Korea's Emission Trading System: An Attempt of Non-Annex I Party Countries to Reduce GHG Emissions Voluntarily

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1. Introduction

As the trading of carbon emission rights became available on 1st January 2015, South Korea (henceforth, Korea) launched a national emission trading system, the Korea's ETS or the so-called KETS, with a cap of 573 MtCO2e in 2015. Covering roughly two-thirds of the country's total emissions, the KETS is the world's second largest carbon market after the EU ETS, and the first nationwide "cap-and-trade" scheme in operation in Asia. Under the KETS, 525 business entities consisting of 243 companies and 283 facilities in 23 sub-sectors have been given a fixed amount of permits for their emissions. The cap for the first commitment period (2015-2017) is 1.687 million tons of CO2e.

The KETS is the government's principal policy measures to reduce 30 percent of greenhouse gas emissions below the business-as-usual (BAU) level by the year 2020. The mentioned government's pledge was submitted to the Copenhagen Accord in 2010. When the government initially announced the plan to implement the ETS in Korea, it was met with a strong opposition from the business sector. For instance, the Korean Chamber of Commerce claimed that Korea's target of 30 percent emissions cut is too ambitious and that adopting the ETS will most likely slow down economic growth. The resistance was so strong that the timeline to introduce the KETS, which was set to be implemented in 2013, was rescheduled for 2015.

Since the adoption of the ETS was not discarded but delayed, the course of legislation associated with the KETS proceeded steadily. The Act on the Allocation and Trading of Greenhouse Gas Emission Permits (henceforth, the ETS Act) and its Enforcement Decree were legislated in 2012. Thereafter, the institutional framework was established in sequence. In January 2014, the government designated Korea Exchange (KRX) as an emission permits exchange, and the Ministry of Strategy and Finance (MOSF) released the first Master Plan, a legal step towards the delivery of the Allocation Plan for the first commitment period.

Five months later on June 2014, the Ministry of Environment (MOE) laid out the "National Emissions Permit Allocation Plan" (henceforth, the Allocation Plan), as part of a follow-up. This plan was to

elaborate details on the operation of the KETS for the period of 2015 to 2017, including the total number of emissions permits (cap) in circulation and allocation methods. As the Allocation Plan was released, the Korea Chamber of Commerce and the Federation of Korean Industries requested for a full-scale reconsideration of the KETS and re-postponement of the launch date to 2020. This request provoked harsh debates on the KETS again and the apex of opposition was seen in the summer of 2014, which was six months prior to the scheduled implementation of the ETS.

Against this backdrop, the first meeting of the Emission Permits Allocation Committee (EPAC) chaired by the Minister of MOSF, was delayed several times. According to the ETS Act, the implementation of the ETS can become effective only after the finalization of the Allocation Plan. The Allocation Plan, drafted by MOE, has to be reviewed and approved by EPAC, and then finalized by the Green Growth Committee (GGC) and a Cabinet meeting. In other words, delays in the EPAC meeting held up the legal process for launching the KETS.

The media reported a growing possibility of cancellation because the MOTIE Minister, Choi, Kyung-hwan, the designated chair of EPAC meetings, was nominated as the Strategy and Finance Minister almost at the same time as MOSF tried to fix the date for the first EPAC meeting. When he had served as a minister of the Ministry of Trade, Industry and Energy (MOTIE), he was opposed to the ETS. Whether this story was true or not, MOSF delayed the first EPAC meeting in order to grasp the tide of public opinion on the ETS.

In late August, the government finally decided to kickoff the KETS as scheduled. This decision was mainly driven by concerns over the nation's credibility shown to the international community, and the sheer unlikeliness of cancellation or delay of the KETS just four months prior to its launch on 1st January 2015. Appeasement polices to placate the business sector followed immediately. The total number of permits or "the cap" was slightly adjusted upward and policy measures to make the ETS less incumbent on participants were formulated. Finally, the first EPAC meeting was held in September 2014 and the revised Allocation Plan was approved. The Plan was first approved by EPAC followed by the GGC and then by a Cabinet meeting on 11th September 2014. After these stepwise approvals, the implementation of the KETS became official on 1st January 2015.

In the present study, we aim to describe some of the salient characteristics of the KETS and derive policy implications for non-Annex B developing countries that are contemplating to adopt a cap-and-trade scheme. The rest of this paper is organized as follows: Chapter 2 carefully reviews the institutional framework to introduce the KETS and related legal preparations, Chapter 3 illustrates the key contents including the scope, the cap, allocation methods and policy measures for market stability and carbon-leakage protection, Chapter 4 compares the KETS with the EU ETS, and Chapter 5 summarizes this study.

II. Institutional Framework for the KETS

In 2010, the then president, Lee Myung-bak, announced a national emission reduction target of 30 percent by 2020 under the BAU scenario at the Copenhagen meeting. This commitment was based on both external and internal motives. First, Korea was facing international pressure to join global efforts to tackle climate change by reducing domestic GHG emissions. Korea was not an Annex I party country under the Kyoto Protocol, hence it was excluded from the emissions abatement obligation. However, Korea's GDP and emissions rankings (the 16th and 7th in terms of size, respectively) have placed the nation under constant pressure from the international community. Second, there were also internal motives. Concerned with a stagnant economy, Lee had proposed a seven-percent annual growth rate and green growth as his election pledge and a growth model to achieve the goal. Lee recognized low carbon industries and the ETS as new growth engines and a key policy tool to encourage green investment, a must for green growth. Third, Lee tried to make "green growth" a global brand of Korea as well as his own. To show his willingness to pursue green growth, he had announced a national reduction target and related policies to international communities by making headlines such as "the highest reduction target among developing countries" and "adoption of a nationwide ETS, the first-ever among developing countries.'

When the final decision to launch the KETS was made in 2014, there were pessimistic views on reaching a legally binding deal on GHG emissions, internationally; and the possibility for green sectors to serve as a new growth engine, domestically. Under this context, the first two motives faded in significance, but there was a strong consensus on the fact that the reversal of initial decision would undermine the international position of Korea, which would be more damaging than the negative impacts that may result from the implementation of the ETS.

This commitment, not mandated by the Kyoto Protocol but set voluntarily, was welcomed by the international community. However, this voluntary action taken by the government was not based on a nationwide social consensus. This left the entire designing process of the KETS, a principle tool to achieve the announced goal, vulnerable to the consistent counterattack. Moreover, as mentioned in Goldblatt and Middleton (2007), environmental ministries often have smaller budgets and weaker political voices than those that directly manage business sectors or determine economic policies in most countries. This was specifically true in developing countries like Korea. The ministerial power of MOE was weaker than those of MOTIE and MOSF and, consequently, the capacity of MOE was not enough to carry out core actions associated with the abatement target and the KETS.

A weak base of the national reduction target announced by the government and the KETS was strengthened using two solutions: stipulating them into laws and making a strategic governance framework.

2.1. A Solid Legal Base for the KETS

The Framework Act on Low Carbon, Green Growth (2010)

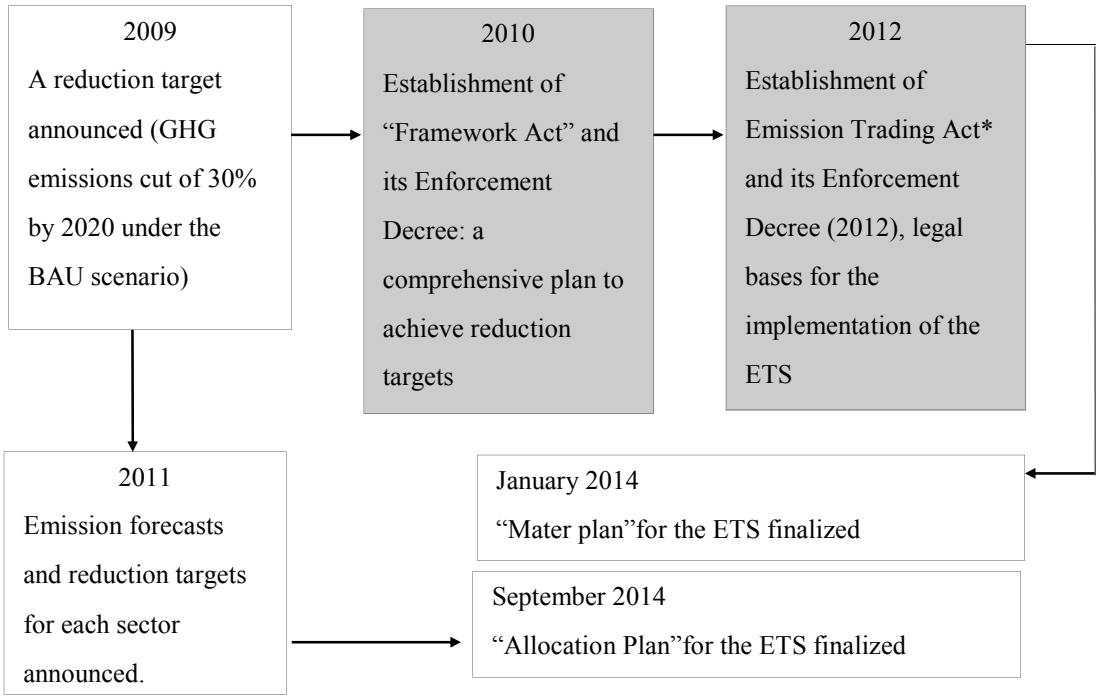
Once the policy decision on emissions reduction was made, the Lee Administration made it an incontestable fact by signing it into a law. The first and highest legal base for green growth and implementation of the ETS was the Framework Act on Low Carbon, Green Growth (Framework Act), established in 2010 with an aim to achieve the national emissions reduction target set a year earlier. As shown in Table 1, various policy tools were stipulated in the Framework Act and the implementation of the ETS was one of them.

