Ministry of Environment
Korea Environment Institute

Emissions Trading Scheme

No. 39

Korea Environmental Policy Bulletin

Vol. XIII Issue 1, 2015

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Summary

The total volume of greenhouse gas emissions in Korea as of 2013 was 694.5 million CO_2 eq, which was the 8th largest in the world. The carbon dioxide emissions per capita were 11.9t CO_2, which was the 17th highest in the world. As a responsible member of the global community, Korea made clear its commitment to the reduction of greenhouse gas, and presented a pledge to reduce emissions by 37 percent from the business-as-usual (BAU) level by 2030.

As a part of its national initiative to reduce greenhouse gas emissions, Korea introduced an emissions trading scheme starting from January 2015. The Emissions Trading Scheme (ETS) is applied to business entities with average greenhouse gas emissions of 125,000 tCO_2 or more, or business facilities emitting more than 25,000 tCO_2 for the past three years. As of the end of 2015, there were a total of 525 companies that are participating in the ETS. A sectoral cap on the emissions was allocated based on the emission volume and the reduction potential of each sector as well as considering the national reduction target. Emissions permits to individual entities for the first phase (2015~2017) were mainly allocated based on grandfathering, and benchmarking method employed in part. In order to ensure flexibility in the submission of emission permits, banking and/or borrowing approaches are allowed when there is a surplus or a shortage of emission allowances. Early action and offset credits are partly approved as a complementary measure to promote flexibility as well.

As of the end of 2015, Korean Allowance Unit (KAU) transaction volume and amount were 321,380 tons and 3.87 billion KRW respectively. Korean Credit Unit (KCU) transaction volume and amount were respectively 920,717 tons and 10.03 billion KRW.

It is expected that the ETS will reduce the cost of reducing greenhouse gas emissions effectively in terms of having a relatively low impact on GDP, price fluctuation and energy prices. Also, the financial gains from operating ETS may be invested back into the green industry, and will likely contribute to low-carbon green growth.

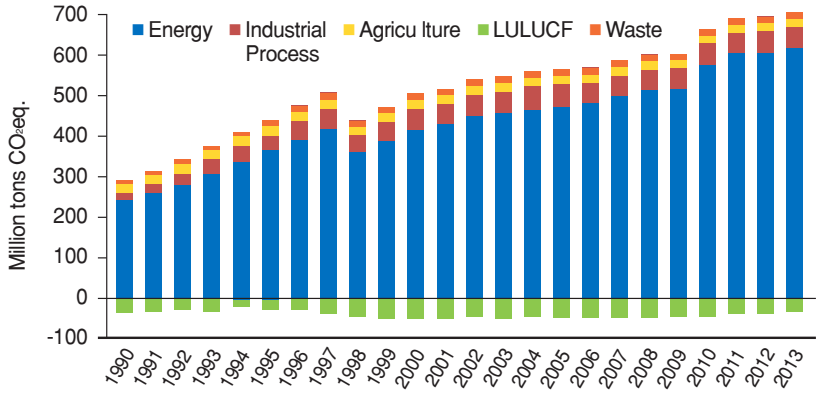
Ⅰ. Greenhouse Gas Emission Status and Reduction Target of Korea

1. Greenhouse Gas Emission[1]

Korea's greenhouse gas (GHG) emissions have continued to increase over the decades. As of 2013, the total GHG emissions were 694.5 million ton CO_2 eq, representing a 137.6 percent increase from 1990. Compared to Annex I countries, Korea ranked 6th following the United States, Russia, Japan, Germany and Canada. Korea would be ranked as the 8th highest if non-Annex I countries such as China and India were included.

After an inspection of nuclear power plants in 2013, the share of nuclear power was reduced, and the proportion of thermal power increased. As a result, the increase rate of GHG emissions turned out to be higher than the previous year, 2012, by 1 percent. The increase rate of GHG emissions of 2013 compared to the preceding year was lower than the increase rate of GDP which was 2.8 percent. Therefore, it turned out that the trend for the decrease of 2012 in increase rate of emissions had continued. The reasons why the increase rate of GDP was higher than the emission increase rate seemed to include the implementation of GHG and the energy target management scheme, the increase in the use of LNG, high oil prices, etc.

