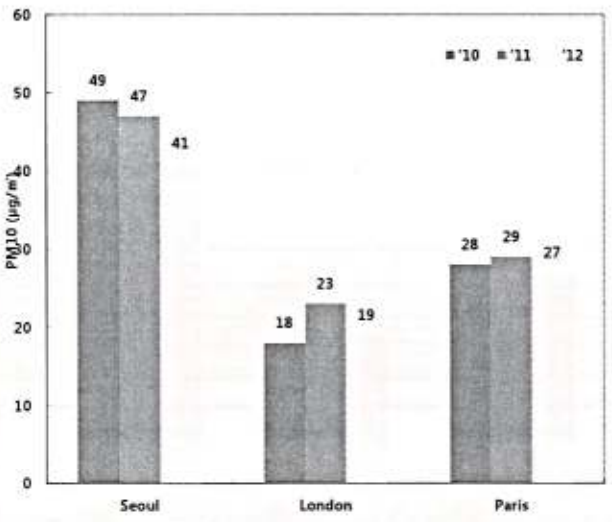


Totally steady and over annual STD(0.03ppm)

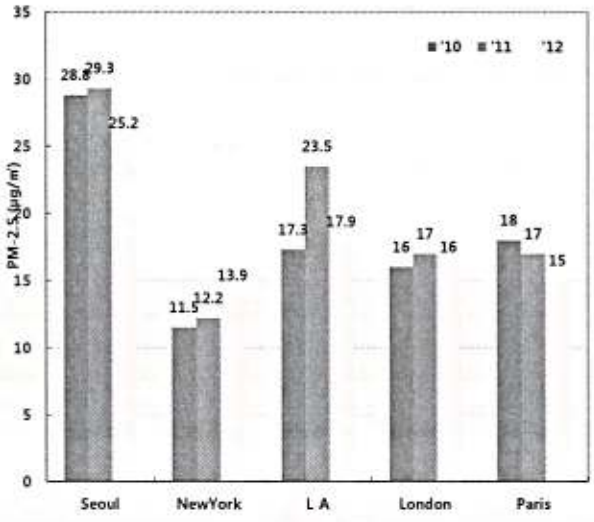
Ⅳ. Current Status of Air Quality

Annual Trend

PM10



PM2.5




THANK YOU
jby442@gmail.com

www.me.go.kr

www.cleansys.or.kr

CleanSYS

Smokestack Tele Monitoring System

More Clean, More Green

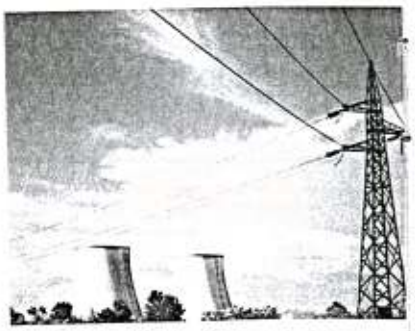
Ministry of Environment

Korea Environment Corporation

Overview of CleanSYS

Introduction of CleanSYS

CleanSYS is a remote monitoring system with various functions, which enables pollutants from smokestack in industrial sites to be measured and transmitted as data from the sites to the control center via telecommunication line.