Table 1. Abatement Policies Stipulated in the Framework Act

	Policy Means		Article
Framework Act	Target management system		42
	Emission Trading System		46
	Basic energy plan		39, 41
	Environment-friendly taxation system (carbon tax included)		30
	Other policies · Supportive policies	Promotion of environment-friendly agriculture and fisheries and expansion of carbon sinks	55
		Transportation: Management of greenhouse gases in transportation sector	47
		Establishment of low-carbon traffic systems	53
		Buildings	54
		Water	52
		Reporting on quantity of GHGs emitted and establishment of integrated information management system for GHG	44, 45
		Supportive policies - Technical support for green innovation	31, 32
		- Development of clusters and complexes for green technology and industries	34
		- Support for SMEs that are engaged in green technology and business	33
		- Creation of green jobs and green industries	35
		- Financial support for green growth	28
		Regulation and countermeasures for international norms	36, 37, 61
		Promotion of green life style	49, 56~59
		Greenizing land-management	51

Source: Framework Act on Low Carbon, Green Growth (2011).

Figure 1. Policy Hierarchy of Korea's National GHG Emission Reduction Target, the Framework Act and the Emission Trading Act



*Full name: the Act on Allocation and Trading of Greenhouse Gas Emissions Allowances (2010)
Source: The Framework Act on Low Carbon, Green Growth.

Because of the following provision, "the government may utilize market functions in accomplishing the national GHG reduction target and operate a cap-and-trade scheme," was added into Article 46 of the Framework Act, this gave the ETS solid legal grounds for implementation. Based on this provision, the Emission Trading Act and its Enforcement Decree were established in 2012 (see Figure 1). By defining important processing steps and timelines by these two laws, the cancellation of the KETS became very difficult since it requested a series of legal procedures, which take a significant time and efforts.

By these two laws, institutional infrastructures involved in the KETS were established: the Korea Energy Management Corporation and the Korea Environment Corporation are responsible for supervising measurement, reporting, and verification (MRV) of emission data; and the Korea Exchange was selected as a single designated emission permits exchange.

Article 44 of the Framework Act mandates large emitters to report the quantity of GHGs produced, so the Greenhouse Gas Inventory & Research Center of Korea (GIR) was established to manage emission data and relevant research. Article 44 is critical in operating the ETS since it enables collection and registry of emission data.

Pursuant to Article 42 of the Framework Act, the Target Management Scheme (TMS) was initiated in 2012. Under the TMS, companies and facilities with high GHG emissions and energy consumption are designated as Controlled Entities and subject to government control (see Table A1). Covered entities are obligated to submit a report on their historical emissions levels to the controlling agencies and set their emissions targets with the corresponding controlling agency, which reviewed the reports with MOE (in fact, the GIR) to detect double counting or omission. If the amount of emissions exceeds the target level, the entity will be charged with a lump sum penalty regardless of the exceeded amount. However, if emissions are below the allowance amount, the entity will not be incentivized.

As summarized in Table 2 and Figure 2, the TMS is different from the ETS in both the operating mechanism and the institutional framework but it serves as a stepping stone to the KETS by enabling the collection of verified emissions data and training the MRV process of TMS entities, which had become important components of the KETS.

Table 2. Comparison between the ETS and Target Management System

Category	ETS	Target Management System (TMS)
Reduction method	·Market-based tool	· No market-function (trading is not allowed)
Competent authority	·MOE (Competent authority/establishment of the Allocation Plan) ·MOSF (Chairman of the EPAC/establishment of the Master Plan)	·MOE (Responsible authority of the TMS) ·Authorities which deal with controlled entities (MOTIE, MOLIT, MOE,)
Eligible entities	·All facilities in 5 sectors that have emitted 25,000 tons or more of GHGs or companies that have emitted 125,000 tons of CO2e per year during the preceding three years	·All facilities (in all sectors) whose emissions level or energy use exceeds a pre-defined threshold.
Eligible GHGs	·Six main greenhouse gases ·Direct and indirect emissions	·Six main greenhouse gases ·Direct and indirect emissions
Establishment of emission reduction targets	·Defined by the Allocation Plan ·Should reflect the national GHG emission reduction targets	·Emissions target determined in collaboration with competent authorities in each sector (MOAFRA, MOTIE, MOLIT, and MOE)
Management method	·Determination of entities eligible for the commitment period (3~5 years)	·Eligible entities selected for each pertinent year
Excess reduction	·Transactions (sale) or carryover in the market	·Terminated at the end of the compliance year (no incentive)
Treatments when emissions level was less than the emissions certified	·Transaction (purchase) or borrowing in the market	·Recognition of GHG reductions from an external project (green credit)
Failure to comply with rules	·Penalty of not more than three-fold of the market price of 100,000 won per ton	·Fine for negligence (max. 10 million won)

Given the fact that the energy sector is a major source for GHG emissions and, therefore, the national emission reduction goal is very unlikely to achieve without greening the energy sector, Article 41 of the Framework Act stipulates that the Basic Energy Plan should reflect the intention of low-carbonizing the power sector.

Figure 2. Governance Framework for the Target Management System

* MOAFRA (Ministry of Agriculture, Food and Rural Affairs)
MOE (Ministry of Environment)
MOTIE (Ministry of Trade, Industry and Energy)
MOLIT (Ministry of Land, Infrastructure and Transport)
Source: GIR(http://www.gir.go.kr).

The Emission Trading Act (2010) and its Enforcement Decree (2012)

While the Framework Act lists only the legal basis for the introduction of a cap-and-trade scheme, the details will be further laid out in a separate Act by Article 46(4) of the Framework Act (Figure 1). In Korea, the process of drafting a new legislation is generally handled by a single ministry. However, the ETS involves conflicting interests of various stakeholders and relevant ministries, and it is difficult for a single ministry to lead the process alone. For this reason, the Presidential Committee on Green Growth (PCGG) took the lead in the legislation of the Emission Trading Act and its Enforcement Decree. Until the PCGG was transformed into a committee headed by the Prime Minister's Office in 2013, the PCGG was an advisory body established to advise the President with respect to promoting the national agenda on green growth policy. It is co-chaired by the Prime Minister and a private-sector representative, and the members of the PCGG consist of government officials from different ministries. Its strong position as the Presidential Advisory Committee and member representation allowed the PCGG to coordinate conflicts of interests among ministries and stakeholders.

In accordance with the Emission Trading Act, MOSF was first designated to serve as the chairman of EPAC. On 14th May 2012, the Emission Trading Act led by the PCGG was ratified by the National Assembly. The legislation procedure for the Emission Trading Act was very unusual. In Korea, a special committee such as the PCGG does not have the authority to draft legislation. Normally, a legislative bill submitted to the National Assembly is brought to the concerned standing committee for deliberation

before the regular session of the National Assembly. In general, bills concerning environmental matters are written by a standing committee, the Environment and Labor Committee, and submitted to the National Assembly. However, the Emission Trading Act was treated as an exception. Considering possible conflicts of interests among members of the standing committee and ministries in the drafting process of the Emission Trading Act, the newly established Special Committee on Climate Change submitted the draft written by the PCGG for deliberation to the National Assembly. The Enforcement Decree was legislated in the same way by the PCGG and enacted on 15th November 2012. By the Enforcement Decree, MOE was assigned as the responsible authority, which was in charge of operating the ETS.

By making the PCGG and the Office of the Prime Minister as the responsible authorities of the Emission Trading Act and its Enforcement Decree, the government intended to avoid potential conflicts that would arise during the implementation of the ETS by a single authority. However, by the time (2013-2014) the national GHG emissions reduction road map and the ETS' two principal plans—the Master Plan and the Allocation Plan, were being made, the status of the PCGG in charge of the Framework Act and climate policies weakened due to the policy regime change from Lee to the current president Park. At last, the PCGG was reorganized as a deputy-level committee of the Office of the Prime Minister, the Green Growth Committee (GGC) and the coordinating function of the PCGG was transferred to MOSF, which was responsible for economic matters and policy coordination. Although MOSF is the most powerful ministry in Korea, it cannot replace a presidential committee such as the PCGG. Since then, more emphasis was placed on industrial and economic growth in the implementation process of the ETS and the policy hierarchy relating to the national emissions reduction target suggested in the Framework Act has not been realized—thereby, finalizing the legal procedures for implementation of the KETS.

Two Principal Plans: The Master Plan and the Allocation Plan (2014)

Article 6 (1) of the Enforcement Decree states that MOE, the competent authority of the KETS, is solely responsible for the Allocation Plan. The Allocation Plan is essential to the ETS since it defines the following detailed matters: the total amount of GHG emission allowances for each pertinent commitment period; standards for the allocation of emission permits for each sector, type of business, the amount allocated to each sector and type of business; criteria for recognition of the outcomes of earlier reduction; and the banking and borrowing of emission permits and offsets. According to Article 5(1) of the Emission Trading Act, the Allocation Plan shall include matters described in Table 3, and thus adjudicating the Plan as not only the authority of, but also the responsibility of the head of MOE. In this regard, an act of omitting any one of them could be considered a serious violation.