Of the total emission volume, the energy sector accounted for 87.3 percent occupying the largest share (see Figure 1). The majority share in the energy sector came from the energy industry, which accounted for 45.3 percent of emissions, followed by manufacturing and construction (30 percent), transportation (14.6 percent) and others (9.3 percent). The reason why the energy sector accounts for the highest share of total emissions is attributable to the structure of Korean economy, which is highly energy-intensive and manufacturing-oriented.



Source: GIR (2015)

<Figure 1> Trends in GHG emissions by sector (1990 – 2013)

1 GIR (2015).

2. Greenhouse Gas Emission Reduction Target[2]

In order to contribute to reaching an agreement on the new climate regime at the 2015 Paris climate conference, Korea set its 2030 GHG reduction target and communicated this goal as the Intended Nationally Determined Contribution (INDC) to the UNFCCC in June, 2015. The target was to reduce GHG emissions by 37 percent from the business-as-usual level (BAU, 850.6MtCO_2 eq). Korea planned to achieve 25.7 percent among 37 percent reduction target by implementing domestic mitigation measures, and the rest (11.3 percent point) of the reduction target to be achieved through international market mechanism.

The government aimed to minimize the primary burden on industries and stated in its policy that the reduction rate in the industrial sectors should not exceed 12 percent from BAU. It also hopes to create new jobs by promoting new energy industries while reducing emissions. Key policies and measures of meeting the reduction target include promoting the implementation and spread of new renewable energy sources, developing and commercializing CCS technology, increasing the share of LNG power plants, enhancing the energy efficiency of home appliances and office appliances, and strengthening GHG and fuel efficiency standards for vehicles (See Table 1).

Sector	Policies and Measures
Energy and Industry	• Expand the distribution of new renewable energy sources, introduce and commercialize CCS, increase the proportion of LNG power generation • Introduce FEMS (Factory Energy Management System) • Introduce eco-friendly fuel and new technology (ex: Clean-room process energy optimization) • Introduce non-CO_2 disintegration units including SF6
Buildings	• Increase the use of LEDs • Enhance the efficiency of home and office appliances • Strengthen the building efficient design • Introduce Building Energy Management System (BEMS) • Improve building insulation
Transport	• Strengthen GHG and fuel efficiency standards - Fuel efficiency: 17.0㎞/ℓ or higher in 2015-> 24.3㎞/ℓ or higher in 2020 - GHG emissions: 140g/㎞ or less in 2015 -> 97g/㎞ or less in 2020. • Switch to low emission vehicles - Increase the penetration of hybrid, electric and fuel cell vehicles, promote green public transportation, increase the share of railroads, and strengthen eco-driving, etc.

Source: Interagency (2015)

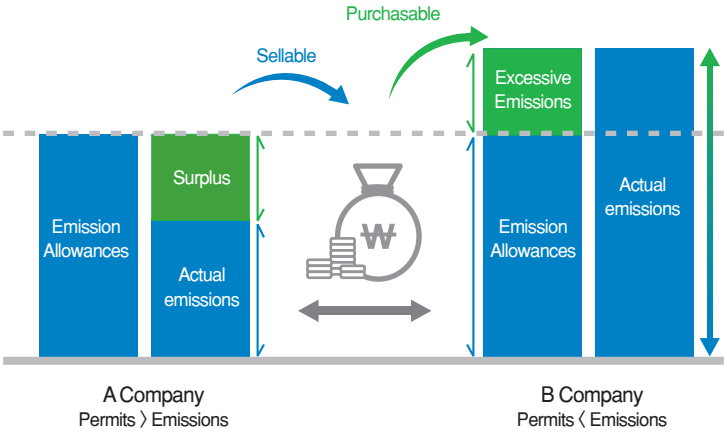
<Table 1> Policies and Measures for GHG Reduction

[2] Interagency (2015).

Ⅱ. Introduction and Operation of the Korean Emissions Trading Scheme

1. Overview of the Emissions Trading Scheme

The Emissions Trading Scheme is one of the principal mitigation policies in Korea to achieve the national GHG reduction target, with the GHG and Energy Target Management Scheme (TMS).
The Korean ETS functions on the basis of the principle of cap and trade. This means that the government imposes a limit on total emissions, called as a cap, and allocates emissions allowances to participating companies within the budget of the cap. Companies need to hold a permit for every ton of GHG emissions. This feature is also found in the TMS. Yet the ETS provides flexibility in how companies decide to meet their obligations so as to induce cost effective reduction methods. Under the ETS, companies may buy or trade permits for a shortage or a surplus of emission allowances, employ bank permits to be used at a later stage, and use offset credits obtained from the GHG reduction projects which are not covered by the ETS.