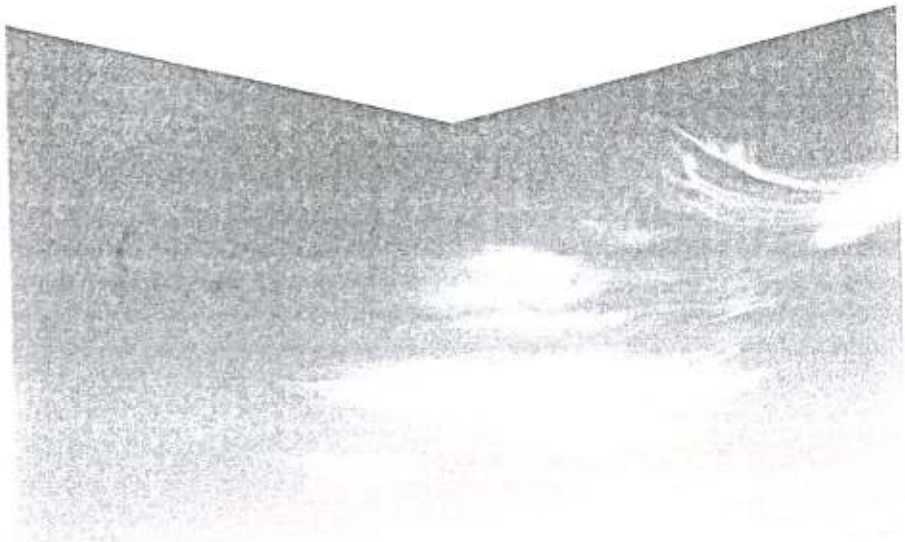
Meaning of Name and Design

Clean + SYS +

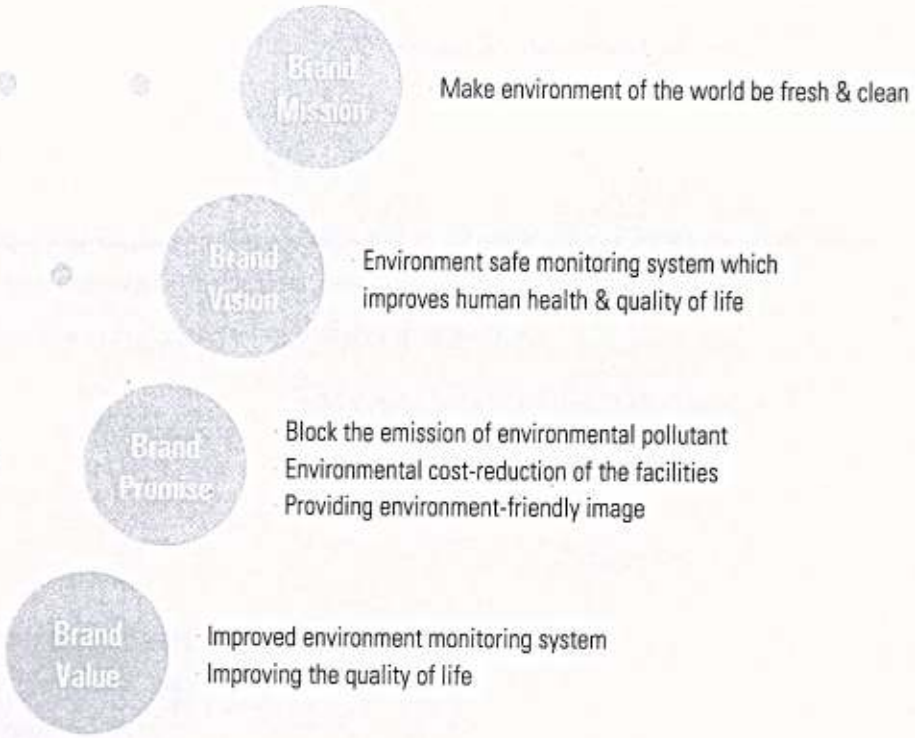
Fresh & Clean air environment	Advanced science system : Tele Monitoring System in real-time	The earth of advanced technology and clean air

CleanSYS

Management, Operation system
keeping fresh and clean air environment



Vision & Value of CleanSYS



Purpose of CleanSYS

- Transformation from regulation-driven to prevention-oriented system.
- Scientific utilization of statistic data about air pollution for making environment policy decision.
- Basic framework for ET(Emission Trading) and the regulation of total emission.

Legal Basis

- Clean Air Conservation Act, Article 32 (Installation of Measurement Equipment)
- Clean Air Conservation Act, Enforcement Ordinance, Article 17 (CleanSYS facilities to install, and types)
- Clean Air Conservation Act, Enforcement Ordinance, Article 19
  (Establishment and operation of CleanSYS control center)
- Clean Air Conservation Act, Enforcement Ordinance, Article 66 (Commission of Authority)
- Ministry of Environment, Notification (Function and operation of CleanSYS control center)

Target Scope & Installation

Measuring Evaluation Items and Target Facilities

Pollutants (7): Dust, SO_2, NO_x, HCl, HF, NH_3, CO
Other Items (3): O_2, Temp, Flow

Companies in 1st~3rd class : Emission air pollutant more than 10 ton/year with specific industry kinds (in terms of generation amount before decontamination process)

▶37 Facilities including power plants, boilers, incinerators and etc.