Table 3. Key Matters described by the Master and Allocation Plans

<8 Components of the Master Plan described by the Decree>
1. Current status and projections for the domestic and international markets for the emissions trading system;
2. Basic direction for the operation of the emissions trading system;
3. Operation of commitment periods for the emissions trading system, considering national greenhouse gas reduction targets;
4. Projections for greenhouse gas emissions produced as a consequence of economic growth, new investment in each sector and type of business, and the expansion of facilities (referring to places of business producing greenhouse gases or part of such places of business; hereinafter the same shall apply);
5. Economic implications, such as the fluctuation of prices of energy and other commodities following the operation of the emissions trading system;
6. Policy measures for supporting domestic industries, considering international trade intensity, carbon intensity, etc.;
7. Plans for the link with international carbon markets and international cooperation;
8. Others related to effective operation of the emissions trading system, including financing, the nurturing professional human resources, education, and public relations, etc.
<17 Components of the Allocation Plan described by the Decree>
1. Total amount of greenhouse gas emission allowances set in consideration of national greenhouse-gas reduction targets;
2. Total number of emission permits for the pertinent commitment period and for each compliance year based on total emission allowances;
3. Sectors and types of business eligible for allocation of emission permits;
4. Standards for the allocation of emission permits for each sector and type of business and the amount allocated to each sector and type of business;
5. Standards for the allocation of emission permits for each compliance year and the amount allocated for each compliance year;
6. Standards and methods for the allocation of emission permits to business entities eligible for allocation;
7. Details on the allocation method (free allocation);
8. Criteria for recognition of early abatement activities;
9. Identifying the sectors and entities subject to the ETS and free allocation;
10. Principles of banking and borrowing of emission permits and offsets
11. Sectors and types of business eligible for allocation of emission permits;
12. Recognized volume of earlier reduction performance
13. Adjustment of allocated emission permits
14. Identifying cases of revocation of emission permits allocated
15. The ratio of emission permits gratuitously allocated after the third commitment period
16. Identifying the limit of offset
17. Other matters necessary for the allocation and trading of emission permits for the pertinent commitment period, which are resolved by the Allocation Committee.

Given that the Allocation Plan defines operation specifications of the ETS, it is unavoidable that rights and duties of business entities eligible for allocation are both directly and indirectly influenced by the

Plan. In a legal context, it seems reasonable that a considerable part of the plan should have been defined by legal provisions. The distribution of permits should be adjusted according to the amount of emissions change over time. Hence, defining allocated permit quantities in a law causes not only inflexibility but also economic inefficiency. At the same time, it is also impractical and highly unusual to revise the law in the current legislative culture of Korea. This is why the details of the KETS were defined by the Allocation Plan, and not by a law. The Allocation Plan was made in compliance with the provisions of the Emission Trading Act and the Master Plan. In short, the Emission Trading Act only provides the basis for the delegation of authority, thereby letting the Allocation Plan to define further details on allocation.

In addition to the Allocation Plan, the KETS includes a ten-year Master Plan for the KETS as well as the five-year plan, no later than one year prior to the launching of each commitment period. This seems atypical considering other ETSs but the establishment of two separate plans, a master plan and an action plan, are required in the process of adopting a national policy in Korea. In the KETS, the former is the Master Plan, and the latter the Allocation Plan. While the Allocation Plan focused on the ETS, the Master Plan was supposed to posit the ETS within other GHG reduction policies and to minimize the negative impact of the ETS on economic outcomes. In this process, the Master Plan should consider the domestic economic conditions and progress in post-Kyoto system on climate change. The first Master Plan, spanning a decade from 2015 to 2024, embraces three commitment periods excluding the last year of the third commitment period. As shown in Table 4, implementation principles are suggested in the Master Plan. Reflecting this, the Master Plan is formulated by MOSF whose head (the Minister of MOSF) is Deputy Prime Minister who is responsible for policy-coordination and economic policies. Korea's Master Plan is similar to Germany's Macro Plan, which is included in its National Allocation Plan. The Master Plan must contain 8 components shown in Table 3, which is decreed by law. The Master Plan released by MOSF was announced through a public hearing and it was ratified by the GGC (Green Growth Committee, the former PCGG) and then through a Cabinet meeting.

As shown in Table 3, although the Master Plan should evaluate whether or not the ETS cap was set properly, it was unable due to the fact that the national GHG emissions reduction roadmap, set by the MOE, was not finalized until the end of December 2013—the legal timeline for the formulation of the first Master Plan. Reflecting the Master Plan, the Allocation Plan must be ratified no later than 6 months prior to the launching of the ETS.

Table 4. The Direction of the KETS proposed by the 1st Master Plan

	1st Commitment Period (2015~2017)	2nd Commitment Period (2018~2020)	3rd Commitment Period (2021~2025)
Main objectives	▪Accumulation of experiences and settlement of the system	▪Reduction of considerable amount of GHG emissions	▪Aggressive reduction of GHG emissions
System operation	▪Improvement of institutional flexibility, such as the scope of setoff recognized ▪Establishment of infrastructures for accurate MRV	▪Expanding the scope of the system, upward revision of the targets ▪Advancement of various criteria on reporting and verifying the amount of GHG emissions	▪Inducement of voluntary reduction in preparation for post-2020 climate change regime ▪Expansion of liquidity supply, such as the participation of the third party into the system.
Allocation	▪Gratuitous allocation of the entire amount ▪Application of experiences with the target management system	▪Initiation of onerous allocation of emission permits ▪Advancement of the method of allocation, such as benchmarking method	▪Increase in the ratio of onerous allocation ▪Settlement of advanced allocation method

Source: Master Plan, Ministry of Strategy and Finance, Jan. 2014.

2.2. Decentralized Governance Framework

The second instrument to supplement the weak base of the KETS was to form a strategic governance framework. Tables 5, 6 and 7 describe the KETS' decentralized governance structure where multiple-government authorities have played an equally important role in developing the KETS. Responsibility of the governance of the KETS has been divided as follows: the Green Growth Committee (initially, the PCGG) of the Office of the Prime Minister is responsible for developing legislation and implementing procedures that set the rules for actors to follow when participating; MOSF coordinates the KETS policies with other policies, drafts Master Plans and operates Allocation Committee; MOE operates and administers the KETS. Detailed duties and related legal basis are listed in Table 5 and Table 6, respectively.

As illustrated in Tables 5 and 6, MOE is the competent authority that formulates the Allocation Plan and implements the KETS. The Emission Trading Act and its Enforcement Decree stipulate that MOE shall be responsible for the overall operation on the specific matters of the ETS. As for the KETS, the functions of MOE are deemed multi-faceted. The functions of MOE include: the establishment of the Allocation Plan, consideration of the linkage with other ETS markets and revision of relevant laws or legislations. The second function pertains to the actual operation of the ETS. This includes decisions, notice and verification of allocation, monitoring of trading markets, promotion of market-stabilizing measures and operation and management of the emission permits register (namely Greenhouse Gas Inventory & Research Center of Korea, GIR). The third function is an advisory role where opinions of

experts and civic groups (through the Allocation Deliberation Committee, Certification Committee and public hearings) are taken into consideration in the implementation of the ETS operation. The fourth function is the development of improved measures based on the evaluation of ETS accomplishments. Suggestions by MOE will be presented to EPAC first, the upper organization in the governance framework, to be finalized. To complete these functions, MOE has an affiliation, the GIR, shown in Figure 3.

Before the enactment of the Enforcement Decree, MOE did not appear in the governance framework of the KETS. As mentioned above, the PCGG, with strong cross-ministerial power, played a leading role in legislating laws on implementing the KETS, and MOSF coordinated policies associated with the KETS and chaired EPAC. In other words, two strong government authorities, the PCGG and MOSF, rather than MOE had impetus at the early development stages of the KETS. This governance framework reflects a strong will to purse a policy of "GHG reduction" set by the President of Korea and fortifies the weak position of MOE in adopting the KETS. In addition, the involvement of MOSF and its Master Plan was aimed at alleviating the opposition of the business sector by providing significant support policies.

Table 5. Major Decision Makers and Their Roles in the KETS

Decision making body of the KETS		Responsible Bureau or Division	Affiliated Institution of the KETS	ETS Functions
Central government agency	OPM	PCGG or GGC (Climate Change Bureau)		- Legislation (the Framework Act and the ETS Act) - Approval of Master Plan
	MOSF	(initially) Policy Coordination Bureau → (now) Future and Social Policy Bureau		- Policy coordination associated with the KETS - Drafting Master Plan - Operating Allocation Committee
	MOE	ETS TF (ETS Task Force)		- Responsible authority of the KETS - Drafting Allocation Plan - Operating Allocation Approval Committee
			GIR	- Registry - Research
			KECO	- MRV
Public institution			KRX	- Operates the centralized market for permit trading - Reports market outcomes
			4 financial institutions	- 3rd-party market participants - Assists MOE in stabilizing the ETS market
Covered entity			Firms & Facilities	- Complies with the KETS regulations

* OPM = Office of the Prime Minister, GGC = Green Growth Committee, MOSF = Ministry of Strategy and Finance, MOE = Ministry of Environment, ETS TF = ETS Task Force, GIR = GHG Inventory and Research Center of Korea, KECO = Korea Environment Cooperation, KRX = Korea Exchange, 4 (public) Financial institutions = Industrial Bank of Korea, Korea Development Bank, Korea Exim Bank, Korea Financial Cooperation

Table 6. Legal Basis related to the Roles of Authorities

Roles	Ministry	Legal basis
- Establishment of the Master Plan (1 year prior to the beginning of each commitment period)	MOSF	Article 4
- Establishment of the Allocation Plan (six months prior to the beginning of each commitment period) - Holding of a public hearing to gather opinions from interested parties	Competent authority (MOE)	Article 5
- Finalizing the Allocation Plan	Emission Permits Allocation Committee → Presidential Committee on Green Growth → Deliberation by the Cabinet meeting → Finalized	Article 5
- Establishment of the Emission Permits Allocation Committee (including matters concerning the establishment of the Allocation Plan, measures for market stabilization, policy coordination and support related to certification and offset, and deliberation in relation to the international link and cooperation; the Allocation Committee shall be comprised of vice-ministerial level government officials and experts.	Chairman of the Emission Permits Allocation Committee (MOSF Minister), Secretary (MOE)	Article 6 (Establishment), Article 7 (Organization and Operation)
- Designation of business entities eligible for allocation (five months prior to the beginning of each commitment period), Designation of new entrants (due to establishment of a new facility or the alteration or expansion of a facility) as business entities eligible for allocation	Competent authority (MOE)	Article 8~10
- Establishment and operation of the Emission Permits Register (GIR)		Article 11
- Emission permits: allocation, application for allocation and notice of allocation		Article 12~14
- Recognition of outcomes of earlier reduction, adjustments to and revocation of allocated emission permits		Article 15~17
- Emission permits in reserve		Article 18
- Exchange and trading of emission permits		Article 19~22
- Stabilization of markets for trading emission permits	Implemented by the competent authority after the deliberation by the Emission Permits Allocation Committee	Article 23

