

“Local-based Pilot Emissions Trading Scheme” in Korea

2009. 10. 20



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

Contents

I.

Backgrounds of ETS policy

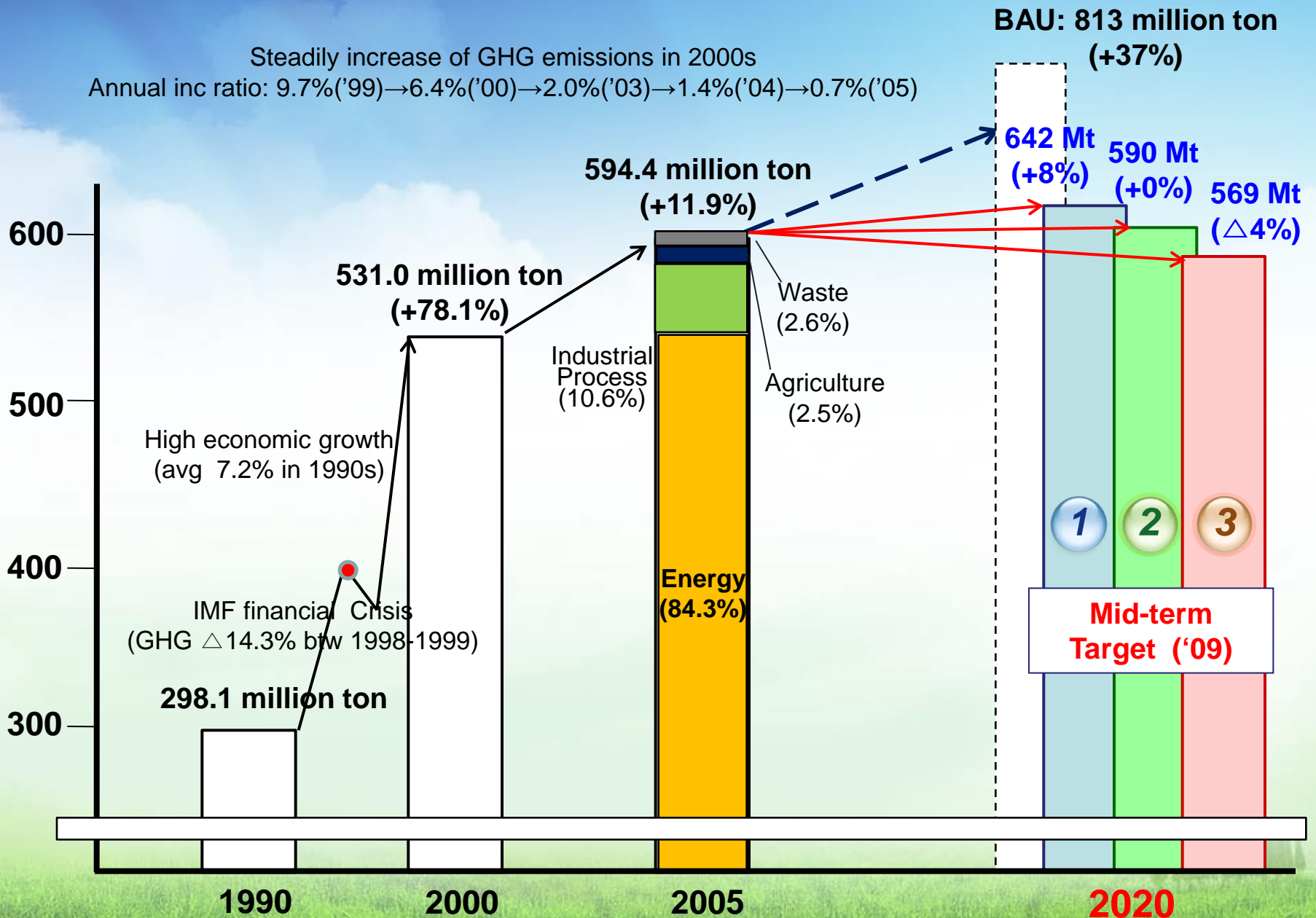
II.

Pilot ETS program by MOE

1. Backgrounds of ETS policy

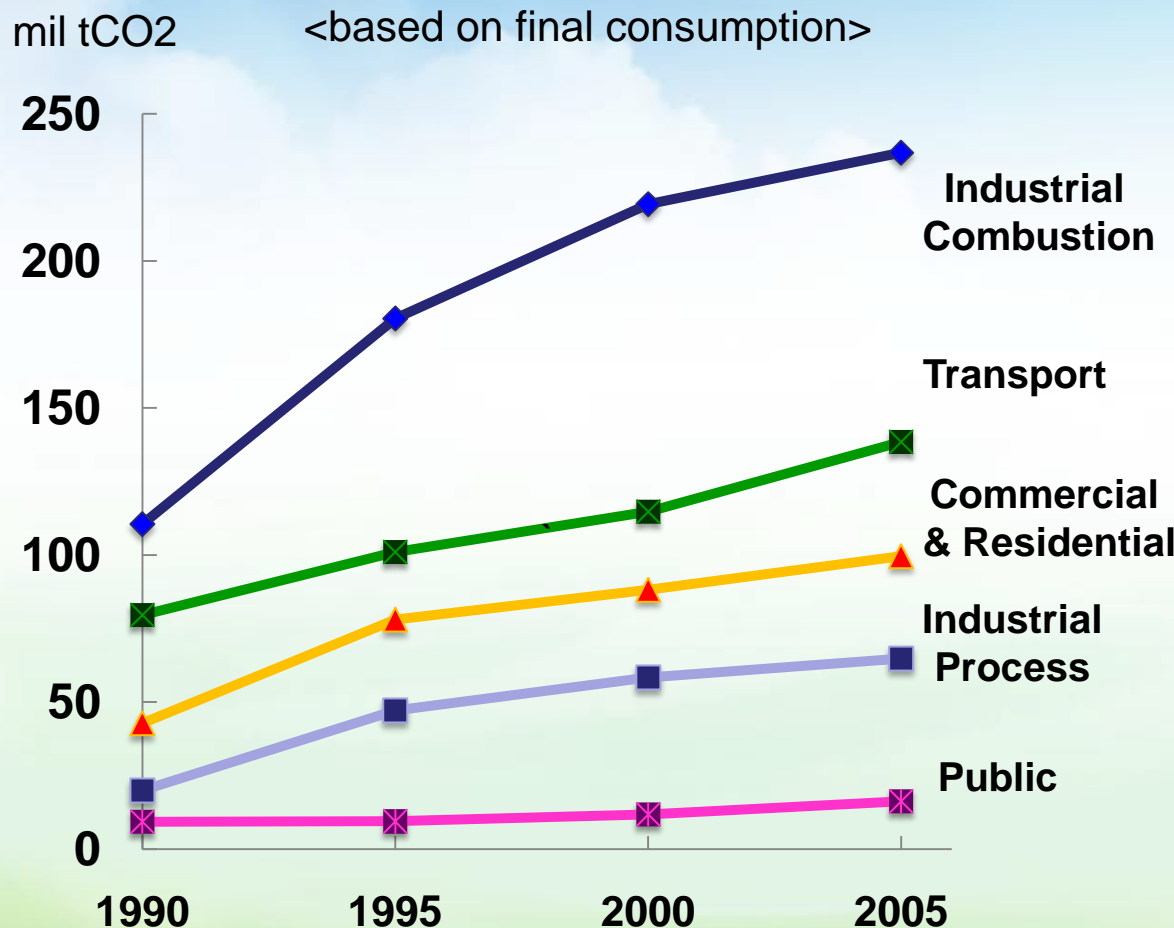
The background features a blue sky with white clouds at the top. Below the sky are several wavy, translucent green lines that sweep across the frame. Three green leaves are scattered throughout the scene, appearing to float or fall. At the bottom, a city skyline with various skyscrapers is visible, partially obscured by the green waves.