There are specific conditions for each industry fields

For example

Power plant in 1st~3rd class

Detail condition		Target item
power production facilities	More than 50MWh(Capacity) or 40ton/hr(quantity of evaporation)	**- Liquid/Solid fuel** Dust, NO_x, SO_2
		- Gas fuel NO_x
internal combustion engine	More than 5000kWh(Capacity)	

* Limit level depends on more specifics.

Operating System

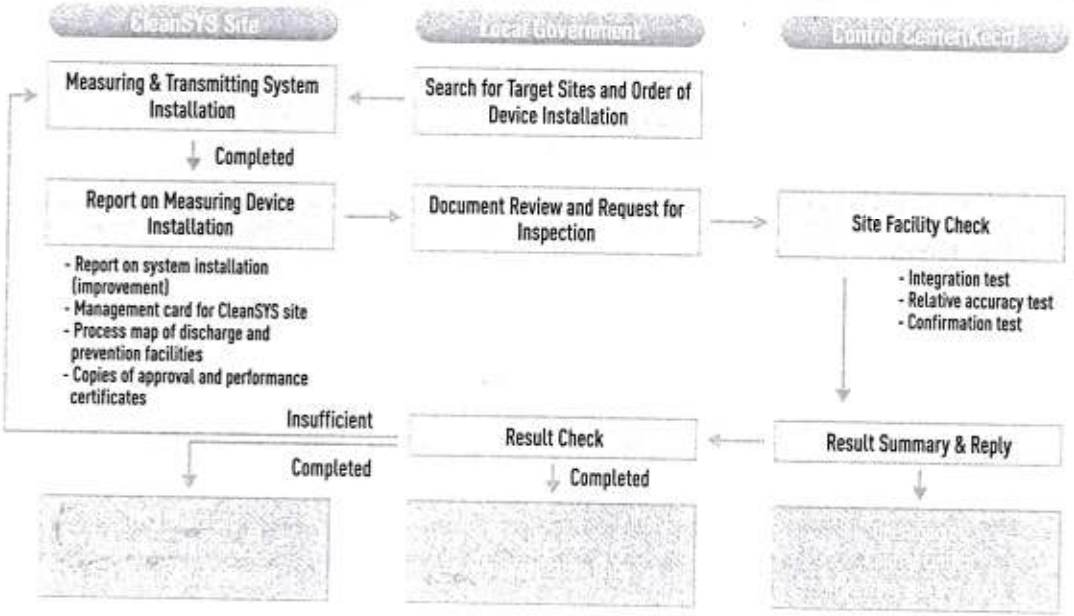
1 Role Description

Facility
- Operating maintenance
- Operating contamination prevention facility

Control Center(Keco)
- Provides technical support
- Securing of the reliability
- Data collection and analysis
- Sharing data for administrative purpose

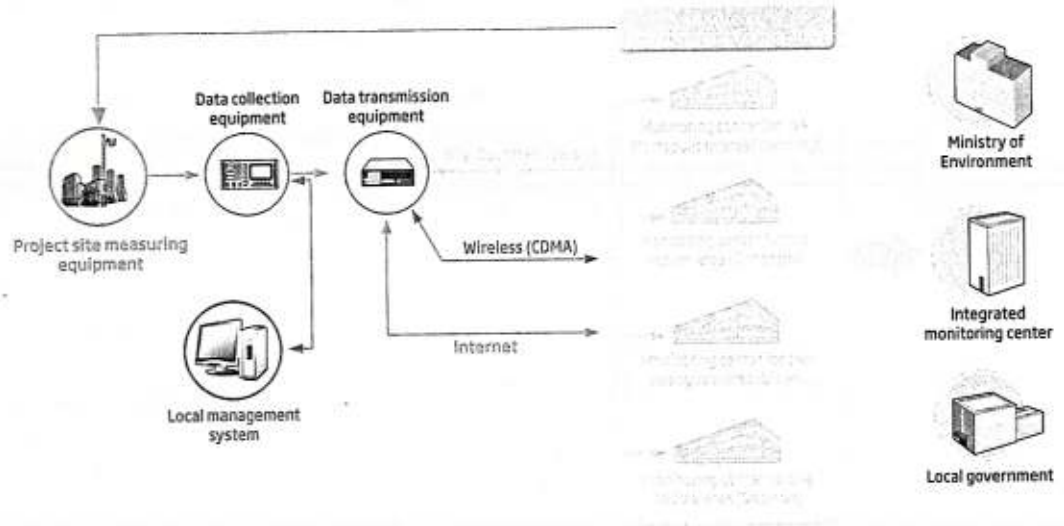
Government Agency
- Designate target facilities
- Facility supervision
- Developing air quality management policy

2 Installing Analyzer Process



CleanSYS Configuration & Function

CleanSYS Operation Chart



Pollutant from the smokestacks of industrial facilities are automatically measured

The data are stored for 5 minutes or 30 minutes, on average.

