

WGIA 7th

# Korea`s GHG inventory Management

2009. 7. 7



Climate Change & Air quality policy division  
Ministry of the Environment, Korea

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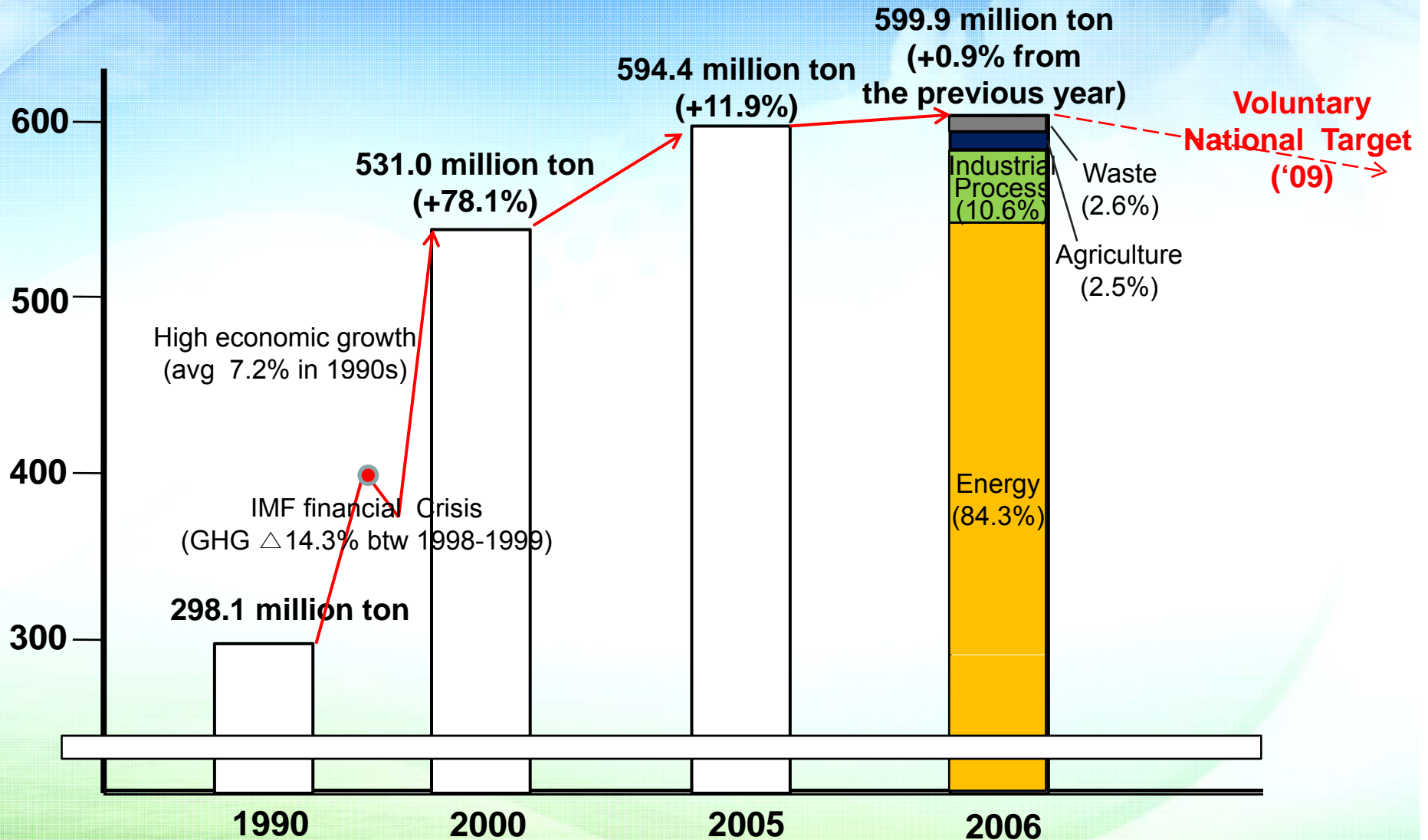
# I.

## National Inventory system of Korea

# Greenhouse Gas Emissions in Korea



Steadily increase of GHG emissions in 2000s  
 Annual inc ratio: 9.7%('99)→6.4%('00)→2.0%('03)→1.4%('04)→0.7%('05)→0.9%('06)