GHG emission trends of Korea



Trends in CO₂ Emissions from Energy Sector

- high increasing ratio due to Economic growth and life style changes, etc



	GHG Emissions(Mt)			Change (1990~2005)
	1990	2005	(%)	
Industrial Combustion	110.5	236.8	40.0	+111.8%
Transport	42.8	99.6	16.8	+132.4%
Commercial & Residential	79.6	138.4	23.4	+70.5%
Industrial Process	19.9	64.8	11.0	225.6%
Public	9.3	16.2	2.7	+69.5%

Command & Control, or Market approach?

● Command and Control is transitional approach

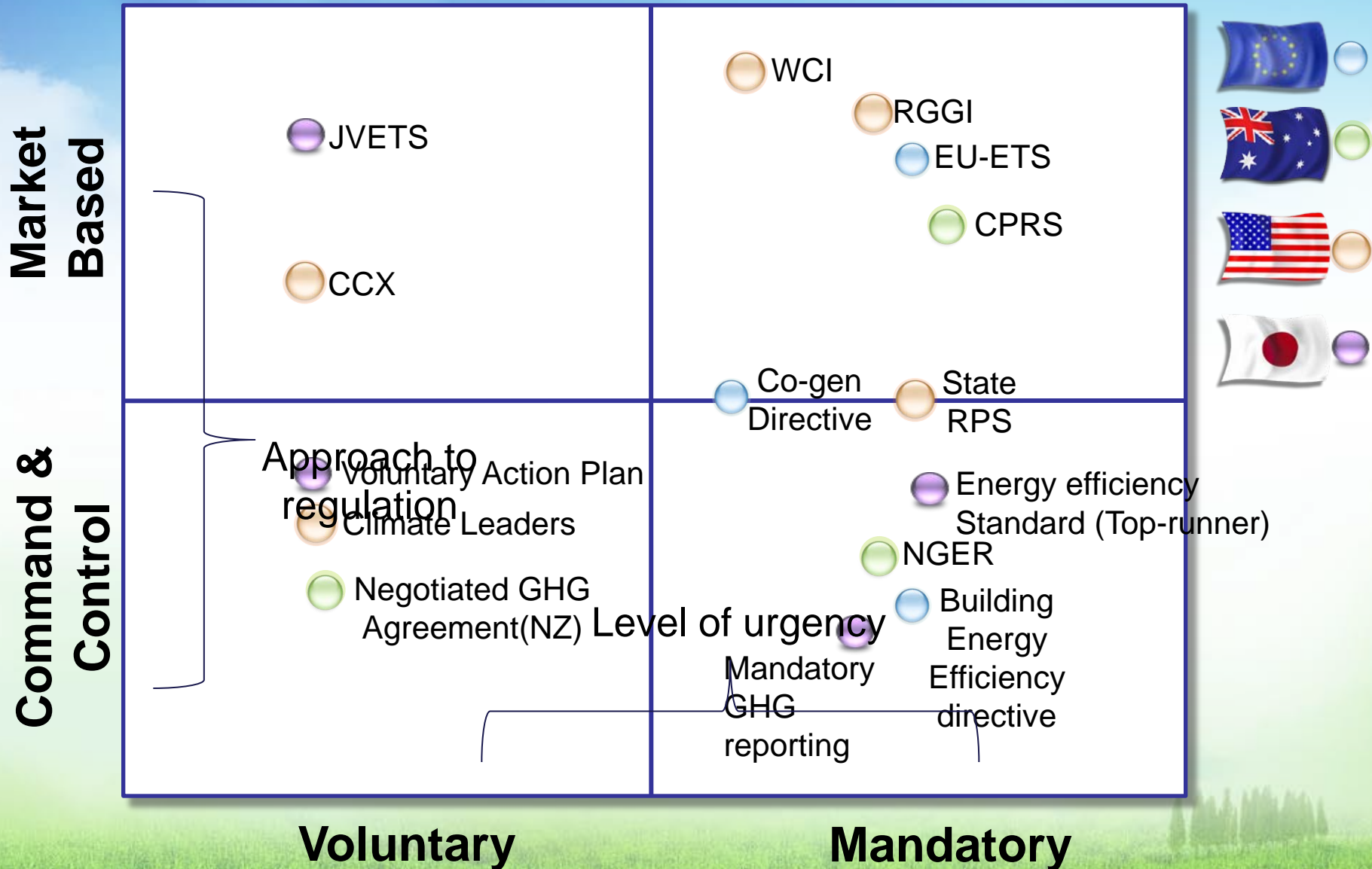
- Well understood
- Fits within existing regulatory infrastructures
- But, doesn't deal with diffuse sources

● Market mechanisms offer a solution

- Environmental objective met at least cost
- More transparent and efficient
- Provides a price signal
- Encourages structural adjustment away from problems
- Creates opportunity for new products and services