Function of D/L(Data Logger)

- Memory : The data should be saved per second.
- CPU : Calculation for the average data of 5 and 30 minutes.
- Disk : The average data of 5 and 30 minutes should be saved for more than 6 days and 7 days respectively.

Function of FEP(Front End Processor): Saving 5 and 30 minutes data which is transmitted from more than two D/Ls.

Data is transmitted to the control center and a self-monitoring system

Communication Method

- Cable : by modem through a leased line.
- Wireless : from the wireless controller including wireless modem to the control center via base station.
- Internet : by internet using VPN(Virtual Private Network).

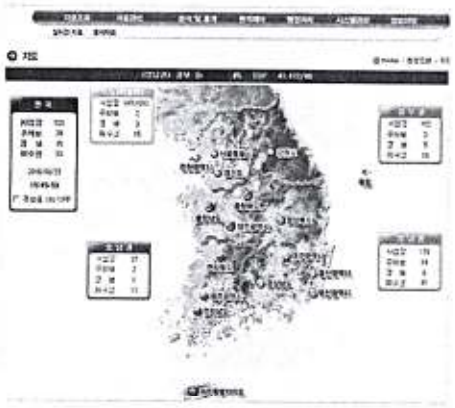
The control center sends the data to be used for maintenance, analysis, statistics or administrative measures on effluent charge.

Main Functions of CleanSYS

Data Analysis of Real-time Emission Status

- Various statistical data can be made. Business can properly manage their emission and preventive facilities through the real-time inspection.

Automatic Pollutant Emission Status and Standard Compliance Status

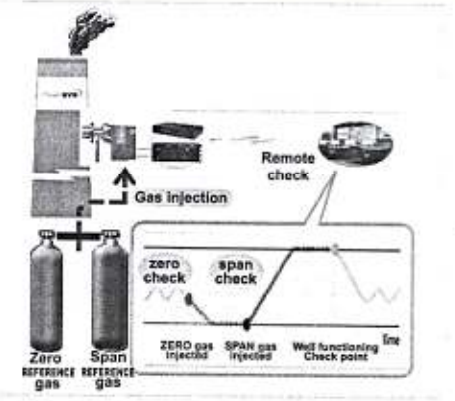


- Officials check whether facilities are observing the emission standards, and calculate the effluent charge based on the data.

Alerting and Warning System

- If the permissible effluent amount is about to be or has been exceeded, facilities and local government are informed through automatic SMS transmission.

Reliability Check Function (Remote check)



- Zero and Span gas are injected into analyzer by 'RCHK (remote check)' command and calibrate the analyzer in real time. Therefore we can check the status of its proper functioning and have the reliability in the data.

Data Quality Maintenance & Utilization as Administrative Data

Data Quality Maintenance

Technical Support

Compliance test to communication system

Check transmission system, D/L(date logger), FEP(Front End Processor) and communication condition from companies to a control center.
It is conducted whenever a company newly installs new analyzers or transmission system.

System Suitability Test

It's a test to verify the high quality of data. It verifies abilities of installed measuring system. This covers two tests;

- Confirmation test : to check the location of installed analyzer, the condition of installation, function and the performance of analyzer, etc.
- Relative-accuracy test : to check differences between measured data from analyzer and data measured directly on the spot by reference method.

Data Management

Searching of the Reduction

- Monitoring unusual emission status
- Analyzing figure of the emission facilities

Data Supply

- Analyzing the data
- Generating alternative data
- Confirming the date
- Keeping data(for 3 years)
- Data Base management

Utilizing CleanSYS as Administrative Data

Legal Basis to Control Emission Level with Reliability

- Confirmation emission level and volume
- Calculating for the emission charge
- Utilizing for environmental policy