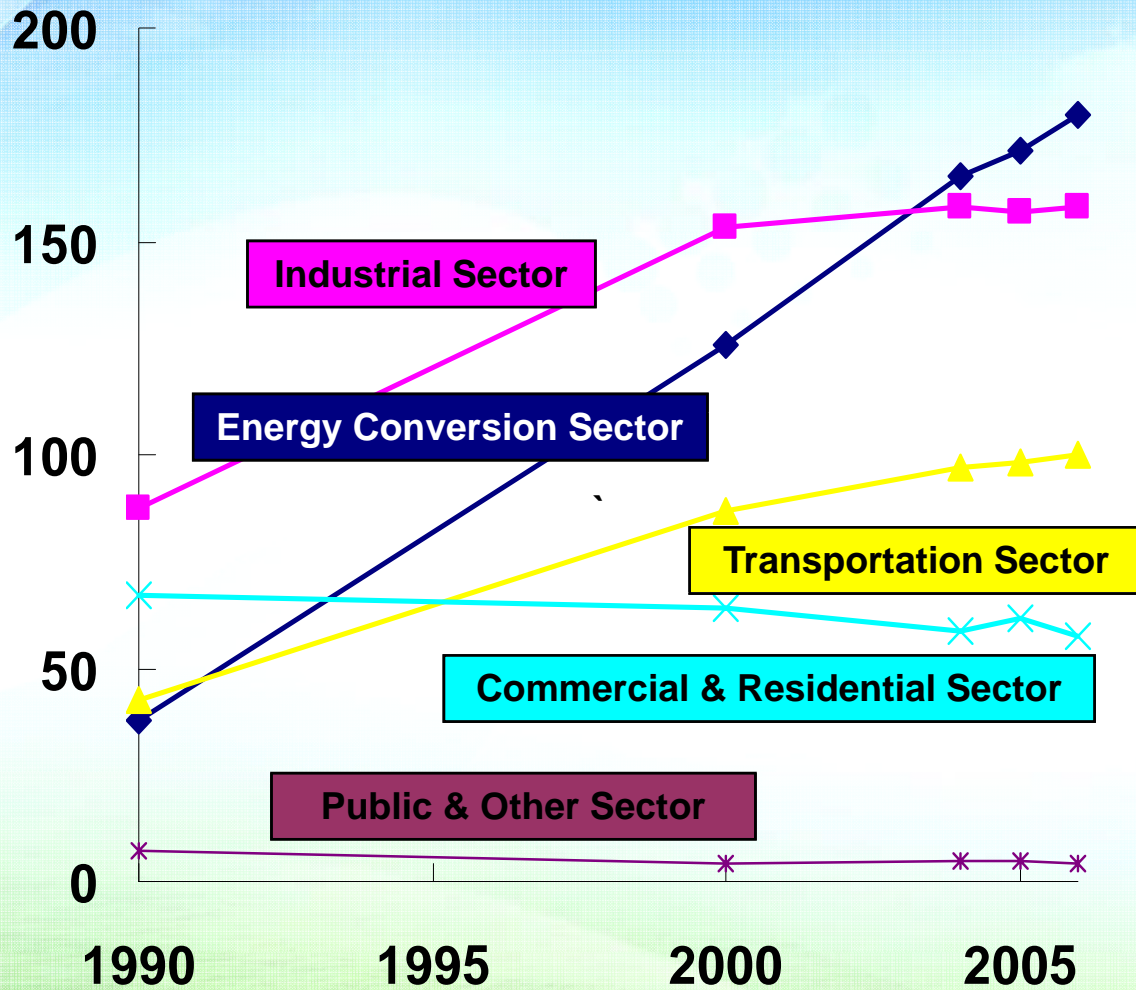


\* Emissions data Source: Ministry of Knowledge Economy (2009.2)

# Trends in CO<sub>2</sub> Emissions from Energy Sector



Million tons of CO<sub>2</sub>



1990	2006	Change from 1990
87.6	158.3	+81%
38.0	179.6	+373%
42.4	99.8	+135%
67.2	57.2	-14.9%
7.0	4.3	-38.6%

## The Aims of the establishing National System

► **National System** means, all **institutional, legal and procedural arrangement** for **estimating** anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, and for **reporting and archiving** inventory information (FCCC/KP/CMP/2005/8/Add.3)

1. Ensure credibility of NAMA (ROK's proposal)
2. Ensure cost-effectiveness of national climate policy

### ● Draft bill of low carbon, green growth

#### Article 45 (establishing of integrated GHG inventory system)

- ① The government should establish the integrated GHG inventory system which estimate and review the anthropogenic emissions by sources, removals by sink, emission and absorption factors and relevant information.
- ③ The government should ensure credibility, transparency and accuracy in establishing national system and estimating GHG inventories reflecting on international trends and guidelines.

## Phase 1('99~'08)

- Coordinate by MKE by the 'Fundamental Energy Act'('99~)
  - National inventory prepared by KEEI as an political research subject and reported to UNFCCC included in National Communication
    - \* 1st NC (1998), 2nd NC (2003), 3rd NC(2009)
  - Each ministry(institution) estimated sectoral GHG emissions and periodically reported to MKE(KEEI)
    - \* Energy(KEEI), Industrial process(KEMCO), Waste(EMC), Agriculture(RDA), Sink(KFS)