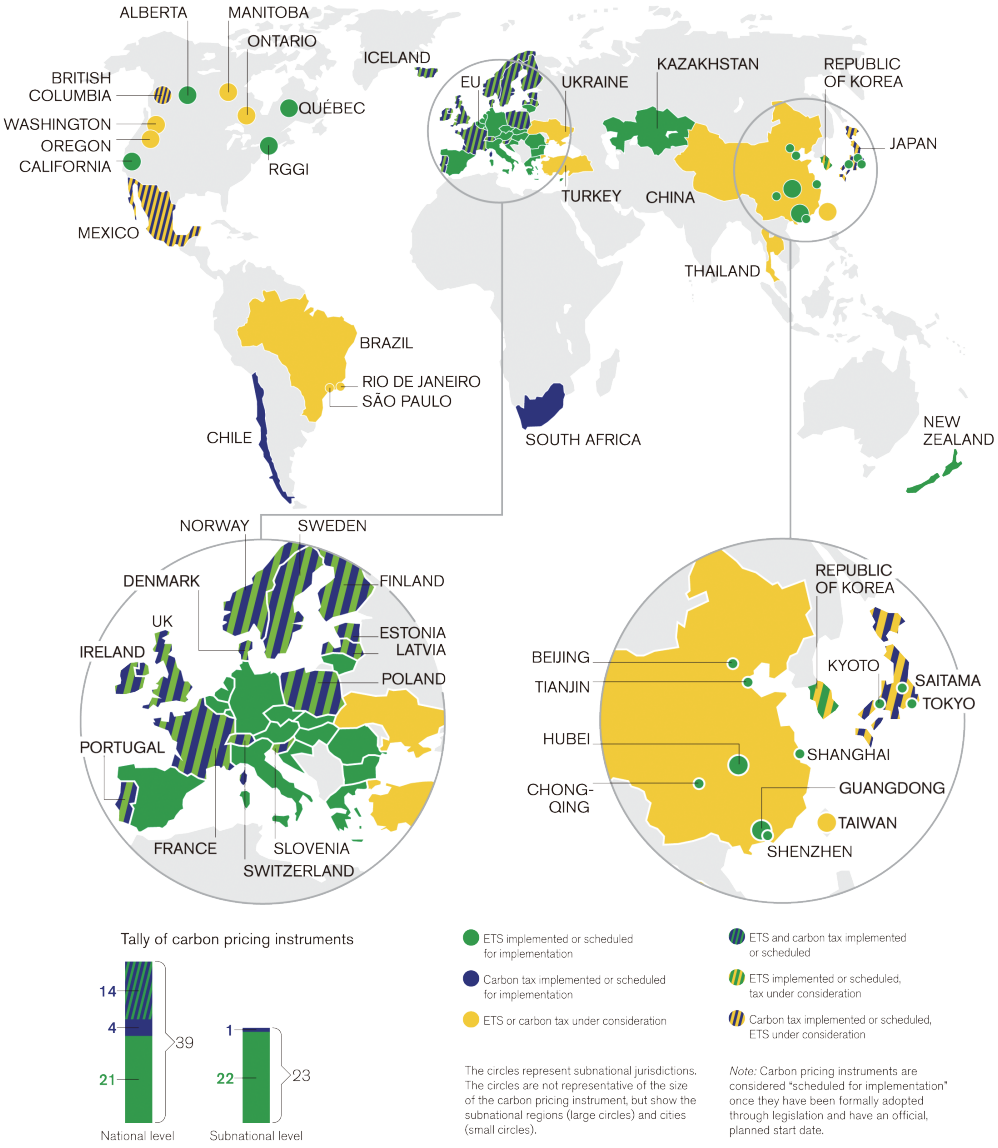


Source: Ministry of Strategy and Finance (2014)

<Figure 2> Overview of Emissions Trading Scheme

Companies with a greater potential for reducing GHG emissions (lower marginal reduction cost) can reduce emissions more than they are required and sell the surplus in the market. Whereas, companies with a lower reduction potential (higher marginal emission reduction cost) can purchase extra permits instead of reducing emissions directly. Depending on the reduction potentials of each company, decisions regarding whether to purchase permits or reduce emissions can be made with flexibility. This flexibility can deliver cost effective reductions in emissions.