Measuring supervision
Emission control by legal action

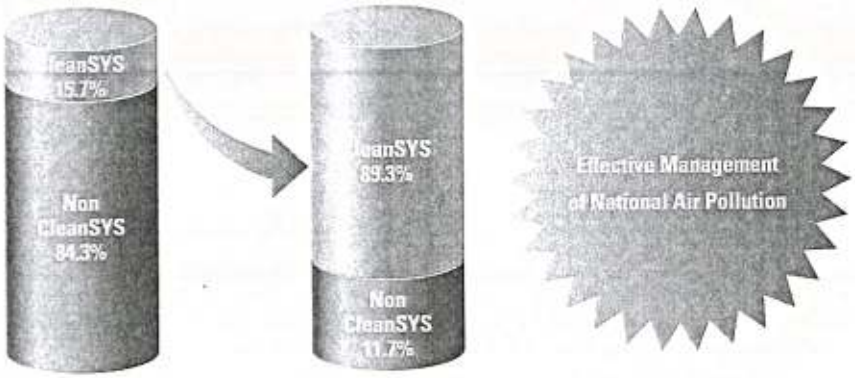
• Emission volume	⇒	Imposing emission charge
• Excessive Emission level	⇒	Legal action • Warning / Penalty (When 30 min data exceeds limit level for 3 times at once or 8 times a week)
• Inaccuracy data generating • Unsuitable condition • Emission data missing • Manipulation	⇒	Legal action • Order of improvement • Warning / Penalty



Major Achievement

Operational Effect

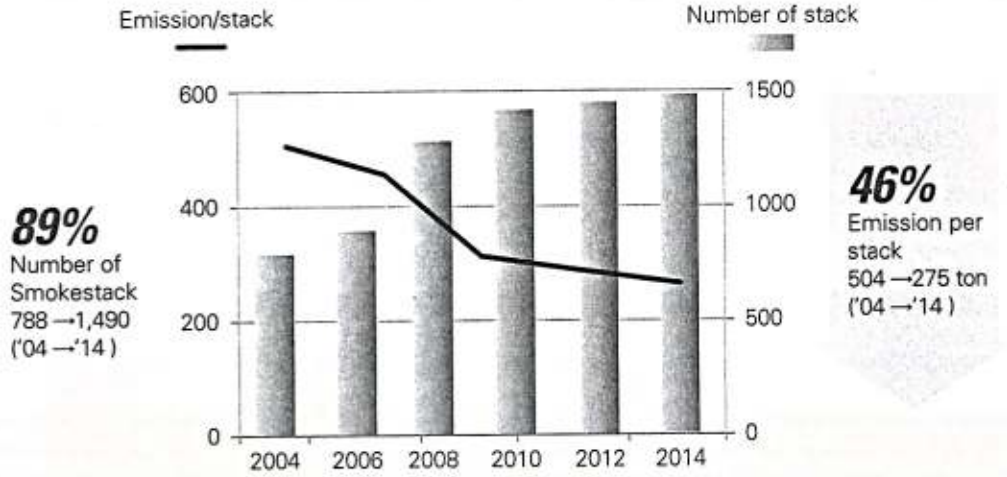
The number of CleanSYS target companies is about 16% of all the companies in 1st~3nd.
It covers 89.3% emission volume of all the facilities in 1st~3nd.



※ Reference : National Institute Of Environment Research(2014, www.nier.go.kr)

Environmental Effects

Reduction of pollutants emission in smokestacks
: the number of smokestacks increased by 89%, but the volume of main pollutants emission decreased by 57%
CleanSYS contributes to social cost benefit by reducing air pollutants



Successful Application and Policy Development by CleanSYS

- Evaluating and assigning best operating facility
- Reduce emission charge for low level emission facility

- Data communication standard development
- Adaption of real time data as administrative data
- Specific make up data generating and test standard

- Control total emission volume especially in metropolitan area by reducing air pollutant load from allowable emission density

Improve Data Reliability and Effective Supervision

24 hour reliability check available
- Remote check 5 time a year for each pollutant item
- At least 5 time a year for each pollutant item

Data reception perfection
- Data transmission check
- Generate proper make up data
- 95% data reception Ratio with 5% reliable make up data

Detection tool for any manipulation
- Quality analyzer program
- Analyzer state management

- No illegal or fake emission
- Supervise pollution scientifically

Providing trust and confidence to people

Clean SYS
Smokestack Tele Monitoring System

www.cleansys.or.kr

Ministry of Environment www.me.go.kr

Korea Environment Corporation www.keco.or.kr

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