Analytical framework – review of existing schemes

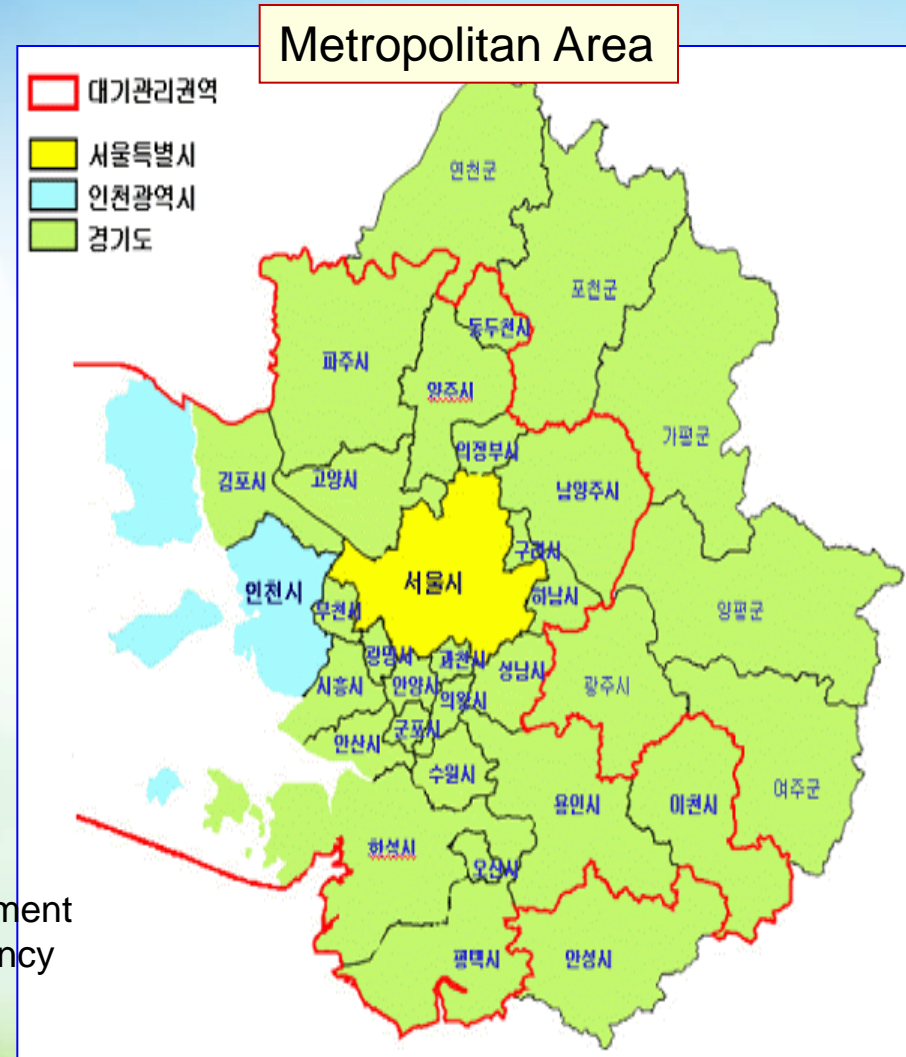
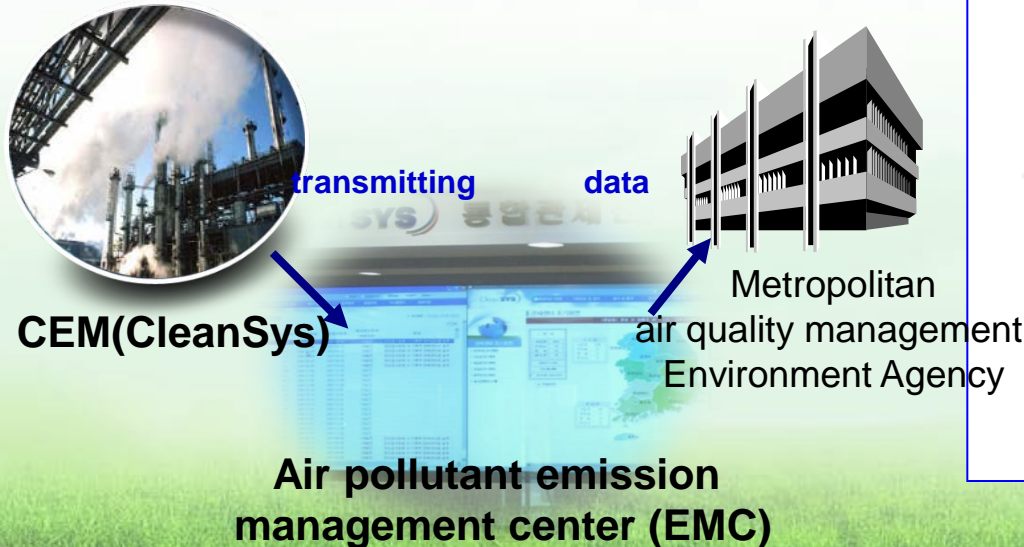
* Source: PricewaterhouseCoopers(2008)



(Ref) Air pollutant Emissions Trading Scheme in Korea

- legal basis: The special Act of air quality improvement in metropolitan area('03.12)

- threshold: SO_x 20t/yr, NO_x 30t/yr (115 facilities)
- Gases : SO_x, NO_x, (PM under review)
- Allocation : Best Available Technology ('08~'12)
- Trading results : NO_x 916ton, SO_x 189 ton
- (price : 0~1,000 won/kg , 18 transfers from '08)
- Using a CEM (CleanSys) to monitor air



The Aim of introducing ETS in Korea

1. Environmental objective - Mid-term mitigation goal
2. Cost-effectiveness – using a market mechanism
3. Facilitating Green growth - Carbon Market

● Legal basis : Draft bill of Low carbon, Green growth

* Under reviewed at the National Assembly

Article 46 (introducing of C&T Emissions Trading Scheme)

- ① The government may introduce the GHG Emissions Trading Scheme in order to reduce GHG cost-effectively and prepare participating international Carbon Market
- ② The government should consider international Climate change negotiation outcomes and competitiveness of industries as of enforcement of this scheme
- ③ Specific issues including allocation methodology, registry, establishment of the Carbon exchange should be legislated in another Law

Policy direction to establish ETS (MOE's direction)

1. Basically, Cap & Trade

- Ensure environmental Integrity
- Effective in international linkage of Carbon market
- Set a regulatory market (carbon price) to facilitate trading

2. Broad Participants

- Industries, Buildings (private / public)
 - * large reduction potential of buildings comparing to industry, Managing building energy demand

3. Ensure credibility of MRV

- Calculated-based : improving MRG guidelines in pilot periods
- Measurement-based : Continuous Emissions Monitoring (CleanSys)

4. Carbon offset scheme

- GHG offset project by local authority : significant potential in Agriculture, Waste, Renewable, etc (contribute compliance of entity's target)

2. Pilot ETS program by MOE



Background of pilot program by MOE

Comprehensive plan to countermeasure Climate Change ('08.9, Prime Minister`s Office)

- ▶ Introduction of pilot Emissions Trading Scheme ('10~)
 - Set reduction target based on negotiation with scheme participants
- ▶ Preparation Early Action Recognition program to facilitate voluntary reduction effort ('09) – based on MRV

Draft bill of low carbon, Green growth (Article § 46, '09.2~)