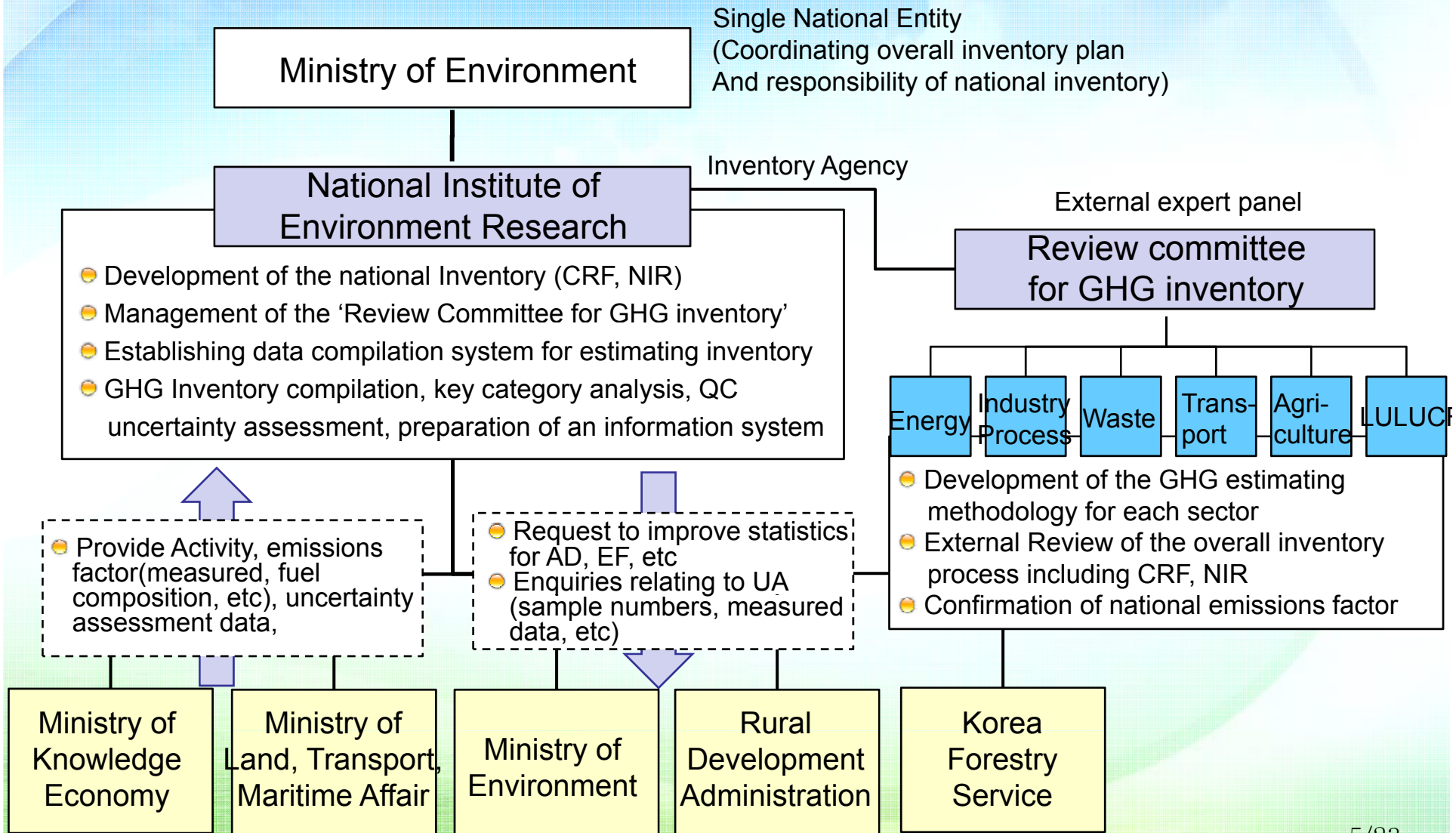
## Transition Phase ('08~'09)

- Inter-ministrial discussions for improvement of National System ('08)
  - Need for review process, QA, Uncertainty Assessment of national inventory to ensure credibility, transparency, accuracy and consistency
- 'Presidential Committee of green growth' set to make an strategy of improvement of national system including institutional arrangement('09)

# Proposed National systems (draft by MOE)



## Phase 2('09~)





# Strength and Weakness of National systems of Korea (draft by MOE)

## ● Strength

- Cost-effectiveness of GHG inventory compilation by using an Integrated Air pollutant and GHG management system (GHG-CAPSS, NIER 2008)
  - Feasibility of integrated inventory planning, preparation, reporting and inventory data archive
  - Estimate GHG inventory both Top-down approach(national inventory) and Bottom-up approach(Local govnt` GHG inventory)
- Inventory improvement process by “Review Committee for GHG inventory”
  - External reviewer from academy, research institute and industry, etc (31members)
  - Overall review of inventory planning and national inventories (NIR, CRF), development of country-specific methodology, confirmation of country-specific emission factors

## ● Weakness

- Need close linkage between ministries/agencies in overall inventory compilation process
  - providing of AD, EF and other related measured data to NIER
  - improvement of statistics for activity data in order to ensure accuracy, credibility of inventory
  - GHG inventory data are fed back to, and utilized by, ministries/agencies for their policy-making
- Lack of experiences of National Inventory Report, external review process,
  - voluntary peer-review, consultant, cooperation with Annex 1

## II.

# Integrated inventory system (GHG-CAPSS)

## ● GHG Clean Air Policy Support System (GHG-CAPSS)

- CAPSS: The yearly national air pollutants emission data has been estimated by database system based on Emission Inventories (point, area, mobile) since 1999
- GHG-CAPSS: National air pollutants and GHGs integrated emissions DB system in order to support for planning reduction strategies, effect analysis of Air quality control policy and Climate Change policy (2007~2008.4)
  - link between SCC(source Classification Code) in CAPSS and CRF(Common Report Format) in IPCC

## ● Key features of GHG-CAPSS

- Provide integrated emissions data
  - air pollutants (SO<sub>x</sub>, NO<sub>x</sub>, PM<sub>10</sub>, NH<sub>3</sub>, CO, VOC, TSP) and GHGs (CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O)
  - \* estimation of F-gases(HFCs, PFCs, SF<sub>6</sub>) is developing by NIER at 2009
- Bottom-up approach
  - provide GHGs and air pollutants emissions map (1kmx1km)
  - provide emissions by each corporation(entity) - SEMS