There are now 40 countries and over 20 cities, states, and regions of the world operating or planning to implement ETS and carbon pricing instruments according to a World Bank report. This is a 90 percent increase from what it was in early 2012 (see Figure 3). This means 7 billion tons of CO_2 eq or 12 percent of global emissions is under carbon pricing instruments, and 8 percent of which is managed by the ETS and 4 percent is under carbon taxation. The carbon prices vary significantly, from less than 1 USD per tCO_2 eq (in the case of Mexico) to 130 USD (in the case of Sweden). The total value of carbon pricing instruments was estimated at just under 50 billion USD in 2015[3] .



Source: World Bank (2015)

<Figure 3> Countries Operating or Formulating Plans of Carbon Pricing Instruments (ETS and Tax)

[3] World Bank (2015).

2. Emissions Trading Scheme Implementation in Korea[4]

2.1 History of Emissions Trading Scheme in Korea

Pursuant to Article 46 of the Framework Act on Low Carbon, Green Growth stipulating that the government may utilize market functions in accomplishing the national GHG reduction target[5] and operate a cap and trade scheme, Korea enacted the Act on the Allocation and Trading of Greenhouse Gas Emission Permits in 2012 and launched the ETS in January 1, 2015 (See Table 2).

Korea Exchange (KRX), which was designated as the trading institution for the permit enlisted KAU and KCU items in the permit markets, concerning which transactions were initiated in January and April 2015, respectively.

Schedule	Performance
November 2009	Setting the National GHG Emissions Reduction Target
January 2010	Enactment of the Framework Acton Low Carbon and Green Growth
May 2012	Enactment of the Act on the Allocation and Trading of Greenhouse Gas Emission Permits
January 2014	Establishment of the Master Plan for ETS
June 2014	Establishment of the allocation plan
September 2014	Determination of the cap, coverage and sectoral allowances
January 2015	Operation of ETS
April 2015	Initiation of KCU Transaction
May 2016	Revision of the Enforcement Decree of the Act on the Allocation and Trading of Greenhouse Gas Emission Permits

<Table 2> History of ETS Implementation

[4] Ministry of Strategy and Finance (2014), Ministry of Environment (2014), Interagency (2016).

[5] In accordance with the climate change response system restructuring, the provisions in Article 25 of the Enforcement Decree of the Framework Act on Low Carbon and Green Growth was changed to “a reduction in the total of the national greenhouse gas emissionsin the year 2030 by thirty-seven hundredthsfrom the business-as-usual projection for the said year".

In February 2016, the government modified the climate change response system in order to implement the Paris Agreement more effectively. As a part of this effort, the existing operating system of the ETS, which was previously supervised by the Ministry of Strategy and Finance and operated by the Ministry of Environment is now reorganized to be operated by relevant ministries (Ministry of Land, Infrastructure and Transport, Ministry of Agriculture, Food and Rural Affairs, Ministry of Trade, Industry and Energy, and Ministry of Environment), and the oversight by the Ministry of Strategy and Finance is reinforced.

In accordance with the restructuring of the operating system, the responsibility of the planning of the allowances, overall management of the Emission Trading Registry, operation of the Allowance Committee and the Emission Certification Committee, and operation of the emissions trading market are now reassigned from the Ministry of Environment to the Ministry of Strategy and Finance. Also, in terms of the operation of the allowances, each relevant ministry is now to be held responsible for each sector, in order to enhance the expertise and autonomy. That is, the Ministry of Strategy and Finance is now to determine the total allowances allocated and summarize, coordinate the allowance in each sector. And, the allowances allocated to industries and companies are to be determined autonomously by the responsible ministries within the total limit of allocation.

In accordance with such restructuring of the system, there has been a revision of the Enforcement Decree of the Act on the Allocation and Trading of Greenhouse Gas Emission Permits.

2.2 Operation Plans

In order for operation to be effective, the Korean government decided to operate the ETS based on a five-year trading period except for two initial periods operating for three years, which is similar to the EU ETS consisting of the first two three-year pilot periods and general five-year commitment periods thereafter. It is intended by the government that, by operating the system on multi-year terms, national caps, emission permits for companies, and actual emission and reduction performances are to be monitored and improved on a regular basis. It is also to provide flexibility and enhance predictability for the participating companies covered by the ETS, and invite them to invest in low emission technologies and reduction equipments/facilities. The initial periods are operated based on a three-year term period in order to detect and resolve unexpected problems concerning the over or under allocation of permits in the early stages and promptly respond to trends in the international carbon market.