- ▶ Legal basis for introduction Cap & Trade and Early Action recognition

Five-year plan of Green Growth ('09.7, Committee of G&G)

- ▶ Establishing basic plan of ROK-Emissions Trading Scheme
 - considering results of pilot program and reviewing specific design issues
- ▶ Introduction of pilot ETS program ('11~)
 - Coordinator: 'Presidential committee of green growth'
 - * supporter: Ministry of Environment, Ministry of Knowledge Economy (specific harmonization issues-not decided yet)

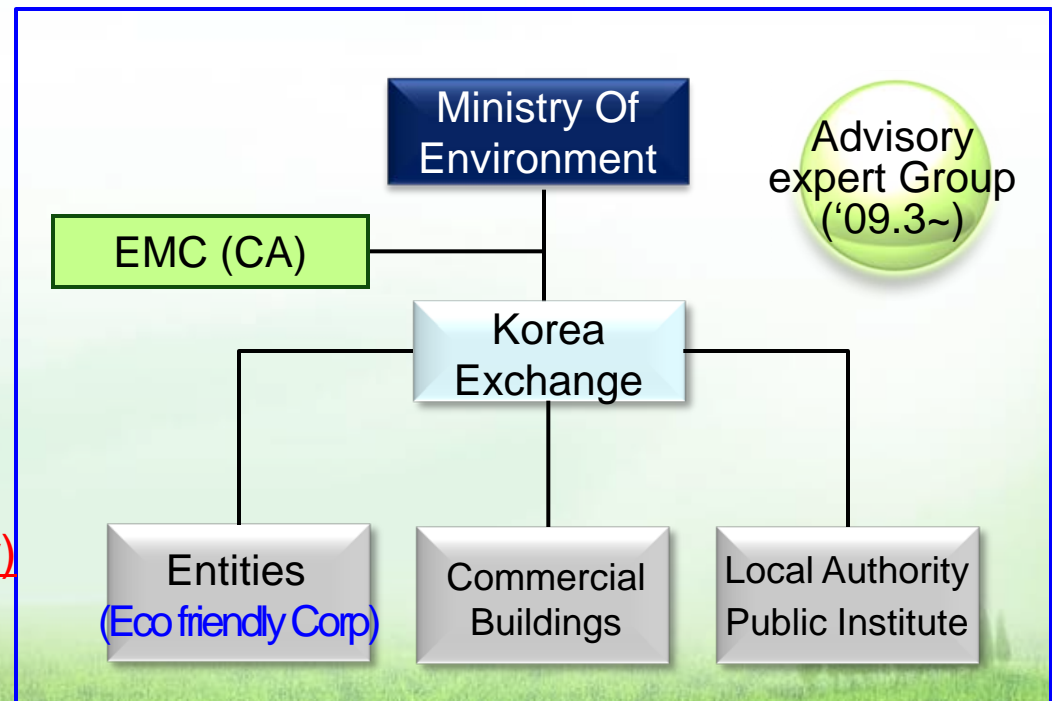
Objective & Operational Structure by MOE

● Scheme Objective

1. Learning experience of Cap & Trade
2. Approving 'Early Action' by register voluntary reductions

● Operational structure

- ▶ MOE : Coordinator
- ▶ EMC : Competent Authority
- ▶ Korea Exchange : operate pilot carbon exchange
- ▶ Large Local authority : coordinating public institute in each local area (assessment & incentive)
- ▷ Capped participants (voluntary) : Eco friendly corp. buildings public institutes



Key features of pilot program by MOE

1. First Cap & Trade system in Korea

- ▶ Emissions Trading Scheme of Government-level is under review
 - target setting methodology: absolute or intensity target
 - participants setting – stepwise or whole large emitters
- ▶ Results and errors by pilot program (MOE) would be contribute to establish nationwide ETS plan

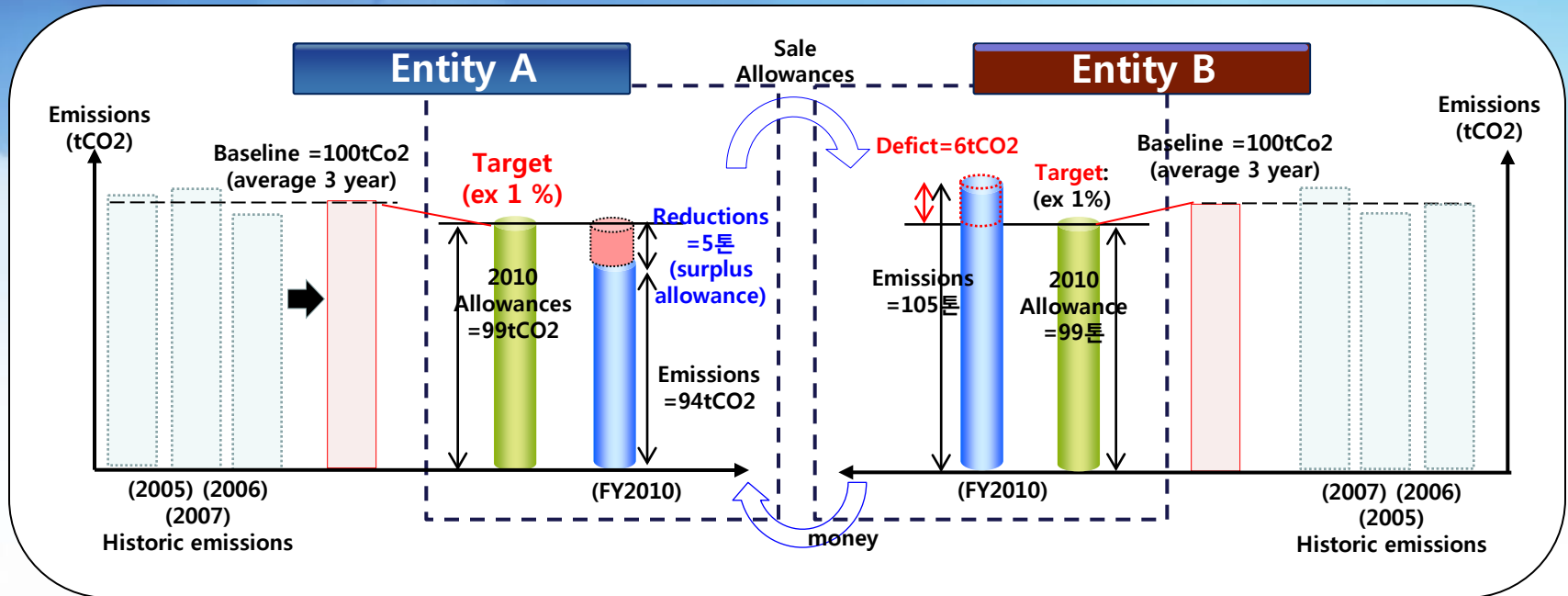
2. Cost-effectiveness, although voluntary basis