# Link between IPCC & CORINAIR



- Linkage categories in CAPSS and GHG-CAPSS based on IPCC 2006 G/L which provide this link between CRF in IPCC and SNAP in CORINAIR

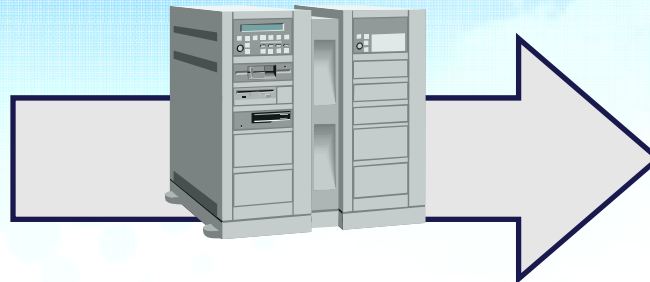
REPORTING CATEGORY				Source Sector	ENEP/CORINAIR Inventory Guidebook Chapter
IPCC category	CRF	NFR			
<b>1. ENERGY</b>					
1A1 Energy Industries	1A1a	1A1a	1A1a	Main Activity Electricity and Heat Production	B111 and B112
	1A1b	1A1b	1A1b	Petroleum	B132 and B136
	1A1c	1A1c	1A1c	Manufacture of Solid Fuels and Other Energy Industries	B142, B146 and B152
1A2 Manufacturing Industries and Construction	1A2a	1A2a	1A2a	Iron and Steel	B111, B112, B323, B324, B325, B331, B332, B333
	1A2b	1A2b	1A2b	Non-ferrous Metals	B336, B337, B338, B339, B3310, B3322, B3323
	1A2c	1A2c	1A2c	Chemicals	B111 and B112
	1A2d	1A2d	1A2d	Pulp, Paper and Print	B3321
	1A2e	1A2e	1A2e	Food Processing, Beverages and Tobacco	B111 and B112
	1A2f	1A2f	1A2f	Non-Metallic Minerals	B3311, B3312, B3313, B3314, B3318, B3319, B3320, B3323
	1A2g			Transport Equipment	B111 and B112
	1A2h			Machinery	B111 and B112
	1A2i			Mining and Quarrying	B111 and B112
	1A2j			Wood and Wood Products	B111 and B112
	1A2k			Construction	B111 and B112
	1A2l			Textile and Leather	B111 and B112
1A2m			Non-specified Industry	B111 and B112	

# Estimating process of GHG-CAPSS (NIER)



## Data Collection

- Activity data (Entity)
  - SEMS (online)
- Activity data (Others)
  - Agencies
  - industry association
  - Statistics from Govn`t
- Geographical Data
  - GIS
  - Land-using data
  - Industry location data
  - Road web, etc
- Emissions Factor
  - Tier 1,2,3, etc
  - other information



## Data Compilation and Check

- Initial estimation by IPCC guidelines
  - Activity
  - entity`s input data
  - emissions factor
- Data check
  - entity`s input data (online, by call)
  - emissions trends (AD, EF, methodology)