The first period from 2015 to 2017 mainly focuses on the successful settlement of Korean ETS (KETS). In this regard, 100 percent of the total allowances was allocated free of charge. The government plans to build up and increase experience of the scheme through the flexible operation of the system and establish infrastructure for precise MRV during the first period.

Starting from the second period, more emphasis will be placed on effective GHG reduction.

The ratio of free allocation is set to be 97 percent in the second period by starting to apply auctions and 90 percent in the subsequent period to encourage companies to embrace technology developments and make investments in equipment (See Table 3).

Item	1st Period (2015-2017)	2nd Period (2018 -2020)	3rd Period (2021-2025)
Main Goal	• Accumulation of experience and settlement of the KETS	• Significant GHGs emissions reduction	• Proactive GHG emissions reduction
System Operation	• Enhancement in flexibility of the system, such as recognition of the offset ranges. • Establishment of the infrastructure to execute MRV with precision	• Expansion of the scope of the ETS and increase in the target reduction level • Advancement of measuring, reporting, verification and other standards	• Inducement of voluntary reduction in preparation for the new climate regime • Lowering barriers for 3rd party participation
Allocation	• 100% free allocation • Utilization of experiences from the TMS	• Introduction of auctioning • Advancement of allocation methods, such as benchmark-based allocation	• Decrease in the proportion of free allocation • Settlement of advanced allocation methods

Source: Ministry of Strategy and Finance (2014)

<Table 3> Operation Plans by Each Period

2.3 Target Entities for Allocation

The KETS covers companies that emit greenhouse gas more than 125,000 tCO_2 eq annually or facilities with emissions of 25,000 tCO_2 eq or higher on average for a three-year period starting from 4 years before the start of the relevant period. The entities of voluntary participation are also under coverage regardless of the emissions standards. When the 25,000 tCO_2 eq criteria is applied, most of the country's emissions are expected to be managed through the KETS. Especially, approximately 80 percent of the total emissions from the energy and industrial sectors are covered by the KETS. During the first period, 23 industries in 5 sectors are designated as the regulation targets under the KETS.

The six greenhouse gases that are subject to the scheme are CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6. Controlled GHG include not only direct emissions caused by human activities but also indirect emissions caused by electricity or heat consumption.

2.4 Allocation of GHG Emissions Permit

Pursuant to the first clause of Article 5 of the Act on the Allocation and Trading of Greenhouse Gas Emission Permits, the emission cap for the commitment period shall be set by taking into account the BAU and reduction rates to be aligned with national reduction targets. Therefore, the BAU of ETS sectors is computed by multiplying the national BAU with the ratio of the emission level of ETS covered sectors to the total national emissions, as shown in the formula below. Here, the emission level that is subject to the application of ETS shall be the average emissions of the recent three years (2011-2013).

ETS BAU = National BAU x (ETS GHG Emissions) / (National GHG Emissions)

The cap during the first period derived based on the above formula is 1,687 million KAU (Korean Allowance Unit). The annual cap is planned to decrease progressively and linearly by the rate of 2 percent every year, thus the cap is 573 million KAU in 2015, 562 million KAU in 2016, and 551 million KAU in 2017. Of the total allowances (or cap), 1,598 million KAU was allocated in advance of the period, while 89 million KAU was set aside by the government as reserves[6] for additional allocation to be provided during the period. Here, the pre-allocations are made before starting the commitment year to existing and new facilities. The additional allocations shall be made by using the reserves when there are unexpected changes in relation to facilities during the period. Emission permits can be cancelled in the case of false reports, down-sizing of facilities, plant closure, etc.

The annual cap is distributed to each sector in consideration of the sector's emission level and the target emissions of the sector. That is, the sectoral BAU will be calculated based on the share of the emission level of that sector. Then, the sectoral cap will be determined in consideration of the reduction rate of the sector.

Sectoral ETS BAU = ETS BAU x (Sectoral GHG Emissions) / (ETS GHG Emissions)
Sectoral Cap = Sectoral ETS BAU x (1 – Sectoral Reduction Rate)

The share of emissions by each sector shall be based on the average emission of the recent three years (2011 -2013). For the first period, the majority of allowances were allocated to power generation, steel and iron, petrochemical, cement and refinery industries (See Table 4).