- Reporting, verification and certification of amounts of emissions, Emissions Certification Committee	Competent authority (MOE)	Article 24~26
- Surrender, carryover, borrowing, offset, and termination of emission permits, Offset Register		Article 27~31
- Carryover, borrowing and offset of emission permits		Article 28~30
- Termination of emission permits		Article 32
- Penalty surcharges		Article 33

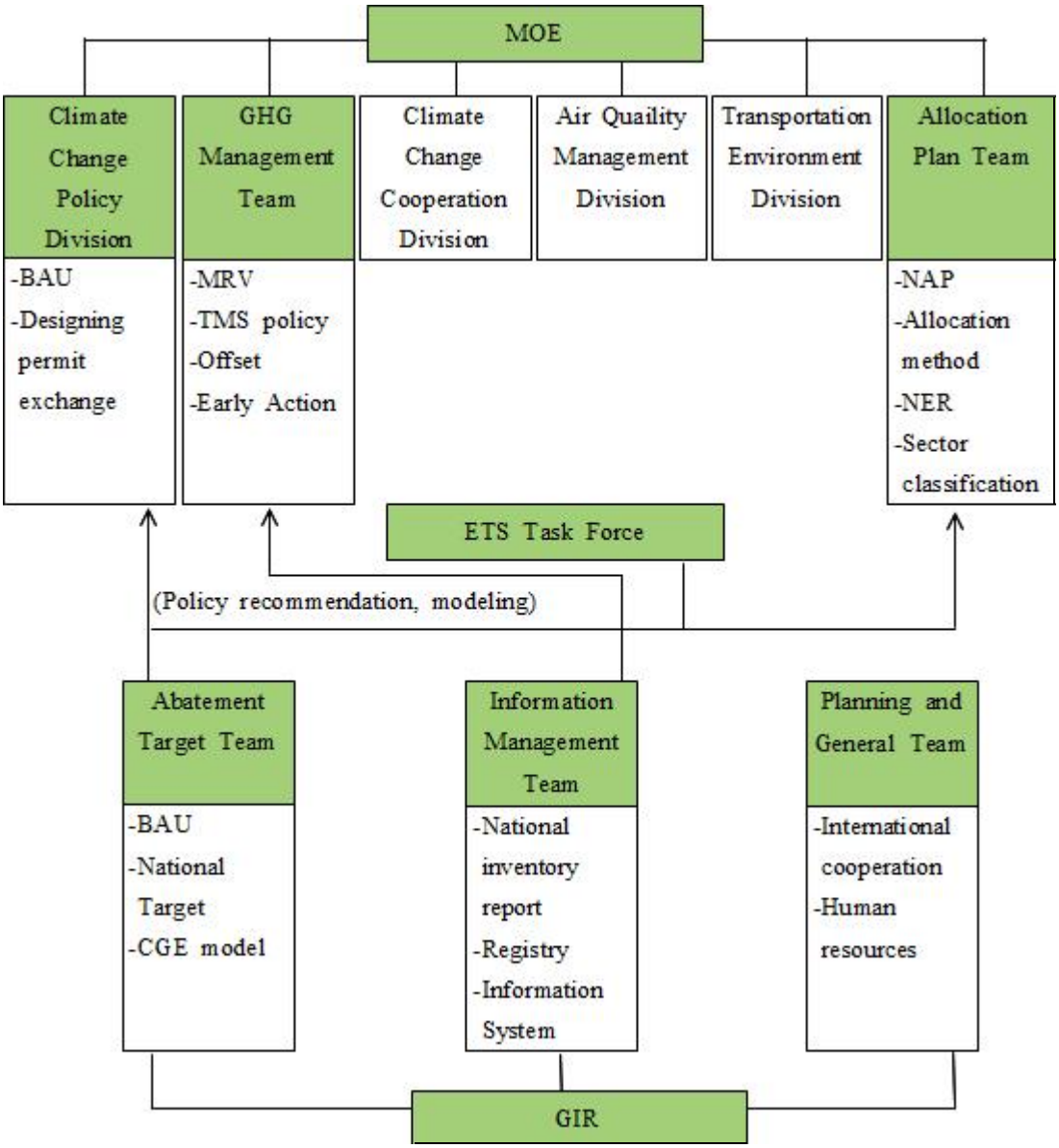
Source: Act on the Allocation and Trading of Greenhouse-Gas Emission Permits.

Table 7. Key Decision-making Institutions and Authorities Associated with the KETS

Decision-Making Institution	(Lead Authority)	Functions, Chair and Members
Green Growth Committee & Cabinet Meeting*	GGC (within the office of the Prime Minister)	▷Function: approve Master Plan drafted by ***MOSF*** ▷GCC was initially a Presidential Committee but became a committee under the Office of the Prime Minister when Master Plan was made. ▷The Cabinet meeting is the highest body for policy deliberation and resolution in the executive branch of Korea.
↓		
Allocation Committee	MOSF (the Ministry of Strategy and Finance)	▷Functions: approves National Allocation Plans (NAPs*) drafted by ***MOE*** and makes the final decision on market stabilization measures. * NAPs includes ETS cap, Sectoral caps, the new entrant reserve (NER), allocation methods, operation rules for offset, early action, emission banking & borrowing and etc. ▷Chaired by the minister of MOSF ▷Committee members - 12 vice-ministers of relevant government authorities and 8 exterior experts
↓		
Allocation Approval Committee	MOE (the Ministry of Environment)	▷Function: approves entity-level allocations prepared by the ▷Allocation Working Group* * Allocation Working Group is chaired by the president of the ***GIR*** and consists of exterior members. The GIR is a branch of MOE. ▷Chaired by the vice-minister of MOE ▷Committee members - director generals of relevant government authorities and exterior experts

Source: Modified from "Korean Emission Trading Scheme: Scheme Design and the Road Ahead (ETS Task Force of the Ministry of Environment, 2013)."

Figure 3. ETS Governance in the Ministry of Environment and the GHG Inventory & Research Center



Source: Korean Emission Trading Scheme: Scheme Design and the Road Ahead (ETS Task Force of the Ministry of Environment, 2013).

III. Main Contents of the KETS

3.1. Cap Setting

The cap, the upper limit of an aggregate GHG allowance budget on covered entities in a scheme, is an essential component of a scheme. In Korea, setting a cap became an extremely difficult task and triggered a lengthy and acrid dispute. The KETS cap for the first commitment period was derived through a process of the following: finalizing a national reduction target for 2020, designing a grand

map for 2020 to curb emissions and setting the KETS cap for the first commitment period covering the period 2015-2017.

National emission target for 2020

Setting a national emission target implies choosing a baseline against which emissions are to be reduced. In the process of setting a target, regulators seek to reconcile environmental targets with their economic feasibility. The national emission target (as well as the cap) is usually set in relation to historical emissions, often referred to as a base year, or projected future emissions (e.g., against a business-as-usual scenario).

It is quite challenging for regulators to set the national reduction target that both the international society for climate change and citizens can agree on, particularly in Korea. Given that Korea is a CO2-intensive economy, when the national reduction target is high, firms should largely adjust their output levels downward and, therefore, economic growth will slow down at least for a short time. Difficulties were encountered in presenting a reduction target lower than those of other developing countries, which promised reduction cuts of 30~40 percent by 2020. A series of discussions were held among government experts and business representatives, and various reduction scenarios were considered. Then, regulators chose "4% of 2005 GHG emissions level" as the national reduction target, taking into account the domestic industrial structure and international economic trends. The target of 4 percent, however, was lower than that of other countries—the EU announced a reduction target of 6 percent of 1990 GHG emissions. Strongly motivated by a desire to present to the international community with a formidable figure, the Korean government eventually adopted the concept, "business as usual (BAU)," to its pledge. Under this concept, a reduction of 4 percent of 2005 emissions by 2020 is actually equivalent to the reduction of 30 percent of the projected 2020 emissions. The two-digit figure was effective in asserting Korea's active commitment. In addition, the target level declared by South Korea was among the highest of the IPCC recommendations for Non-Annex I Parties—a decrease of 15~30 percent GHG emissions, and likely to be accepted without difficulty by the international community. It is worth noticing that this national reduction target was stipulated in Article 25(1) of the Enforcement Decree on the Framework Act and, therefore, the target became solidified in 2010.

Roadmap to curve the national GHG emissions

Although the Framework Act stipulated the 30 percent reduction compared to the BAU scenario, the BAU emissions level itself remained incomplete by late 2013. In fact, the BAU level had been already estimated at 7.76 billion tons of CO2e in 2009 when the Korea's pledge for the Copenhagen Meeting

had been prepared. However, the industrial sector requested to use the latest data and to re-estimate the BAU level as of 2013. Their request was accepted and the government was expected to release a revised 2020 emissions forecast under a BAU scenario in 2013, prior to the release of the Master Plan in December 2013.