## Inventory Reporting

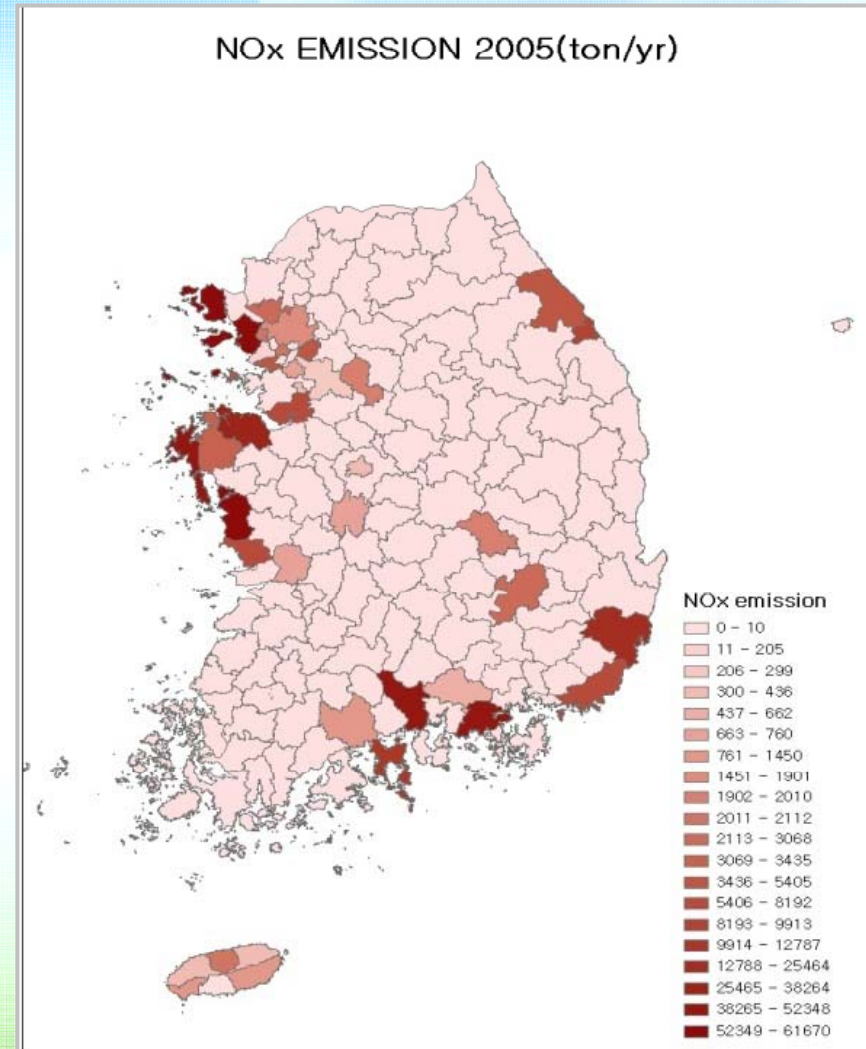
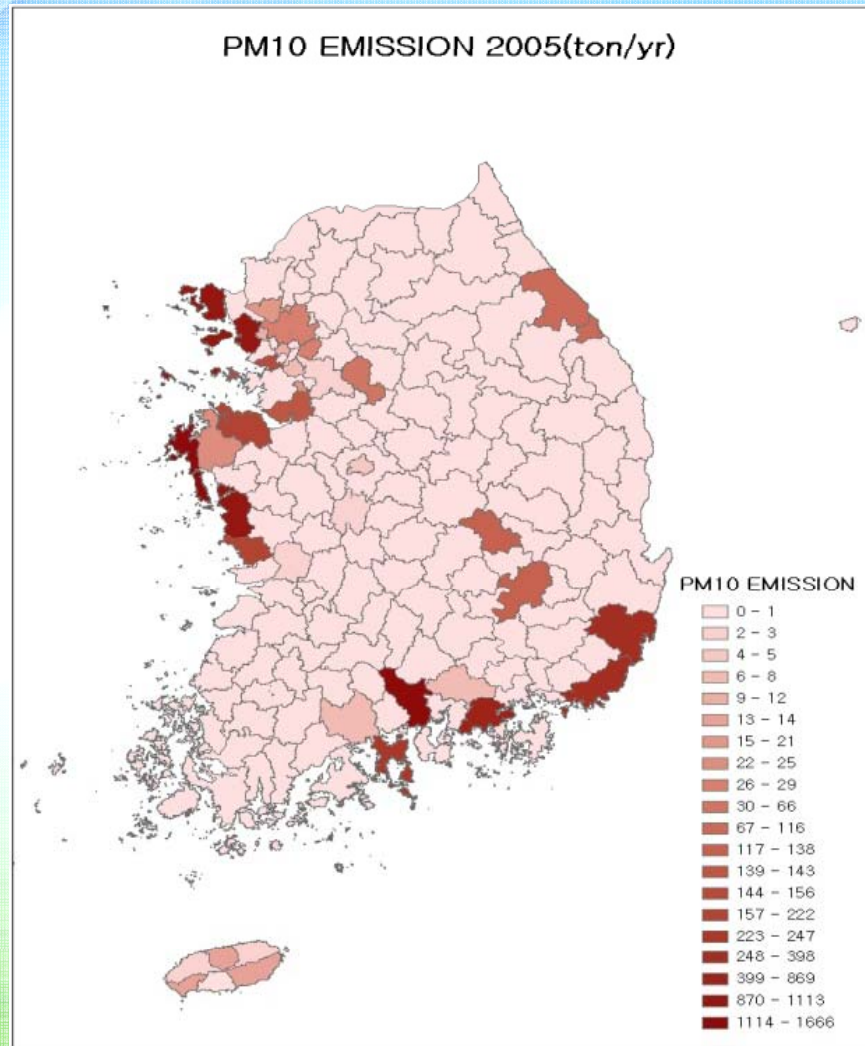
- period : 2001~2006
- Gases
  - air pollutant (SOx, NOx, VOC, CO, etc)
  - GHGs(CO2, CH4,N2O)
    - \* F-gases(HFCs, PFCs, SF6) will be provided from 2010
- Categories :  
CRF & SCC
- Area & Scope
  - Entity level (3,000)
  - Local government level (emissions map)