[6] The allowances kept by the government for the cases of additional allocation and/or market-stability management.

	Year			Total Volume during the Period
	2015	2016	2017	
Total Allowances	573,460,132	562,183,138	550,906,142	1,686,549,412
Pre-Allocations	543,227,433	532,575,917	521,924,398	1,597,727,748
Reserve	88,821,664			
Power Generation	250,189,874	245,284,190	240,378,507	735,852,571
Industry	274,955,466	269,564,185	264,172,899	808,692,550
Buildings	7,106,462	6,967,120	6,827,777	20,901,359
Transport	1,289,780	1,264,490	1,239,201	3,793,471
Public & Waste	9,685,851	9,495,932	9,306,014	28,487,797

Source: Ministry of Environment (2014)

<Table 4> Allocated by Each Sector during the First Period

2.5 Allocation Methods

The principal method of free allocation for the first period was grandfathering (GF) which allocates allowances based on historical emissions. Benchmark (BM) based allocation which allocates allowances based on activity levels was also applied in three cases of cement, refinery, and aviation industries. The GF is frequently used in the early stage of the scheme when information on emissions and activity levels of the covered entities is not sufficient because the method is relatively easy to apply based on historical emission records. On the other hand, BM considers technological efficiency and so requires more comprehensive data to be collected and verified. The application of BM method is planned to be expanded from the second period.

Item	GF Method	BM Method
Strength	• Relatively easy to calculate the reference baseline emission volume and setting the indicators. • Relatively easy to implement the policies.	• Can reflect early action and continued emission reduction efforts. • Can ensure equity by applying the same criteria. • Can reflect the level of low-GHG technology. • Encourage development for the low-GHG technology
Weakness	• Can not reflect early action • Disadvantageous to the companies with higher low carbon efficiency over time • Limited application of the growth rate.	• Difficult to establish facility boundaries and indicators to apply benchmarks. • Requires additional measurement, reporting, and verification of the activity data. • Potentially huge administrative costs and burden.

Source: Korea Environment Institute (2015)

<Table 5> Free Allocation Methods

2.6 Flexibility in Submitting Permits

The ETS allows submission of allocated permits by various other means to minimize the costs involved in reducing emissions. For example, the banking of unused allowances is permitted as well as the borrowing of allowances to make up for shortages, with a view to enhancing flexibility depending on the management conditions of the company including future production or output targets. Yet only up to 10 percent (20 percent during the initial plan period) of the permits are to be borrowed, and borrowing from the subsequent period is not allowed.

In order to prevent any disadvantages incurred from making reductions ahead of schedule, additional permits may be assigned in return for early emission reduction actions. But, such incentives shall be assigned, in consideration of the total emission units allocated during the first period, as the emission allowances for the 2nd and 3rd year.

In addition to the reduction or the trading within the boundaries of the ETS, the offsets obtained from the external reduction projects, such as the CDM (Clean Development Mechanism), can be converted to KCU (Korean Credit Unit) in order to provide flexibility in the choice of reduction activities. However, the number of offset credits that may be surrendered to meet reduction obligations is set to be no more than 10 percent of the total amount of allowances

2.7 Penalty

If the permit submitted by a covered entity is less than the allocated allowances, a surcharge for the amount in shortfall shall be imposed at a maximum of three times, the average market price of the permits. However, it shall not exceed 100,000 won per ton of CO_2 eq.

3. Operation Status of Greenhouse Gas Emissions Trading Scheme in Korea[7]

As of December 2015, 525 companies participated in emissions trading. As per KAU, the total number of days with transactions by December 2015 was eight, and the accumulated traded volume was 321,380 tons. This amounted to an accumulated traded value of 3.87 billion KRW (See Table 6)

Date	Price (Closing)	Traded Volume (ton)	Amount (Won)
15.01.12	8,640	1,190	9,740,400
15.01.13	9,500	50	475,000
15.01.14	9,510	100	951,000
15.01.16	9,610	40	384,400
15.10.07	11,300	12,000	135,600,000
15.10.08	11,300	168,000	2,024,400,000
15.12.09	11,600	100,000	1,210,000,000
15.12.10	11,600	40,000	484,000,000
Aggregated Total		321,380	3,865,550,800

Source: Korea Exchange

<Table 6> KAU Transaction Summary

By December 2015, the number of days with transactions of KCU was 11 and the aggregated trade volume was 920,717 tons, amounting to 10.03 billion won.