In order to complete this mission, the government formed an inter-ministerial expert working group led by MOE in 2013. The mission of the working group was not only to re-estimate the BAU level but also to draw the "National Greenhouse Gas Emissions Reduction Roadmap 2020 (henceforth, the Roadmap)." The Roadmap is the national action plan contouring the GHG emissions to the target emissions level in 2020 and identifying reduction capacity and abatement methods by emission sectors. Due to data limitation and insoluble conflicts among stakeholders, it was next to impossible to fix the national as well as sectoral BAU levels. At last, the draft of the Roadmap was finalized in November 2013 and the final version in January 2014.

According to the Roadmap, compared to the BAU estimates in 2009, the amount of anticipated emissions from the industrial sector decreased, while a large increase was seen from electricity generation. In spite of these changes in emissions distribution, a gap in the aggregate between the old and new estimates was minute, approximately 3 percent. The government concluded that the benefits of updating would not be significant enough to compensate for the burden of altering the BAU estimate and adjusting the Korea's pledge to the international community. Thus, the government decided to abide by the BAU estimate for 2020 estimated in 2009 (7.76 billion tons of CO2). The Roadmap also projects BAU estimates and national emissions targets for the first commitment period (2015-2017), shown in Table 8.

Table 8. National BAU level, Emissions Targets and the ETS Cap for the First Commitment Period

Category (unit) / year	2014	2015	2016	2017	2020
BAU_t National (1 million tons of CO2e)	694.5	709.0	720.8	733.4	776.1
National reduction rate (% to BAU)	5.1	10.0	13.8	16.2	30.0
National emissions target (1 million tons of CO2e)	659.1	637.8	621.2	614.3	569.0
Yearly reduction rate (%)	-	3.2	2.6	1.1	
Cap* (1 million tons of CO2e)	-	573.5	562.2	550.9	-

Note: * The KETS cap includes the amount of indirect emissions.

Source: The Allocation Plan (2014).

A Cap for the first ETS commitment period

One of the salient features of the KETS is that it defines the emissions reduction targets by sectors and industries. Table 9 summarizes sectoral reduction targets that were first released in 2011 and revised in 2013. The Master Plan established by MOSF recommends that reduction rate should be the same for all emitters as long as they are in the same industrial sector. This has been reflected in the Allocation Plan.

Table 9. The Distribution of GHG Emissions in 2020 across Sectors & Target Reduction Rates

Category	Industry*	Transportation	Building	Agriculture, Forestry and Fishing	Waste Management	Public Sector	Total
Proportion of each sector to the total BAU of 2020 (BAU) (%)	56.0	13.2	22.0	3.6	1.7	2.3	100
Sectoral reduction rate compared to the BAU estimate of 2020 (%)	18.5	34.3	26.9	5.2	12.3	25.0	30.0**
Proportion of each sector to the total BAU of 2014 (BAU) (%)	53.7	13.7	22.2	4.3	2.1	2.5	100

Note: *The reduction target for industrial energy is 7.1%. ** The national reduction rate was calculated by adding the reduction amount (68.19 million tons) from conversion (power sector) to the reduction rate of each sector.
Source: National GHG Emissions Reduction Roadmap; Press release by MOE (28th January 2014).

Table 10 lists various methods to calculate the ETS cap considered for the first commitment period. Method A is the closest to the original draft established in 2011, which requires the application of both BAU and reduction rates for each sector. The calculation is as follows: The emissions target for 2020 can be calculated by applying the reduction rate by sector (δ^J) to the estimate of 2020 BAU emissions in Sector *J* presented in the Roadmap. Method A calculates the annual reduction rate (δ^{*J}) between 2015~2020 according to the principles of linear reduction and obtains the emission target for Sector *J* in year *t,* by applying the annual reduction rate regardless of whether it is covered by the ETS. Then, after obtaining the emission target for 2015~2017 and calculating the sum of three years, corresponding to the first commitment period (2015~2017), the ETS emission cap for Sector *J* in the first commitment period can be obtained. The BAU^J_{2020} calculation considers the sectoral growth rate ($r^J_{\tau\rightarrow 2020}$), target reduction rate (δ^J), and abatement capacity until 2020. Since these parameters are not conclusive but estimates, there are uncertainties associated with the calculation. While the sum of BAU estimates,

$\sum_{J=1} BAU^{J}_{2020}$, does not vary across researchers, there are notable differences in sectoral estimates. Several industrial groups including the Korean Association of Steel Manufacturers are planning to sue the Korean government by challenging the current Allocation Plan specifically on the appropriateness of the sectoral BAU and caps.

As shown in Table 10, the method used in the Allocation Plan is different from the original version, and uncertainty is less reflected in the decision for the sectoral emission cap. Principles of determining the ETS cap were offered by the Master Plan: First, the ETS should be a major policy instrument to reduce GHG emissions; second, the formula to set the cap should be simple and accountable; lastly, the reduction burdens of both ETS-covered and non-covered entities should be the same.

National BAU_t in Equation ① is the BAU emission level in year *t* defined in the Roadmap. And, the KETS BAU emission level in year *t* ($KETS\ BAU_t$) is calculated as a product of *National* BAU_t and $E^{KETS}_{2011/13}/E^{T}_{2011/13}$, the proportion of emissions produced by all covered entities to the nationwide emissions during the 3 base years (2011~1013). Then, the cap of Sector *J* in year *t* $KETS\ BAU^{J}_{t}$ in Equation ② is obtained by multiplying $KETS\ BAU_t$ and $E^{J,KETS}_{2011/13}/E^{KETS}_{2011/13}$, the proportion of emissions produced by covered entities in Sector *J* to the total emissions of all covered entities during the 3 base years. These two equations are not just a reflection of the government's willingness to conduct reduction policies so as to make both the ETS and non-ETS reduction rates the same, but also the result of applying the principle of simplicity. In fact, it is almost impossible to empirically prove differences in the emissions growth rate and reduction capacity between the ETS and non-ETS emitters in Sector J, though they exist. Lastly, as in Equation ③, the cap of Sector *J* in year *t* can be calculated by reflecting the sectoral reduction rate defined in the Roadmap on the projected emissions in Sector *J* in year *t*. With the cap for three years, calculated in the aforementioned way, the Allocation Plan can adjust yearly targets taking into consideration burdens on the industrial sector, while clarifying that the principle of medium-to-long-term linear reduction will be met. Results of the BAU and cap by sector and business type are displayed in Table A2 at the end of this paper.

This method is preferred as it decreases uncertainty through the use of historical emissions in 2011-2013, instead of using the predicted emissions for 2020. However, this method cannot reflect the growth rates of each sector and, therefore, it contradicts the abatement principle defined in the Framework Act. The $KETS\ BAU^{J}_{t}$ of 26 sub-sectors and caps of the KETS for 3 years are displayed in Tables A3 and A4.

Table 10. Calculation Methods for the First Commitment Period for ETS cap

	Methods used in the Allocation Plan	Original Plan (A)
BAU emissions for Sector *J* in 2020 = BAU_{2020}^{J}		$(1 + r_{\tau \to 2020}) \times E_{\tau}^{J}$
Emissions target for Sector *J* in 2020 = E_{2020}^{*J}		$(1 - \delta^{J}) \times BAU_{2020}^{J}$
Annual reduction rate = δ_{t}^{*J}		$\sqrt[2020-\tau]{E_{\tau}^{J}/E_{2020}^{*J}} - 1$
Emissions target for Sector *J* in year *t* = $TCAP_{t}^{J}$		$(1 - \delta^{*J})^{t-\tau} \times E_{\tau}^{J}$
① BAU emissions for the KETS in year *t* = $KETS\ BAU_{t}$	$National\ \ BAU_{t} \times (E_{2011/13}^{KETS}/E_{2011/13}^{T})$	
②BAU emissions for covered entities of Sector *J* in year *t* = $KETS\ BAU_{t}^{J}$	$KETS\ BAU_{t} \times (E_{2011/13}^{J,KETS}/E_{2011/13}^{KETS})$	
③ETS Cap for Sector *J* in year *t* = CAP_{t}^{J}	$(1 - \delta_{t}^{J}) \times\ KETS\ BAU_{t}^{J}$	

Note: *Non-ETS entities in Sector J included. Denotes the reduction rate of Sector J in δ_{t}^{J} year *t* defined in the Roadmap, which is adjusted δ^{*J} considering the conditions of each year. E_{τ}^{J} denotes the amount of emissions of the entire Sector J as of the base year, and is equivalent to the annual average amount of emissions in 2011~2013.

3.2. Inclusion of Direct and Indirect Emissions

In general, either direct or indirect emissions can be a subject of the ETS but not both simultaneously. In this sense, it is unique for the KETS to include both emissions associated with the power sector. The proportion of indirect emissions in Korea is high (above 20%) compared to other countries. Since the electricity price in Korea is cheap and does not reflect the changes in costs, regulators are concerned that consumers will not reduce their electricity consumption if the ETS covers direct emissions only and so it also included indirect emissions. This also reflects the fact that the Target Management System includes indirect emissions.

However, it brought controversy regarding double burden on a single release of emissions—along with opposition from industrial sectors. Nevertheless, MOE did not discard indirect emission (See Kim and Lim 2014 for details on the basis for the inclusion of indirect emissions and the reflection of indirect emissions on the cap). As expected, in fall 2014, the industrial sector rejected the Allocation Plan, attacking the inclusion of indirect emissions. The cap level, finalized in September 2014, was increased compared to the previous level released in June, as the reduction rate for indirect emissions was lowered. Most countries with an ETS, do not account for indirect emissions in the calculation of the cap or reduction target because of the following reasons: ① Where the power sector is included in the calculation of the cap or reduction target rates, the inclusion of indirect emissions is contrary to an

economic principle of being charged only once for each action; ② In particular, if the power sector shifts the burden of cost spent for buying emissions permits under the ETS towards the electricity rate, large electricity-consuming businesses would be double-burdened, contrary to the principle of fairness; ③ the quantity of emissions is double-calculated, making the calculation of BAU and reduction amounts more complicated hence a dent on the simplicity of the system.