# Emissions Map by GHG-CAPSS



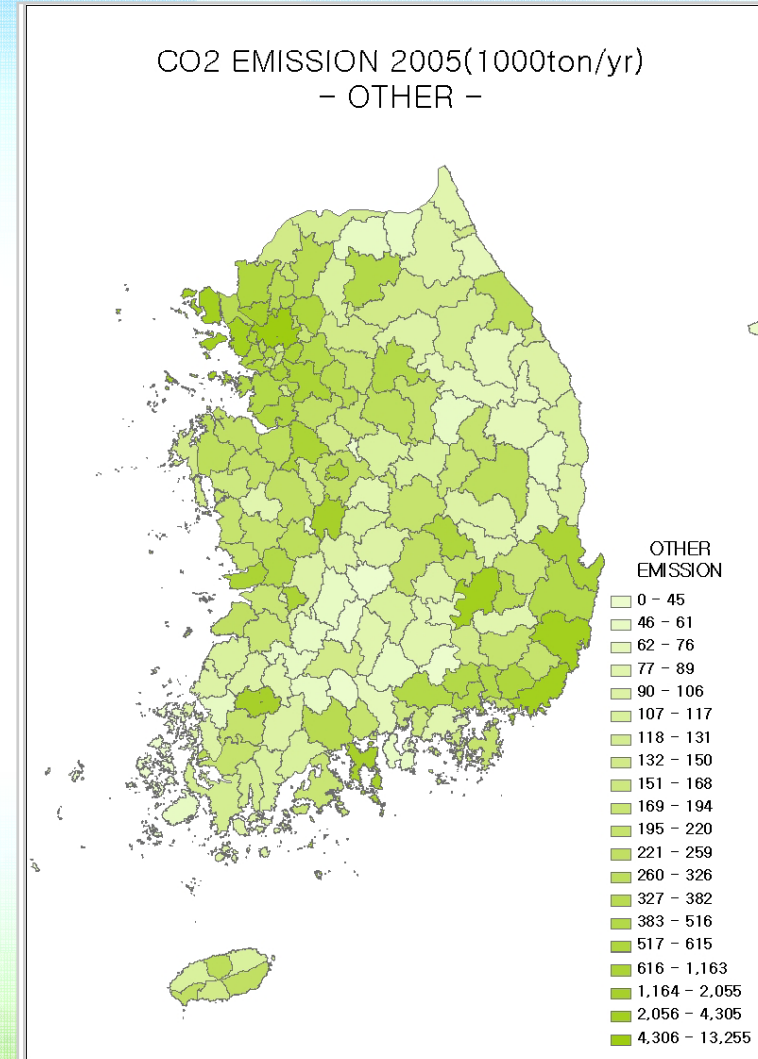
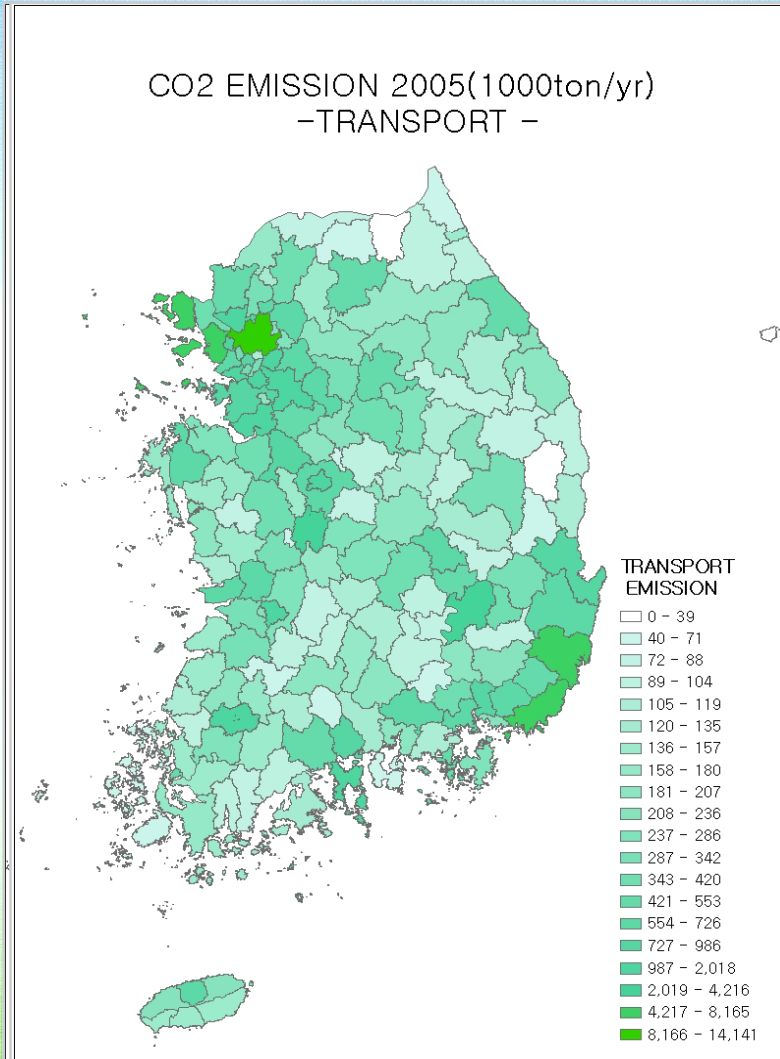
## ● CO<sub>2</sub>, SO<sub>x</sub>, NO<sub>x</sub>, PM<sub>10</sub>