[7] Korea Exchange. Emission Trading Market. http://ets.krx.co.kr/

Date	Price (Closing)	Traded Volume (ton)	Amount (Won)
15.04.06	10,100	1,500	14,900,000
15.04.07	10,200	1,658	16,911,600
15.04.08	10,300	1,500	15,450,000
15.04.10	10,450	75,000	772,500,000
15.04.28	10,550	200,000	2,100,000,000
15.06.19	10,550	500,000	5,100,000,000
15.12.21	12,200	10,059	122,719,800
15.12.22	13,400	23,000	306,650,000
15.12.23	13,700	78,000	1,138,800,000
15.12.28	13,700	15,000	219,000,000
15.12.29	13,700	15,000	219,000,000
Aggregated Total		920,717	10,025,931,400

Source: Korea Exchange

<Table 7> KCU Trading Summary

To facilitate the soft landing of the system and enhance the convenience of participants, a nation-wide training program for allocation application preparation was provided. A "Help Desk" was also operated to promote overall understanding about the system, including making voluntary participation applications, filling in and submitting the allocation application forms, preparation of a monitoring plan, emission transaction reporting and the use of transfer offset systems, etc.[8]

In 2015, the “One-Stop Support System” was introduced to provide comprehensive assistance on technology, information provision and financial support, to small and medium sized companies which were more sensitive to such changes, so that business competitiveness would not have to be sacrificed. Through the “Greenhouse Gas Reduction Equipment Support Program for Participants to ETS,” a total of 1.83 billion won was provided to 8 companies. Based on the schedule of the ETS, assistance was provided through the preparation of application forms for allocations and monitoring plans to 31 companies. An expert group that was capable

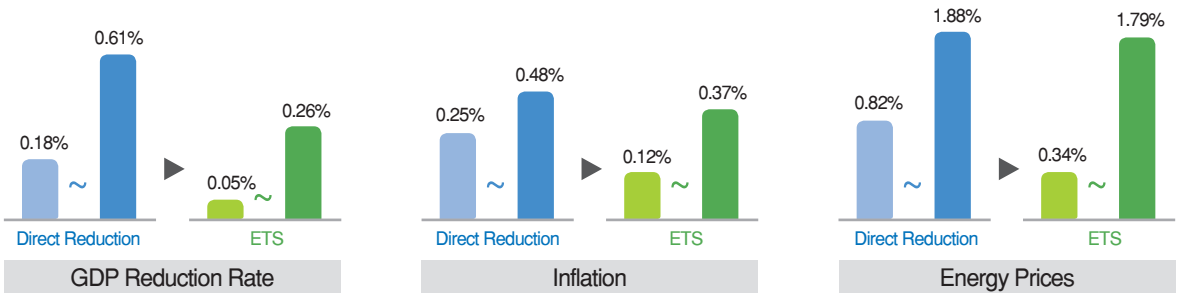
[8] Ministry of Environment (2014).

of identifying reduction potentials and reduction technologies, was formed to provide support by means of customized consulting services as the group visits participating companies (13 companies in total), as a part of the total commitment of the government to make sure the system was established satisfactorily.

Ⅲ. Expected Effects of Greenhouse Gas Emissions Trading Scheme

The Korean government plans to use the ETS proactively, to meet its target to reduce GHG emissions by 37 percent from BAU by 2030. The ETS covers companies which emit more than 60 percent of the total emissions of Korea. Thus it is expected that the ETS will make a substantial contribution to reducing total emissions in Korea.

Many studies show that the ETS can lower the costs of reduction by 44 to 68 percent compared to direct regulation. It is also expected that the ETS will not have a significant impact on GDP reduction, the inflation rate and energy prices compared to direct regulation.



Source: Ministry of Environment (2014), Re-quote from KEI (2015)

<Figure 4> Comparison between ETS and Direct Regulation

In addition, the ETS revenues obtained through operating the system (auctioning revenues, penalties, etc.) can be recycled for equipment support or green technology developments so that the advancement of the green industry will be promoted. This, in turn, will trigger the development of low-carbon technologies and contribute to the growth of low-carbon industries and job creation.

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ISSN 1976-6246