3.3. Other Components of the KETS

Other key contents of the KETS are summarized and compared with those of the EU ETS in Table 11.

Coverage and Scope

According to Act 8 of the Emission Trading Act, "a business entity or a firm which emits no less than 125,000 tonnes of CO2 equivalents (CO2-eq) annually based on the average of GHG emissions for the preceding three years or a facility produces 25,000 tonnes of CO2 equivalents (CO2-eq) annually for the same period" among those defined in Article 42(5) of the Framework Act are subject to the KETS. In addition, "a controlled entity that does not fall under Subparagraph 1, but files an application for designation as a business entity eligible for allocation" (voluntarily participating entities) are all referred to as "entities eligible for allocation." They are subject to the allocation of emission permits under the KETS and responsible for reporting the amount of GHG emissions.

Unlike the EU ETS, the compliance unit of the KETS is either a firm or a facility. The Emission Trading Act stipulates two criteria to designate covered or eligible entities for allocation: a firm that releases not less than 125,000t CO2-eq on an annual basis and a facility that releases not less than 25,000t CO2-eq on an annual basis. This triggered several questions; for instance, a business entity operating several facilities, some of which release not less than 25,000t CO2-eq on an annual basis, but all of which release not more than 125,000t CO2-eq. Should each of them be treated as a single business unit, or should all of them be treated as one business entity? In the Act, "a business entity with a facility" that has produced 25,000 tonnes of CO2 equivalents (CO2-eq) is regarded as a business entity eligible for allocation, implying that the unit is "a business entity." In this sense, it should be understood that in the case of a business entity with a facility that has produced 25,000 tonnes of CO2 equivalents (CO2-eq) per year, no matter how many facilities it has, the business entity shall be treated as a single unit.

Another question arises in the case of a business entity with one facility whose annual emission amount is not less than 25,000t CO2-eq and another one whose annual emission amount is slightly less than 25,000t CO2-eq. When the Act is applied, the former would be subject to the ETS, and the latter would

be subject to the TMS, even though both belong to a single business entity (a firm). In this case, should the business entity fall under the ETS and TMS, respectively? Or, should all facilities of a firm be taken under the coverage of the ETS so that the business entity would be only responsible for the regulations under the ETS? There would be, of course, no problem at all if the entity is willing to implement both the ETS and TMS, respectively, according to the amount of emissions released by its places of business. But for an entity that finds it cumbersome, it could turn its place of business, which emissions do not exceed 25,000t CO2-eq into a voluntary participant under Article 8 (1) 2 of the Emission Trading Act by filing an application for designation as a business entity eligible for allocation. By doing so, the business entity could make both of its places of business eligible for the ETS, hence operational problems do not exist.

However, even if the compliance unit is either a firm or a facility, the statement (a report on the amount of GHG emissions produced) needs to be reformed by the unit of installation or product as in the EU ETS. Investment for better energy efficiency or lower carbon intensities, or dynamic effectiveness of the ETS tends to be maximized when the method of product benchmarking is used. For this reason, the Master Plan requested extensive use of benchmarking. To make the product benchmarking work, the reporting of emissions and activity level should be made based at the product level. Thus, the current format of statement reported at either a firm level or a facility level should be changed, which seems to an administrative burden in a near future.

Compliance Schedule

As in Article 46(1) of the Framework Act, stipulating "the Government may operate a cap-and-trade scheme," the implementation of the ETS was already under consideration at the time of the enactment of the Framework Act in 2010. Details of the system were scheduled to be defined in a separate law, since it might take some time to prepare for its implementation. Accordingly, the government initially planned for the system to commence on 1st January 2013 based on the belief that three years would be sufficient to prepare. Industrial sectors, on the other hand, rejected the schedule for reasons of delayed preparation and the necessity to review international cases concerning the implementation of the ETS. The government as well considered it partly necessary to postpone the launch so that it would be able to gather more reliable information on GHG emissions through the TMS adopted in pursuant to the Framework Act. Therefore, industrial sectors and the government agreed to a two-year postponement from 2013, and the Emission Trading Act included in Article 2, of its Agenda, that the first commitment period shall begin on January 1, 2015 and end on December 31, 2017, implying that the ETS will be initiated starting in 2015.

Expansion of the ratio of free allocation

Compared to the current version, the government's original version seems to have envisioned a KETS that was strict. The initial ratio of free allocation the government had in mind was 90 percent of the total emission permits in the first commitment period (2015~2017) and then zero free allocation after the end of the third commitment period (2021). This plan was considered quite radical, when compared to the EU's plan, which intends for the same (zero free allocation) starting in 2027. Hence, strong resistance was unavoidable and resulted in significant revisions to the free allocation ratios: not lower than 95 percent of the total emission permits in the first commitment period and the percentage to be decided in consideration of international trends by the Enforcement Decree in subsequent periods; not lower than 95 percent of the total emission permits in the first and second (2015~2020) commitment periods and the percentage to be determined by the Enforcement Decree in subsequent periods; and finally free allocation of all emission permits in the first commitment period, 97 percent of total emission permits in the second commitment and the percentage to be determined by the Allocation Plan but not higher than 90 percent of the total emission permits in subsequent periods.

Additionally, new regulations were added to support sectors with high dependence on export and energy, according to which all emission permits may be allocated for free to businesses whose international trade intensity and production cost increase results from GHG reduction that are higher than certain standards regardless of the legal ratio of free allocation.

Free allocation method

The KETS' basic free allocation method in the first commitment period is the "grandfathering", which determines the number of "emission permits to be allocated" (allowances) based on historical emissions of the concerned business entity. This method can be regarded inefficient since it would be a disadvantage to those with prior efforts to reduce GHG emissions or with advanced technology. The other method is benchmarking.

Through Benchmarking, the number of emission permits allocated per business entity are determined based on the amount of GHG emissions released by those in the same type of business that show a certain level of excellent performance in GHG reduction. This could help resolve unreasonable factors inherent in the grandfathering method. Thus, using the benchmarking method to determine the percentage of free allocation can be deemed more reasonable, but can only be made possible when there is sufficient GHG emission data available by business type and entity. The implication is that the system at its early stage of development, where there is insufficient data, will utilize Grandfathering. As data

is gathered and becomes sufficient, a transition will be made into Benchmarking for the allocation of emission permits.

In the first commitment period of the KETS, the types of business subject to free allocation according to Benchmarking are businesses in the aviation services, gray cement clinker and oil-refined products. The average total emission coefficients of those in the same business type is used as the benchmark value of the concerned business type or product, unlike the Best-Practice Benchmarking planned for the Phase Ⅲ of the EU ETS.

Securing elasticity in the choice of reduction methods: Banking, borrowing and offset

Article 13(1) of the Emission Trading Act stipulates that a business entity eligible for allocation shall prepare an allocation for emission permits stating the total number of emission permits applied for in each commitment period. Also, Article 17(2) of the Enforcement Decree of the same Act stipulates that the competent authority shall register the emission permits allocated to a business entity eligible for allocation in the emissions trading account of the business entity eligible for allocation, stating the compliance year in which the emission permits are allocated. This means that each permit will specify the year of issuance (vintage year) and therefore, in the case of fewer or more emission permits (for the vintage year) than necessary, the business entity will have to dispose of unused permits or purchase the shortage of emission permits by end-June in the following year, or all unused permits will become useless or penalty surcharges will be imposed for fewer emission permits surrendered than GHG emissions certified by the competent authority. However, the number of emission permits to be surrendered will be finalized in late May of the following year when the competent authority evaluates the validity of the statement report and certifies the actual amount of GHG emissions. This, in many cases, means business entities eligible for allocation are given only one month to dispose of unused permits or purchase additional emission permits if they are short. Similarly, when the disposal of or purchase of emission permits occurs intensively at a particular time, there may be abnormal fluctuations in the price of emission permits. To reduce the possibility of such abnormalities and to ensure each eligible business entity some elasticity to make a strategically advantageous choice (among disposal, purchase, carryover or borrowing), the Act allows eligible business entities—that are required to surrender emission permits—with approval from the competent authority to carry over unused emission permits into the following compliance year in the same commitment period or to the first compliance year in the following commitment period, or to borrow some of emission permits of the following compliance year when necessary to make up for the shortage. Unlike carryover, the Act only allows the borrowing of emission permits of the compliance year in the commitment period, which is intended to

prevent an unintended outcome: when the borrowing of emission permits of the following commitment period is allowed, eligible business entities short of emission permits could repeat borrowing from the following commitment period to surrender emission permits equivalent to GHG emissions certified, resulting in the weakening of incentives to reduce GHG emissions and making it impossible to check whether emissions reduction targets are achieved.

For banking and borrowing of emissions permits, Article 28 of the Emission Trading Act stipulates that an entity who holds emission permits shall carry over the emission permits to the following compliance year in the same commitment period or to the first compliance year in the following commitment period with approval from the competent authority, implying no limits. Conversely, Article 36 (2) of the Enforcement Decree of the same Act stipulates that the borrowing limits of emission permits shall not exceed ten percent of the emission permits to be surrendered, and it only allows the borrowing of emissions permits of the following compliance year within the same commitment period. Banking and borrowing limits of emission permits could undermine the elasticity of the system when they are set too low, or could weaken the incentives to continue reduction efforts in order to avoid penalty for failure to comply with the obligation to surrender emission permits, when set too high. Managing those limits within a certain scale is necessary. However, a limit on banking might result in a case where, when the number of unused permits (due to reduction efforts) exceeds the banking limit, the excess number of unused permits would become useless due to the limit of vintage year, unless disposed unconditionally, thereby forcing participating entities to give away rewards from their reduction efforts–thus, the reason for the Act allowing no limits on the size and period of banking.