# CO2 emissions by sectors



## ● Power plant, industry, Transport, others

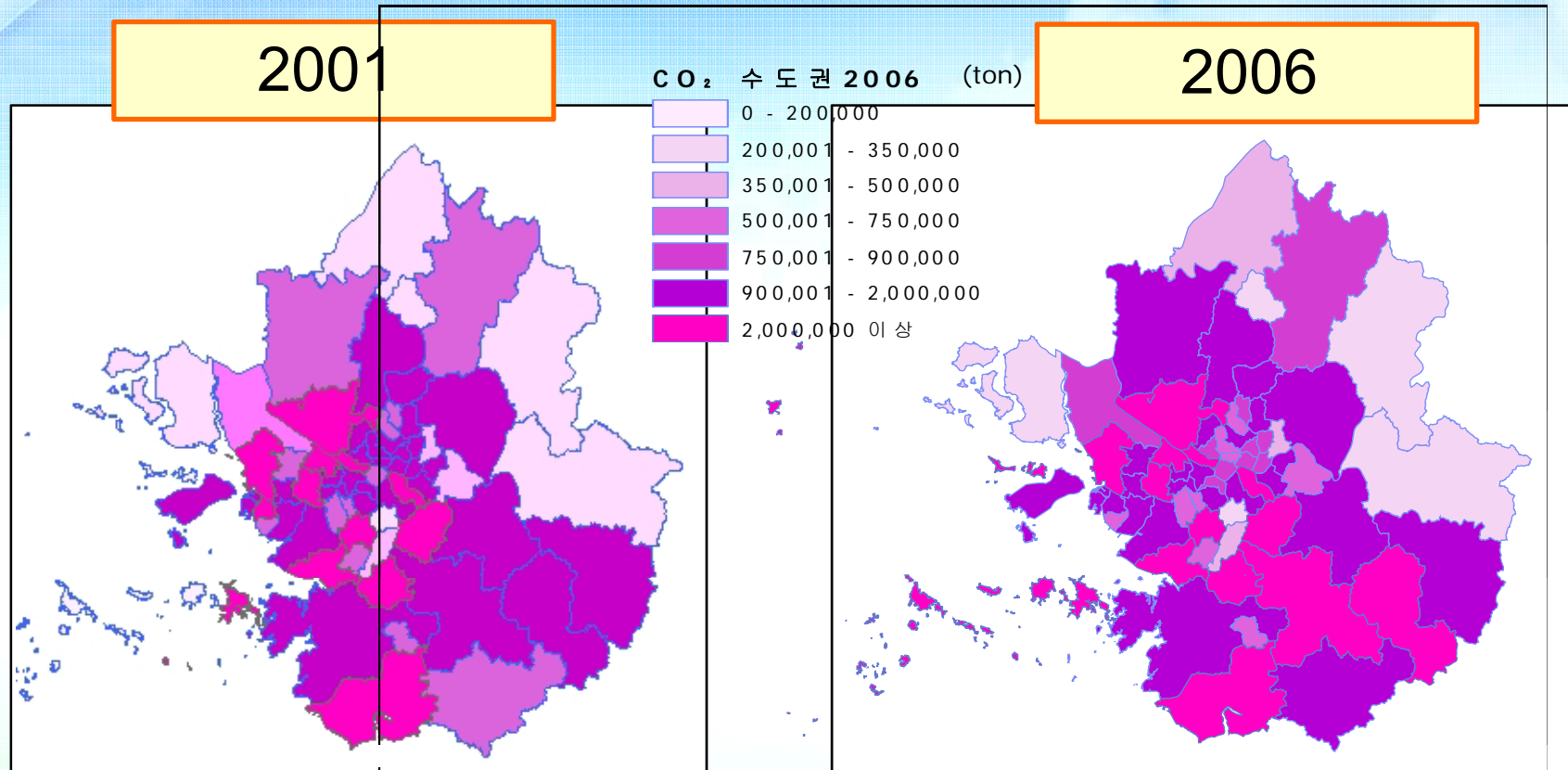




# CO2 emissions from Local government



## ● Emission trends in Metropolitan Area



- most decreased areas : Jung-gu, Seoul ( $\Delta$ 57%), Nam-gu, Incheon ( $\Delta$ 56%)
- most increased areas : Ongjin-gun, Incheon(15692%), Icheon-Si, Gyeonggi-do (82%)
- increasing in outside of seoul by New-town development and large emitting entities

### III. GHG inventories of local governments

## The Aims of the Local Government`s Inventory

1. Supporting implementation of Local govnt` Climate policy
2. Fostering Local climate change & inventory experts

### ● Draft bill of low carbon, green growth

Article 11 (implementation of local govnt`s green growth policy)

- ① The Local government should prepare ‘local government`s green growth plan’ in order to implement local government level - ‘low carbon, green growth’ harmonizing with ‘National green growth strategy’

### ● Comprehensive plan of Climate Change (‘08.9)

Establishing of local government`s GHG inventories (By MOE)

- Prepare for local govnt` level - inventory guidelines
- establishment inventory DB for estimating BAU, abatement potential

## Considering factors for estimating local inventory

- Unlimited movement(migration) of products, waste, mobile vehicles between local governments

- ▶ Need to identify the emissions boundaries based on emissions sources and mobility