- ▶ participant`s Voluntary GHG Reductions in pilot program will be recognized at the subsequent regulatory scheme
[but, legislation of the ‘Act of low carbon, green growth (article § 43)’ is needed]

3. Capacity building of local authorities

- ▶ Cap & Trade program for public(or private) institutes in each area would be coordinated by Large local authorities
 - Cap setting, review emissions, assessment & subsidy to participants
- ▶ Local authorities will carry out important role as an Offset Aggregator (later)

Concept of Cap & Trade



Merits for Participants

- ▶ Recognition of Early Action (Voluntary GHG reductions at pilot program)
- ▶ Opportunity to establish the participant's GHG inventory & Verification
- ▶ Increases eco-friendly brand image
- ▶ Acquisition experience of Carbon Trading
- ▶ Subsidy for Large Local authorities (FY 2010 = 1.35 billion won)

Targeted GHG gases

- **Mandatory basis(with cap) : CO2 (Scope 1 & 2)**

- (ref) local authorities (Public institute) : CO2 only

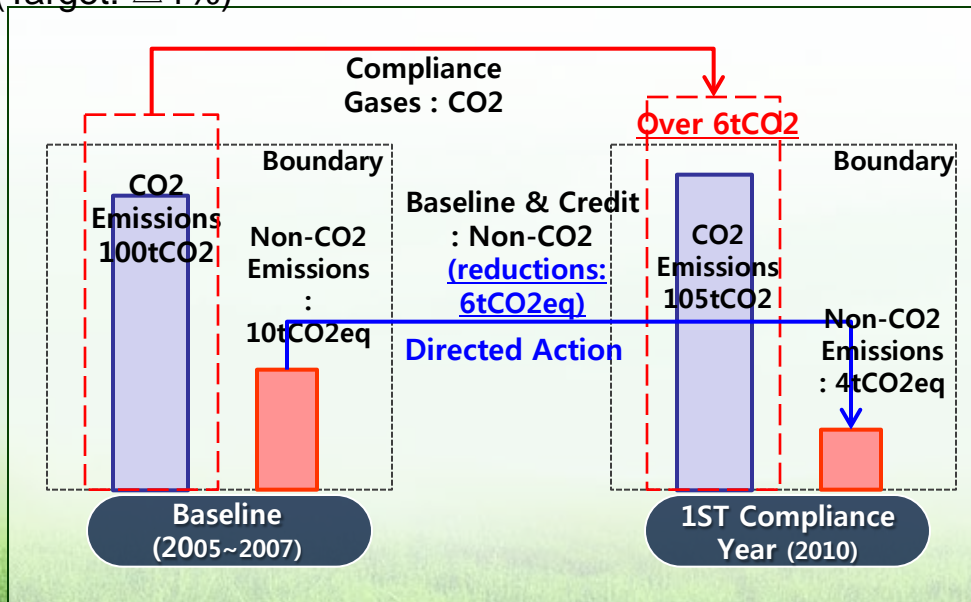
- * Apply to default EF(Tier1), because of not existing confirmed country-specific EF(Tier2)

- **Voluntary basis : CH4, N2O (Scope 1 & 2)**

- Estimation and verification of Non-CO2 would be initially difficult, So additional effort on MRV is needed at pilot period

- **Eco Friendly Corporation**(Main participants) generally established the Database on environment information related with Non-CO2 emissions

(Target: $\Delta 1\%$)



<Eco-friendly Corporations>

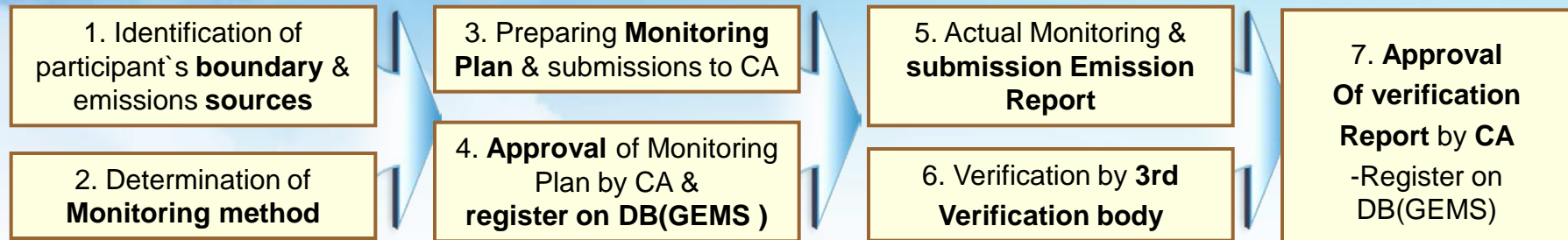
- ▶ MOE designated the eco-friendly corp. based on environment performances of entities ('96~, 186 entities)
- ▶ MOE Contracted voluntary agreement with Eco-friendly Corp. which integrated reducing air Pollutants and GHGs ('06.11, 171entities)

<Calculation of Compliance>

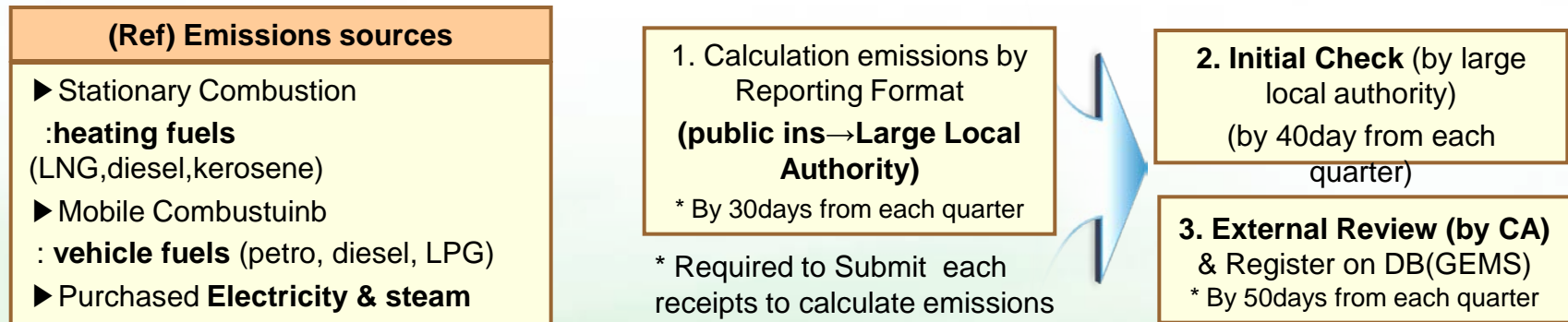
- ▶ **Initial allowances** = 99tCO2-eq
 $[100t(\text{baseline}) \times (1 - 1/100(\text{target})) = 99t]$
- ▶ **Compliance** = 99tCO2-eq (O)
 $[105t(\text{emissions}) - 6t(\text{Credit from Non-CO2})]$