The EU ETS regards Phase Ⅰ as a pilot period, hence there is no allowance of banking of emission permits from Phase Ⅰ into Phase Ⅱ, with an intention to prevent any early-stage errors of the ETS from affecting Phase Ⅱ. Due to such severance in the market, the prices of emission permit at the end of Phase Ⅰ will become zero, obviously because the emission permit of Phase Ⅰ is invalid in Phase Ⅱ. For countries with high possibility of errors in the early market designing, the EU ETS format would be preferred, while for those concerned with chaos resulting from severance in the market, the KETS scheme would be a better fit.

Meanwhile, a business entity eligible for allocation is allowed to undertake its duty to surrender emission allowances using the emission reduction credits obtained through a clean development mechanism (CDM) project referred in the Kyoto Protocol and reduction performance certified by the competent authority through GHG emission reduction projects outside the boundary of its business type—offset of emission permits. Acknowledgment of the offset of emission permits signifies that the ETS is designed to eventually reduce total GHG emissions, not to regulate respective source of

emissions. GHG emission reductions obtained outside the boundary of its own business type need to be recognized as long as they contribute to reducing total GHG emissions.

When these cases are accepted without limits, the probability that participants will select external projects that prove to be highly cost effective increases, implying a strong possibility that abilities to reduce GHG emissions could be weakened in the medium-to-long-term perspectives and difficulties will be met to induce innovation in technologies for GHG emissions reduction. For this reason, the number of types of certifiable external projects or the ratio of offset is limited in general. To buffer against this, Article 30 (1) of the Emission Trading Act stipulates GHG reductions generated through projects that comply with international standards and are defined in the United Nations Framework Conventions on Climate Change and relevant protocols, including CDM projects. Also, Act 38 (4) of the Enforcement Decree of the Emission Trading Act stipulates that the limit of surrender of offset emission permits that can be surrendered shall be determined by the Allocation Plan within 10 percent of the emission permits to be surrendered by a business entity eligible for allocation.

Furthermore, as South Korea makes an effort to reduce GHG emissions through the implementation of the ETS, although not included in Annex Ⅰ, domestic reduction efforts are far more important than achieving emissions reduction through overseas projects. Thus, the acceptable amount of GHG emissions reduction achieved by external projects performed in any foreign nation is limited to maximum 50 percent of the surrender limits of offset emission permits. This however, shall not be applied in the first and second commitment periods, according to Article 3 of the Addenda of the Enforcement Decree on the Emission Trading Act.

A ban on participation of any third party in the ETS market

Allocation of emissions permits are for eligible business entities, but the market for trading emission permits should involve participation of any third party so that, through a multilateral trading, the price of emission permits could converge towards a reasonable level. If a handful of eligible entities are allowed to trade emission permits, the market would become very thin, and it is very unlikely to find a right price of carbon through the ETS. In recognition of such risk, no foreign countries operating the ETS have banned third parties other than eligible entities from participating in the market.

South Korea was concerned about the possibility in which a participation of a third party—other than eligible business entities directly affecting the price of emission permits in industrial sectors—might encourage speculative activities in the market, causing a price escalation of emission permits. Accordingly, the objection of industrial sectors that were more concerned about third-party speculation than thin market resulted in the ban on the participation of a third party in the ETS trading market during

the first and second commitment periods. Meanwhile, the participation of four public financing institutions, including the government-owned bank, was allowed so as to serve as a market buffer in the event of occurrence of a thin market.

Table 11. Comparison between KETS and EU ETS

	KETS	EU ETS
National reduction target	- Voluntary - As of 2020: 30% reduction relative to BAU (4% reduction relative to 2005)	- Mandatory under the Kyoto Protocol (8% reduction by 2012 relative to the 1990 level) - As of 2020: 20% reduction relative to 1990 (13% reduction relative to 2005)
ETS initiated in	- January 2015	- January 2005
ETS commitment period	- 1st commitment period (3 years): 2015-2017 - 2nd commitment period (5 years): 2018-2020 - 3rd commitment period (5 years): 2021-2025	- Phase I (3 years): 2005-2007 - Phase II (5 years): 2008-2012 - Phase III (8 years): 2013-2020
ETS Coverage	- Not lower than 55% as of all GHGs (1st commitment period)	- 50% as of CO2 - 40% as of all GHGs (43% in Phase III)
Subjects	- 23 types of business in 5 industries:1) 1 power combustion-energy, 17 sectors (mining, food & beverages, textile, wood, paper, oil refining, petrochemical, glass·ceramics, cement, steel, non-ferrous metals, machinery, semiconductor, display, electricity·electronics, motor vehicle, ship building), public·waste materials (water service, waste materials), 2 building sectors (building, communications), 1 transportation (aviation) - Subject GHGs: carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrogen fluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF6) - Direct emissions + Indirect emissions	- Power sector, industrial sector: power combustion, oil refining, coke and steel, cement and lime, glass, bricks and ceramics, pulp and paper, others - Aviation: Inside the EU from 2012, outside the EU from 2014 (negotiations underway through ICAO) 2) - Subject GHGs: CO2 (industrial gasses, such as aluminum PFCs and N2 included from Phase II)

		- Direct emissions
Covered entities	- A facility that has emitted 25,000 tons or more of CO2e or a firm that has emitted 125,000 tons or more of CO2e per year during the preceding three years - New entrants (same criteria are applied) - Voluntarily participating business entities	- A facility that has emitted 25,000 tons or more of CO2e per year during the preceding three years - New entrants (same criteria are applied) - Voluntary participants
Number of eligible entities	- 525 entities (243 firm entities and 282 facility entities)	- 5,000 business entities across 30 countries (11,500 installations)
Target reduction rates in ETS-covered sectors	- 30% reduction relative to BAU in 2020 or 4% reduction relative to 2005 (same as the national reduction target rate) - Reduction rate for the 1st commitment period = 2% linear reduction on an annual basis (same for each industrial sector)	- Reduction of 21% relative to 2005 by 2020 - Phase III reduction rate = 1.74% linear reduction on an annual basis (equivalent to annual 5% reduction relative to 2010)
How to determine a Cap	- Estimated emissions and reduction potential by sectors are reflected in a bottom-up manner	- Bottom-up reflection of NAPs of each country by the end of Phase II - Reflection of a harmonized single EU-wide Cap starting in Phase III
Cap	- 1st commitment period (1 billion tons of CO2e): 16.867 (annual=5.62)	
How to allocate	- Free allocation * 1st commitment period: Grandfathering (basic), benchmark (on 3 items: oil refining, gray cement clinker, aviation) * 2nd commitment period and afterwards: extended application of benchmark cases - non-free allocation: auction	- Free allocation * Phase I, II: Grandfathering (basic), benchmark (partly) * Phase III: benchmark (basic), Grandfathering (auxiliary) - - non-free allocation: auction
Ratio of free allocation	- 1st commitment period: 100% - 2nd commitment period: 97% or lower - 3rd commitment period: 90% or lower - Sensitive sectors will receive 100% of their allowances for free. ① Trade intensity > 30% ② Production cost > 30% ③ Trade intensity > 10% + Production cost > 5%	- Phase I: 95% - Phase II: 90% - Phase III (excluding power sector): 80% in 2013 → about 30% in 2020 → 0% in 2027 * 0% for power sector from 2013 - Up to 100% free allocation for EITE sectors(based on trade intensity) 3)
BM calculation	- GHG/activity level average	- Average of top 10 percent of GHG/activity level
Allocation unit	- Firm & facility	- Installation
Emission permits	- Permit of 1tCO2e emission per 1 KAU	- Permit of 1tCO2e emission per 1 EAU
Offset	- 1st and 2nd commitment periods: Domestic offset alone is recognized (upper limit: 10%)	- CERs (offshore) and ERUs (onshore) recognized (Upper limit for Phase III:11%) - Recognition of CERs alone that have been produced in poorest countries since 2012

Borrowing	- 10% - Allocation is made one-year beforehand, hence higher borrowing limit than upper limit	- Not allowed - Allowance is made a year earlier, meaning borrowing within a year is actually possible within the pertinent Phase
Market-stabilizing measures	- Implementation of market-stabilizing measures through the Emission Permits Allocation Committee when abnormal price or excess demand occurs (emission permits in reserve, fixed price system, etc.)	- Price containment reserve: adjustment of emission permits in reserve to respond to abnormal prices
Auction market	- Korea Exchange (single market) - Limitations on market participants (KETS eligible business entities + 4 public financial institutions)	- Multiple markets - No limitations on market participants
Linking	- Not allowed in 1st and 2nd commitment periods	- International CDM market, Norwegian ETS, Swiss ETS (one-sided link), link to Australian ETS (full link)
Use of auction revenue	- Similar to EU ETS, but more emphasis on financing the operation expenses of KETS and using supportive financial resources for industrial sectors - Little emphasis on climate finance for developing countries	- Support to climate-related projects in developing countries (climate finance) - Investment in onshore renewable energy, EU targets, adaptation, assistance to low-income households in difficulties brought by the increase in electricity rates, afforestation projects, support for carbon storage (CCS) projects
Failure to comply with the obligation to surrender emission permits	- A failed entity shall return emission permits that are leftover, or pay penalty surcharges (three-times the market price within the scope of 100,00 won per tCO2e	- A failed entity shall pay penalty surcharges of 100 euros per tCO2e and be obliged to surrender emission permits additionally (a list of failed entities to be disclosed) 4)
Upper and lower limits for permit prices	- Lower limit: none - Upper limit: none (actually 100,00 won per tCO2e)	- Upper and lower limits: none

Note:1) Subjects of the Target Management System are 'road' and 'railway' besides 23 subjects eligible for ETS. 2) ICAO = International Civil Aviation Organization, 3) Emissions-intensive trade exposed (EITE), 4) Penalty surcharge in Phase I=40 euros/tCO2e.Source: Constructed by authors, using data such as the Allocation Plan (Sep. 2014), EDF/IETA (May 2013).