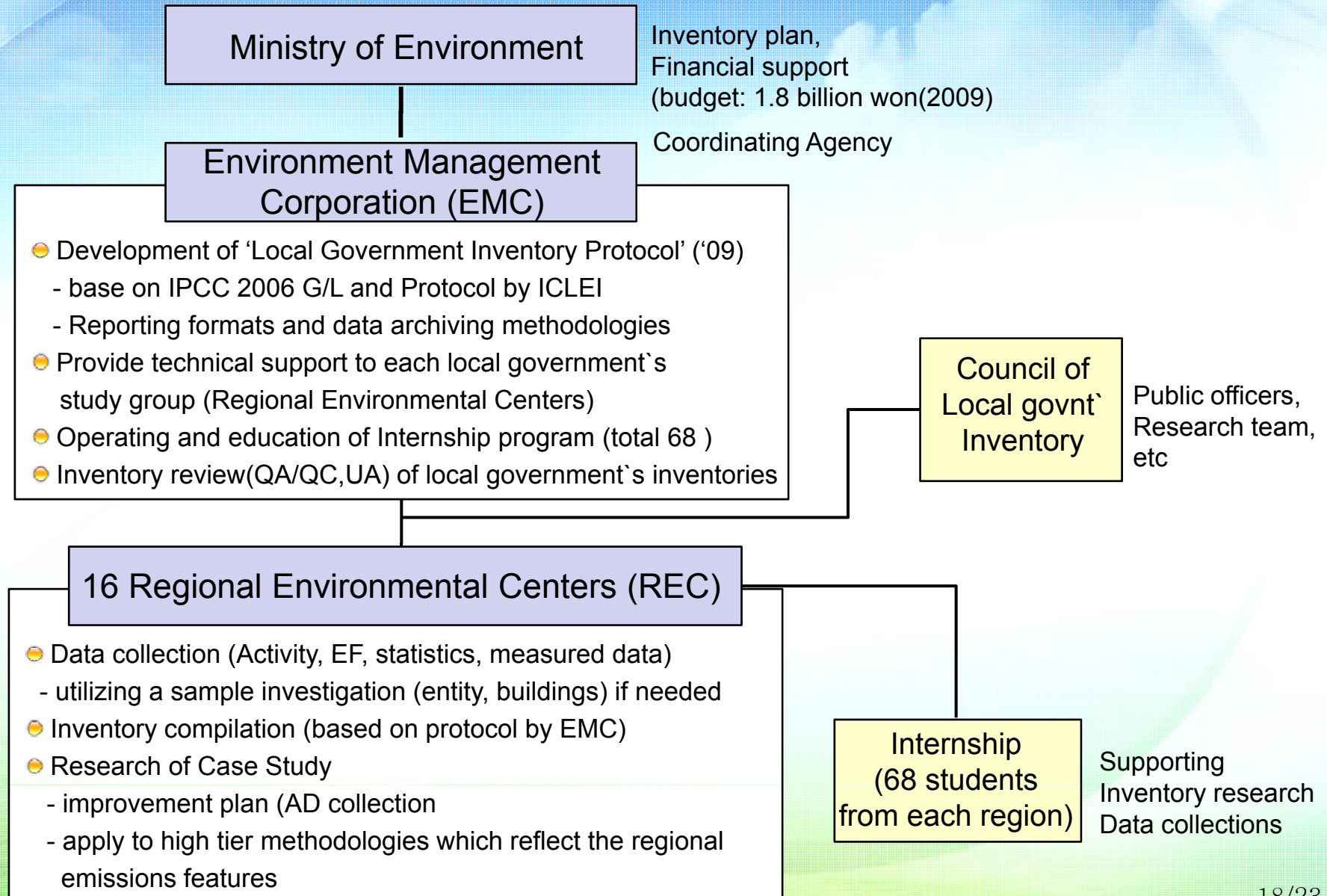
- Discrepancy in policy ability by local government for each emission sources
  - (ex) Direct GHG reduction of emissions by private facilities and entities is limited at local government level climate change policy

- ▶ Need to distinguish emissions scope based on control approach of local government`s policy options

- Demand side GHG management is an important policy options at local government`s climate change policy
  - (ex) facilitating low carbon lifestyle (Green start, purchasing carbon labelled product) Energy efficiency investment (Renewables on building LED roadlamp)

- ▶ Need to compile inventory based on indirect emissions(electricity, etc) and considering of energy demand(consumptions)

# Establishing of local govnt inventories



# Establishing of local govnt` inventories



## Timetable

		2009. MAR	JUN	OCT	DEC	2010 FEB	MAY	2011 FEB
EMC	Inventory Protocol	→						
	Internship program	1 (Seoul)	←	(Each	Region)			
	Technical support to REC							
	Inventory QA, UA							
16 REC (Regional Environmental Center)	16 Large Local government	→						
	10 Small local government (pilot)	→						
	230 Small local government					→		
Inventory Council	Council (total 6th in 2009)	Initial	Mid-term		Final			

## Key features

- Ensure cost-effectiveness, consistency, comparability of Local govnt` inventories
- Feasibility of peer-review of Top Down(national inventory) and Bottom Up inventory
  - need additional measures to decrease numerical deviation
  - peer-review with local inventories by GHG-CAPSS and provide to each local government (end of 2009)
- Ensure local areas` expertise by utilizing of '16 Regional Environmental Centers' and operating of Internship program from local universities

# Inventory Reporting Format



## Inventory Protocol (by EMC)

Scope			Contents
Scope1			Direct emission sources(sinks) in local government`s boundary
	Scope 1-A	Direct emission sources(sinks) under Local government`s operational control	
		Scope 1-A-a	Having an Operational / Financial control *Environmental facility, public institute of local authority
		Scope 1-A-b	Not having an Operational / Financial control * Private facilities (Corporations. Buildings etc.)
	Scope 1-B		Direct emission sources(sinks) out of Local government`s operational control * Airport, harbor, etc (national infrastructures)
Scope2			Indirect emission sources(sinks) in local government`s boundary
	Scope 2-A	Indirect emission sources(sinks) under Local government`s operational Control	
		Scope 2-A-a	Having an Operational / Financial control
		Scope 2-A-b	Not having an Operational / Financial control
	Scope 2-B		Indirect emission sources(sinks) out of Local government`s operational Control
Scope3			Emission sources(sinks) under local government`s operational control, but outside of local government`s boundary
	Scope3-A		Direct emission sources(sinks)
	Scope3-B		Indirect emission sources(sinks)

# Internship program (2009.3~)



## Education program : Climate Change, GHG inventories

- 68 graduates from each regional university, (2009.3.3~4.2, Seoul)





# 3<sup>rd</sup> Council of local authority inventory

- MOE, EMC, 16 Regional Environmental Center, Internship students (2009.6.17, Daejeon)



감사합니다

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