2-fold MRV regime in pilot program => two trading markets

MRV of entities & commercial buildings (Common Method)



MRV procedure of public institutes (Simplified Method)



Future directions

- preparing for CEMS as a GHG MRV tool to increase accuracy (~'12)
- Simplified MRV method for public institute would be transformed to common MRV procedure, and then **integrated Trading Market** would be introduced

Cap & Trade for public institutes (MRV, Trading)

Example of Busan-City ('08~)

- ▶ Busan-city introduced cap & Trade program for public institutes for the first time in Korea

* As an theme program according to MOU with MOE & Busan ('08.1)

- ▶ baseline : average emissions between '05~'06

▶ 1st Round('08)

- Participants : 26 institutes, (baseline: 32.39ktCO₂)
- Target & Results : **△2%(△0.6ktCO₂)** / △4.3% (△1.37ktCO₂)
- Incentive money : 0.1billion won (subsidy by MOE, 50%)
- Trading : by paper (e-mail, fax, etc)

▶ 2nd Round('09)

- Participants : 42 institutes, (baseline: 125.71ktCO₂)
- Target & Results : **△2%(△2.46ktCO₂)** / (not yet published)
- Incentive money : 0.2billion won (Subsidy by MOE, 50%)
- Trading : by cyber matching system ('09.5)

(ref) Emissions Reporting of Public institutes

● Emissions Sources for public institutes

- Scope 1: Heating fuel, public Vehicle fuel (LNG, LPG, gasoline, diesel, petro)
- Scope 2: Purchased Electricity and Heat

* Each receipt must be submitted to large local authority (& CA) to review emissions

● Reporting Format (excel sheet, by CA)

- CO2 emissions = Activity × Oxidation ration(%) × Emissions Factor

(ex) Stationary Combustion

$$\text{CO}_2 \text{ emissions (tCO}_2) = \text{Activity (petroleum: } \ell/\text{yr)} \times \text{Oxidation ratio (\%)} \times \text{Low heating Value (kcal/}\ell) \times (\text{GJ/kcal}) \times \text{CO}_2 \text{ EF (kgCO}_2/\text{GJ)} \times 0.001$$

$$126.90 \text{ tCO}_2 = 50.523 \ell/\text{yr} \times 100\% \times 8,350 \text{ kcal/}\ell \times 4.186 \times 10^{-6} \text{ GJ/kcal} \times 71.86 \text{ kgCO}_2/\text{GJ} \times 0.001$$

FY: ('07~'08년) Quarter: 0/4 Ⓣ		Step 1				Step 2		Step 3		Step 4		Step 5	
		Fuel Usage Ⓣ	Oxidation Ratio Ⓣ	LHV Ⓣ	Unit (Kcal→GJ)	CO2 EF Ⓣ	CO2 Emissions	N2O EF Ⓣ	N2O Emissions	CH4 EF Ⓣ	CH4 Emissions	total CO2 Emissions	
facilities	Fuel type	(m ³ kg ℓ/yr)	(%)	(kcal/m ³ kg ℓ)	(kcal → GJ)	kgCO ₂ /GJ	tCO ₂ /yr	kgN ₂ O/GJ	tN ₂ O/yr	kgCH ₄ /GJ	tCH ₄ /yr	(tCO ₂ -eq/yr)	
1	Boiler	Petro(ℓ)	50,523	100	8,350	4.186×10 ⁻⁶	71.86	125.59	0.00	0.00	0.00	0.00	126.90
2	Heater	LNG(m)	31,422	100	9,550	4.186×10 ⁻⁶	56.10	70.47	0.00	0.00	0.0012	1.51×10 ⁻³	70.50
Total													197.40

▶ Estimation method



Input data slot (by charge man)



automatically calculated slot

Ⓣ input combustion facility name & fuel type

Ⓣ Input activity data(usage) by fuel types

Ⓣ~Ⓣ Input EF(CO₂, N₂O, CH₄), LHV for each fuel types

▶ Each institutes must submit receipts for each renergy usages (by quarter)

▶ refer 'operating manual for public institute Cap & Trade program' 83p (information of EF data for each fuel type)

Cyber trading system (public institutes) by Busan('09.5)

Main Image



[중구청]

배출권할당
ALLOTTED

배출권거래
TRADE


정산관리
SETTLE

이행평가
EVALUATE

게시판관리
BOARD

시스템관리
SYSTEM

[Home](#) [환경설정](#) [Logout](#)



거래분기	2009년 1분기	
거래일자	2009-04-24 10:53 현재	
거래호가	22,000 원	
매도(톤)	단가(톤당)	매수(톤)
	23,000	5
	22,600	8
15	22,500	
10	22,100	
5	21,900	

Today`s bid/offer

총 할당량	5,713.88 톤
실 배출량	5,713.72 톤
잉여(부족)량	0.16 톤

Quarter (1/4)

Transaction date

Cyber price

Total Allowance

Total emissions

Surplus / deficit

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- 공지사항 테스트... [2009-04-20]

📄 묻고 답하기... [▶ 더보기](#)

▶ 묻고 답하기 테스트... [2009-04-20] [공개]

Q/A



부산광역시
BUSAN METROPOLITAN CITY

우) 611-735 부산광역시 연제구 중앙로 2001 (연산동 1000) 대표전화: (051)120.
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Cyber trading system (public institutes) by Busan('09.5)

Administrative Mode

Dynamic BUSAN [ADMIN]

배출권할당 ALLOTTED | 배출권거래 TRADE | 정산관리 SETTLE | 이행평가 EVALUATE | 게시판관리 BOARD | 시스템관리 SYSTEM

Home 환경설정 Logout

Annual target

거래년도 2009 년 | 삭감목표 2 %

배출권할당 ALLOTTED

- 연간 삭감/배출권 할당
- 분기별 배출실적 관리
- 분기별 배출권 할당 현황
- 연간 배출 실적 현황
- 거래소 개설 관리
- 거래호가 공시 관리