Source: Act on the Allocation and Trading of Greenhouse-Gas Emission Permits

4. Summary and Implications

South Korea's implementation of the KETS has incurred attention from countries around the world. South Korea, though recognized as a developing country under the Kyoto Protocol and therefore, has no responsibility to reduce GHG emissions, is attempting to initiate the ETS nationwide. The focus of this paper is to explain the background for the implementation of KETS, reviewing the characteristics that are different from those in advanced economies, estimating projected difficulties in its operation and thereby providing implications for developing countries in designing and operating of their own ETS.

Countries not included in the Annex Ⅰ, like South Korea, who are trying to reduce GHG emissions would see strong opposition from their industrial sectors, quite different from the EU. The likelihood of either postponing or cancelling the ETS is high. In securing a system, the emission cap may be revised upward (for less burdens of reduction), various support policies would incur effects of production subsidy, the price of emission permits reaching above the cost of internalization of externalities would lead to strengthening market-stabilizing measures focused on easing the burden in the industrial sectors. Modifications to the governance framework can also occur. Where there is a power imbalance between the industrial ministry and environment ministry resulting from exports- and manufacturing-oriented economic growth, the ETS implementation would not be possible through the governance framework of the environment ministry alone.

The most significant factor that has maintained the ongoing development of the KETS against unfavorable conditions is that the legislation of relevant ETS laws has been finalized. Other factors are: international negotiations over climate change continued to bring some pressure, though to a limited degree; the multiple governance framework—influenced by the willingness of the primary policy decision maker—has contributed to easing the power imbalance between disparate ministries; and numerous supporting policies have been developed to reduce negative effects on growth. However, these positive factors that supported the launch of the ETS are highly likely to turn into negative factors that could distort the operation of the ETS in the future. The multiple governance framework might result in conflicts between the growth policy and GHG emissions reduction policy, depending on the changes in economic conditions, and the consistency of the ETS-related polices. Also, other measures are highly likely to discourage corporate investment in GHG emissions abatement, a key to success of the ETS.

Comparing the KETS with foreign cases shows that the KETS adopts complicated methods in setting the emission cap (based on the estimated BAU level instead of emissions in the past, business type-based cap setting, simultaneous inclusion of both direct and indirect emissions, etc.), eluding the benefit

of simplicity. Meanwhile, the simple-format statement by a business entity or a place of business poses an obstacle to operating the ETS in a more reliable, cost-effective manner, compared to foreign cases. Moreover, the problem of a "thin market" is likely to worsen. Until recently, South Korea is considered a developing country and as such, Korea lacks the experience of risk management using auctioning or derivatives. The current KETS created an entry barrier as a market-stabilizing measure that is higher than that of foreign countries. The person in charge of selling and buying of emission permits are more inclined to concentrate on leaving no room for reprimand by making no trading efforts instead of hedging risks through trading. All these conditions imply a high possibility that the KETS market could go beyond a thin market to become a market with almost zero trading. In recognition of this, the government announced that the target price of trading emissions permits—which might incur the consideration of implementing market-stabilizing measures—is 10,000 won per ton, implying that now it is much harder to expect a "smooth" function of the market, particularly the price. When the price fails to function properly and trading does not occur, the ETS can become a system consuming huge administrative costs, instead of reducing GHG emissions in a cost-effective manner. Therefore, there is currently a need to prompt efforts to explore market-invigorating measures, not market-stabilizing ones, that simply concentrate on maintaining the price of emission permits at a low level in the design and operation of the ETS.

References

EDF/IETA, 2013, European Union: The World' Carbon Markets: A Case Study Guide To Emissions Trading

Kim, Y. and Lim, J., 2014, *An Emissions Trading Scheme Design for Power Industries Facing Price Regulation*, Energy Policy (forthcoming).

Ministry of Environment, *National GHG Emissions Reduction Roadmap;* Press release by the MOE (28th January 2014)

Ministry of Environment, *Allocation Plan*, 2014.

Ministry of Strategy and Finance, *Master Plan*, 2014.

Presidential Committee on Green Growth, *Framework Act on Low Carbon, Green Growth*

Table A1. Criteria for Designation of the TMS' Controlled Entities

	2010-2011		2012-2013		Beginning 2014	
	Company	Facility	Company	Facility	Company	Facility
GHG emission (CO2-eq ton)	125,000 or higher	25,000 or higher	87,500 or higher	20,000 or higher	50,000 or higher	15,000 or higher
Energy consumption (Tera Joule)	500 or higher	100 or higher	350 or higher	90 or higher	200 or higher	80 or higher

source: GIR(http://www.gir.go.kr).

Table A2. Projected BAU Emissions by Sectors and Sub-Sectors (Unit:1 MTons of CO2e)

Industry	Business	2014	2015	2016	2017	2018	2019	2020
Industry	Oil refining	16.1	16.2	16.3	16.4	16.4	16.5	16.6
	Mining	0.8	0.7	0.7	0.7	0.7	0.7	0.6
	Steel	110.3	115.0	115.4	115.8	116.2	116.5	116.9
	Cement	40.5	40.7	40.7	40.7	40.7	40.7	40.8
	Petrochemical	54.5	55.5	56.3	57.1	58.0	58.8	59.6
	Paper, Wood	7.9	7.8	7.7	7.6	7.5	7.4	7.3
	Textile	10.3	10.0	9.9	9.7	9.6	9.4	9.3
	Ceramics	5.1	5.1	5.1	5.1	5.1	5.2	5.2
	Non-ferrous metals	4.6	4.6	4.7	4.7	4.7	4.8	4.8
	Machinery	11.6	11.8	11.9	12.0	12.2	12.3	12.4
	Electricity/ Electronics	38.5	39.1	39.5	39.8	40.1	40.4	40.8
	Display	23.1	28.5	35.0	42.5	51.0	60.4	70.2
	Semiconductor	11.2	11.8	12.3	12.7	13.2	13.7	14.2
	Motor vehicles	11.1	11.3	11.4	11.5	11.6	11.8	11.8
	Ship building	2.8	2.9	3.0	3.2	3.3	3.4	3.6
	Other manufacturing	16.5	16.5	16.4	16.3	16.2	16.2	16.1
	Food & beverages	6.3	6.2	6.1	6.1	6.0	5.9	5.8
	Construction	2.6	2.6	2.7	2.8	2.9	2.9	3.0
	Subtotal	373.6	386.3	395.1	404.7	415.4	427.1	439.0
Transportation	Transportation/ Passenger car	95.0	96.0	96.7	97.4	98.2	98.9	99.6
Buildings	Home	78.2	78.6	79.1	79.7	80.2	80.7	81.2
	Commercial	76.3	77.0	78.9	80.8	82.7	84.6	86.4
	Subtotal	154.5	155.6	158.0	160.4	162.8	165.2	167.6
Public sector /Others	Public sector/Others	17.4	17.2	17.3	17.5	17.6	17.7	17.9
Agriculture, forestry and fishing	Agriculture, forestry and fishing	30.2	29.9	29.6	29.3	29.1	28.8	28.5
Waste materials	Waste materials	14.9	14.8	14.7	14.7	14.6	14.2	13.8
Total*		694.5	709.0	720.8	733.4	747.1	761.4	776.1

* Municipal gas (LNG) manufacturing and fugitive emissions (2 million tons of CO2e, 7.6 million tons of CO2e, respectively, as of 2020) included.

Table A3. KETS Cap by Industry and Business

(Unit: 1 million KAU)

Industry	Business		2015	2016	2017	2017
Total number of emission permits			573.46	562.18	550.91	1,686,55
Pre-allocated emission permits			543.23	532.58	521.92	1,597,73
Emission permits in reserve						88.82
Converted to	Power sector·energy		250.19	245.28	240.38	735.82
Industry	Oil refining		19.15	18.78	18.40	56.33
	Mining		0.25	0.24	0.24	0.72
	Steel	Processing, etc.	103.28	101.26	99.23	303.78
		F-gas processing	0.68	0.66	0.65	1.99
	Cement		43.52	42.67	41.81	128.00
	Petrochemical		48.86	47.90	46.94	143.70
	Paper		7.63	7.48	7.33	22.44
	Wood		0.38	0.38	0.37	1.13
	Textile		4.70	4.61	4.52	13.83
	Glass·Ceramics		6.26	6.14	6.02	18.42
	Non-ferrous metals		6.89	6.75	6.62	20.26
	Machinery		1.42	1.39	1.36	4.17
	Electricity·Electronics		2.88	2.82	2.76	7.17
	Display	Processing, etc.	6.71	6.57	6.44	19.72
		F-gas processing	2.44	2.39	2.34	7.17
	Semiconductor	Processing, etc.	8.25	8.09	7.93	24.27
		F-gas processing	2.20	2.16	2.12	6.48

	Motor vehicle	4.24	4.16	4.08	12.48
	Ship building	2.68	2.63	2.58	7.89
	Food & beverages	2.53	2.48	2.44	7.45
Transportation	Aviation	1.29	1.26	1.24	3.79
Buildings	Buildings	4.02	3.94	3.86	11.82
	Communications	3.09	3.03	2.97	9.09
Public sector·Waste materials	Water service	0.77	0.75	0.74	2.25
	Waste materials	8.92	8.74	8.57	26.23

* Municipal gas (LNG) manufacturing and fugitive emissions (2 million tons of CO2e, 7.6 million tons of CO2e, respectively, as of 2020) included.