2009-04-24 10:56 현재

매도	단가	매수
	23,000	5
	22,600	8
15	22,500	
10	22,100	
5	21,900	

Current Bid/offer

총 할당량	5,713.88 톤
실 배출량	5,713.72 톤
잉여(부족)량	0.16 톤

기관명	기준배출량 (tCO2e/yr)	배출권 할당량 (톤/년)	삭감 목표량 (톤/년)	잔량	
				1/4	2
부산광역시청	6,639.11	6,506.33	121.76	33.19	
중구청	691.49	677.66	14.75	5.00	
서구청	553.61	542.54	11.07	3.55	
동구청	966.21	946.89	19.32	4.50	
영도구청	999.47	979.48	19.99	5.16	
부산진구청	1,750.51	1,715.50	35.01	10.35	
동래구청	679.46	665.87	13.59	4.15	
남구청	1,606.91	1,574.77	32.14	8.40	
북구청	875.15	857.65	17.50	4.96	
해운대구청	1,089.59	1,067.80	21.80	4.90	
사하구청	984.54	964.85	19.69	4.00	
금정구청	977.56	958.01	19.55	5.68	
강서구청	1,032.75	1,012.10	20.66	5.16	
연제구청	1,004.50	984.41	20.09	6.28	

Dynamic BUSAN [ADMIN]

배출권할당 ALLOTTED

- 연간 삭감/배출권 할당
- 분기별 배출실적 관리
- 분기별 배출권 할당 현황
- 연간 배출 실적 현황
- 거래소 개설 관리
- 거래호가 공시 관리

2009-04-25 13:04 현재

매도	단가	매수

Baseline Allowances

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총 할당량	5,713.88 톤
실 배출량	5,713.72 톤
잉여(부족)량	0.16 톤

Dynamic BUSAN [ADMIN]

배출권할당 ALLOTTED | 배출권거래 TRADE | 정산관리 SETTLE | 이행평가 EVALUATE | 게시판관리 BOARD | 시스템관리 SYSTEM

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Quarter allowance Deficit /surplus

Baseline quarter target emissions banking Tradable Allowances

거래년도 2009 년

기관명	기준배출량 (톤/년)	삭감목표량 (톤/분기)	배출권 할당량	배출 실적량	잉여(부족)량	전분기 미일량	추가 거래가능량	거래가능량
부산광역시청	6,639.11	33.19	1,626.58	1,615.74	10.84	0.00	325.32	336.16
중구청	691.49	5.00	197.72	193.77	3.95	0.00	39.54	43.49
서구청	553.61	3.55	173.62	182.21	-8.59	0.00	0.00	-8.59
동구청	966.21	4.50	220.61	285.92	-65.31	0.00	0.00	-65.31
영도구청	999.47	5.16	244.71	290.28	-45.57	0.00	0.00	-45.57
부산진구청	1,750.51	10.35	507.32	486.63	20.69	0.00	101.46	122.15
동래구청	679.46	4.15	199.43	199.43	0.00	0.00	39.89	39.89
남구청	1,606.91	8.40	409.40	318.38	91.02	0.00	81.88	172.90
북구청	875.15	4.96	243.30	250.82	-7.52	0.00	0.00	-7.52
해운대구청	1,089.59	4.90	267.50	336.60	-69.10	0.00	0.00	-69.10
사하구청	984.54	4.00	300.64	294.13	6.51	0.00	60.13	66.64
금정구청	977.56	5.68	278.27	278.81	-0.54	0.00	0.00	-0.54
강서구청	1,032.75	5.16	325.33	325.65	-0.32	0.00	0.00	-0.32
연제구청	1,004.50	6.28	307.64	290.49	17.15	0.00	0.00	17.15

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Cyber trading system (public institutes) by Busan('09.5)

Participants Mode

The screenshot shows the 'Dynamic BUSAN' trading system interface. Key components are highlighted with colored boxes and labeled as follows:

- Deposit money:** A yellow box highlights the 'Deposit money' label at the top right of the main form.
- Surplus (deficit):** A yellow box highlights the 'Surplus (deficit)' label on the right side of the main form.
- Current Allowance:** A yellow box highlights the 'Current Allowance' label on the right side of the main form.
- Receivable money:** A blue box highlights the 'Receivable money' label on the left side of the main form.
- Allowance:** A yellow box highlights the 'Allowance' label on the left side of the main form.
- Bid amount:** A yellow box highlights the 'Bid amount' label on the left side of the main form.
- date:** A yellow box highlights the 'date' label on the left side of the main form.
- Bid price:** A yellow box highlights the 'Bid price' label on the left side of the main form.
- Bid amount:** A yellow box highlights the 'Bid amount' label on the left side of the main form.
- Bid times:** A yellow box highlights the 'Bid times' label on the left side of the main form.
- Bid(offer) amount:** A yellow box highlights the 'Bid(offer) amount' label on the right side of the main form.
- Bid(offer) price:** A yellow box highlights the 'Bid(offer) price' label on the right side of the main form.
- bid:** A yellow box highlights the 'bid' label at the bottom of the main form.
- offer:** A yellow box highlights the 'offer' label at the bottom of the main form.

The main form contains the following data:

거래년도	2009	년		분기	2/4분기	기관명	중구청
총 할당량	134.82	톤	실 배출량	0	톤	잉여(부족)량	134.82
이월량	0	톤	추가 거래가능량	0	톤	거래 가능량	134.82
매도량	37	톤	매수량	10	톤	현 보유량	107.82
미수금	300,280	원	예치금	1,110,980	원	거래체결 건수	9

The bottom table shows bid and offer details:

주문수량(톤)	희망가격(원)
10	28,000
5	31,000

- Amount of total allowances(+/-) at the end of the year \propto **Incentive**

$$- \text{Final Allowances} = \text{Actual Emissions} + \text{deposit money/final price} - \text{deposit money/final price}$$

Cap & Trade for Entities (Registry, Trading)



- Ministry of Environment & Korea Exchange contracted MOU to establish Caron Exchange at Oct, 2008

Registry of pilot program (EMC)

Unit type

- ▶ KAU(Korea Allowance Unit) : for entities & commercial buildings
- ▶ LAU(Local Allowance Unit) : for local authorities (public institutes)

* Two allowances are not transferrable because of discrepancy of MRV regime unless 3rd verification process for public institute based on same MRG & Verification Guidelines, etc (but administrative cost would be increased)

Unit Code

KOR-01-000,000,000,000,001-10-10-0,000,001

① ② ③ ④ ⑤ ⑥

- ① Country name
- ② Unit type (1=KAU, 2=LAU, 3=VER-offset)
- ③ Serial number (1~999,999,999,999,999)
- ④ Issuing year (10~12)
- ⑤ Retirement year (10~12)
* if banked unit, '10' changed to '11'
- ⑥ Serial number of GHG project (1~9,999,999)

Legal basis of unit trading

- The Act of the integrated Capital Market('09.2~)

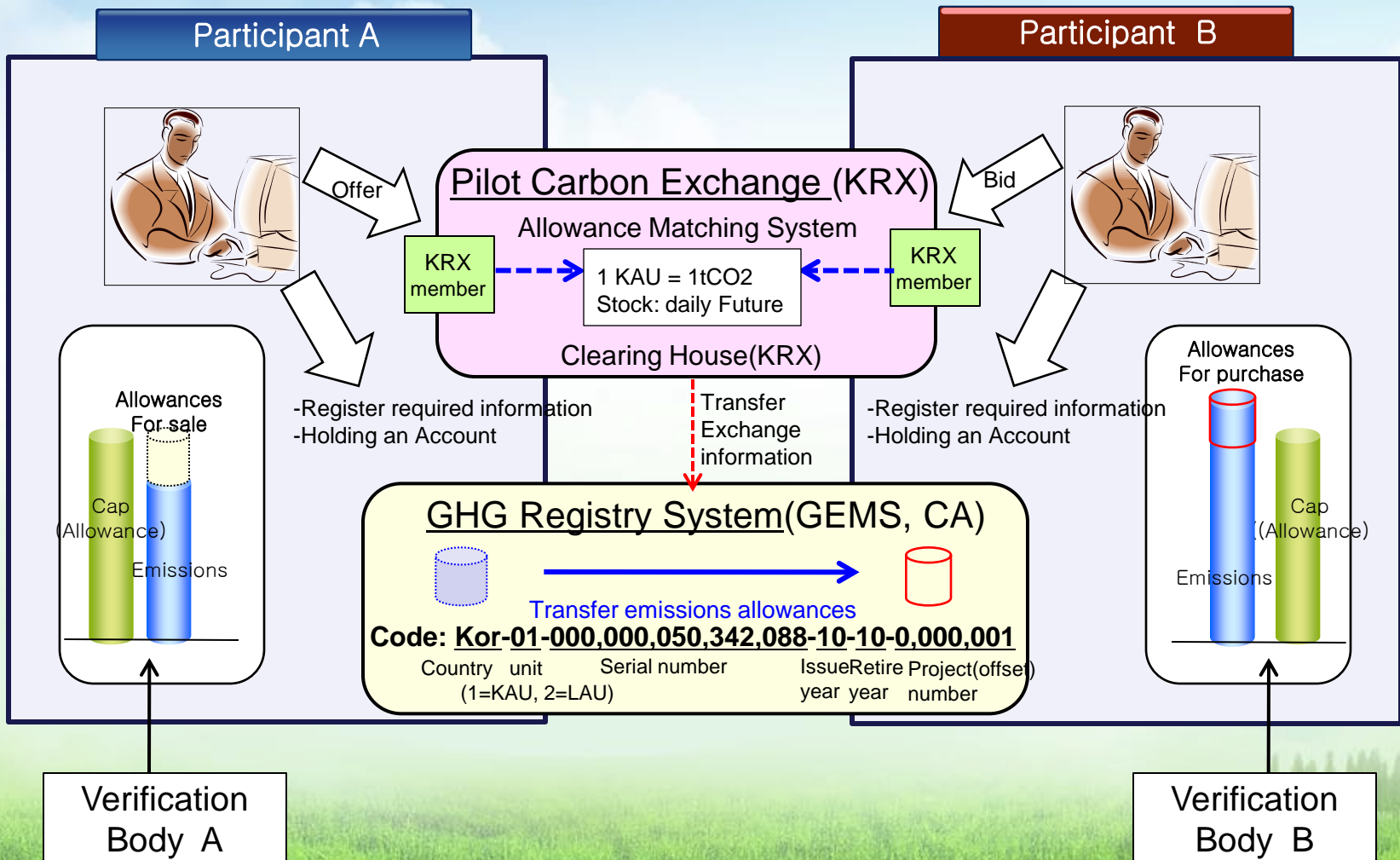
* Article § 5 (derivatives) ① the derivatives means contractual right includes,
1. The contracts which deliver money at a specific point of a time estimated by fundamental property or an index, price, units based on fundamental property

- ▶ Only Allowance Futures can be tradable.

Pilot ETS operation infrastructure

● GHG Registry & Trading system (draft by MOE)

- ▶ Successful System linkage between Registry and KRX will need more times



GHG registry operating image

GEMS 온실가스 관리 시스템
GREENHOUSE GAS EMISSION

시스템 소개 | 배출량관리 | 마이페이지 | 참여마당

2. 배출량관리

기준년도 배출량 산정 >

기준년도 배출량 검증관리 >

기준년도 배출량 인증관리 >

기준년도 배출량 조회 >

Allowance records (history)

○ 배출권 이월/회수이력 조회

Allowances incoming emissions retirement

baseline Commitment Reserve outgoing banking status

번호	년도	기준 년도 배출량	최초 할당된 배출권 (A)	최소보유 배출권	배출권 매입량 (B)	배출권 매도량 (C)	이행년도 배출량 (D)	전년도 이월량 (E)	배출권 회수량 (= A)	배출권 과부족분 (A+B-C-D+E)
1	2012	1,500	1,458	1,040	100	200	-	170	-	-
2	2012	1,500	1,458	1,040	100	200	-	170	-	+ 170
3	2012	1,500	1,458	1,040	100	200	-	170	-	+ 80

출력

기준년도 배출량 산정 >

기준년도 배출량 검증관리 >

기준년도 배출량 인증관리 >

기준년도 배출량 조회 >

○ 배출권 이전이력(결과) 조회

Transfer results

referring

이행년도 2010년 거래형태 전체

조회 출력

Transfer date Transfer participants incoming outgoing Transferable allowances

번호	이전일자	거래 대상자	매입량	매도량	거래가능 배출권
1	2010/03/01 15:18	코오롱 베니트	100	-	170
Total			100	80	170

Incentive of pilot program

● Early Action Credit as an incentive (industry)

- **Surplus allowances** at end of pilot program as an **Early Action Credit**
 - ▶ Early Action Credit of entities would be used as Target achievement performance when if regulatory regime will be introduced in Korea

Draft bill of Low carbon Green growth, **Article 43 (promotion of Early Action)**

- ① The government shall approve voluntary GHG Reductions of large emitters as an target achievement performance or facilitate trading of these **credits** before imposing on regulatory GHG target

* **Ensuring legal basis of Early action is important issue in pilot-ETS by MOE**

● Budgets for the local authority (FY 2010 = 1.35 billion

won)
According to assessment by Large local authority, each public institution would gain incentives as compliance (**invest to increase building E efficiency**)

- Ministry of Environment also give following year`s budget to local authority as a **reduction target level of Large local authorities**

Future plan

- Tour presentation meeting ('09.8.26~9.29, 13 large local authority)



(GyeongGi-do, 8.26)



(GyeongNam-do, 9.3)

(JeonBuk-do, 9.4)



- Participants recruiting (~'09.10.31, public institutes & entities)
- Verification of baseline emissions ('09.10~12)
- Launch pilot ETS program ('10~'12)

감사합니다

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