

京都大学大学院経済学研究科  
再生可能エネルギー経済学講座  
ディスカッションペーパー

**韓国温室効果ガス排出量取引制度及び第1期計画期間(2015-2017)  
の企業の炭素経営**

**South Korea's Emission Trading Scheme and Company Carbon Management  
in The First Phase (2015-2017)**



**2021年6月**  
June 2021

長崎大学大学院水産・環境科学総合研究科  
准教授  
**昔宣希**

**Sunhee SUK**  
Associate Professor,  
Graduate School of Fisheries and Environmental Sciences,  
Nagasaki University



## 韓国温室効果ガス排出量取引制度及び第 1 期計画期間 (2015-2017) の企業の炭素経営

### South Korea's Emission Trading Scheme and Company Carbon Management in The First Phase (2015-2017)

長崎大学大学院水産・環境科学総合研究科 准教授 昔宣希  
Sunhee SUK

Associate Professor, Graduate School of Fisheries and Environmental Science, Nagasaki University

#### Abstract:

As the latest release of the Discussion Paper Series on the Korea Emissions Trading Scheme(K-ETS), this paper analyzed the background and characteristics in introducing the Korean emission trading scheme and the outliers in terms of system's government structure, following the previous paper on scheme design, allocation method, transaction market status, and so on<sup>2</sup>. In particular, focusing on the perspective of the business side, key issues surrounding K-ETS introduction and operation were identified and the ETS subjected companies' responses and carbon management to the scheme were clarified. The main gear in the introduction of K-ETS was that the government shifted the policy principle of energy-saving and GHG mitigation from Voluntary activities to negotiation agreement, furthermore, moved a step to introduce and utilise market mechanisms as a core measure for GHG mitigation. More importantly, although companies resisted the introduction of K-ETS and showed a low level of policy acceptance, they sought the second best option of carbon pricing in the direction of the policy shift rather than unilaterally opposing it. Regarding companies' response and carbon management, companies under K-ETS view the cap implicit in their allowance allotment as a mere matter of compliance and tended to take a wait-and-see attitude for the carbon market participating in the early stage. However, it is noteworthy that the awareness and interest of the top management level is increasing, and in particular, large corporations are introducing activated carbon management by setting internal carbon prices at the end of the First Phase. Experiences on the part of the industry in the initial stages of K-ETS are believed to act as a good point of reference and be increasingly relevant during the introduction of carbon pricing throughout many national and sub-national jurisdictions.

**Keywords:** Carbon management, Company's perspective, Greenhouse gases Emission Trading Scheme, Internal carbon pricing, South Korea

#### 要旨

本ディスカッションペーパーは、韓国排出量取引に関連するシリーズペーパーとしては、制度設計、割当方式、取引市場の現状について記述した以前ペーパーに続いて、韓国の温室効果ガス排出量取引制度の導入、背景と政府体制の特徴を分析し、また、ビジネス側の観点を中心に、K-ETS 導入と運用をめぐる主なイシューを把握した。また、第 1 期の ETS 対象企業の対応現状を整理した。K-ETS 導入の主要なギアとなったのは、韓国政府が省エネと温室効果ガス削減政策の原則を自主規制から交渉合意に切り替えた後、市場メカニズムを活性化する政策（炭素価格）へ転換したことと思われる。また、これに対して、企業が、K-ETS の導入に強く抵抗して、低い政策受容の立場を示したが、それにもかかわらず、政府の大々の政策転換に対して一方的な反対より妥協策を模索したことも考えられる。第 1 期間の初期段階では、企業は割当権に内在された限界を単に総量準拠の問題として認識し、したがって、炭素市場を観望 (wait and see) する傾向を示した。しかし、第 1 期末には、経営陣の認識と関心が高まり、特に大企業では、内部炭素価格を設定して、積極的な炭素経営を実施したことが見られた。K-ETS と産業のこのような経験は、炭素価格の導入を準備または検討している他の国や地方政府に参考のものになるだろう。

**キーワード：** 炭素経営、企業の見方、温室効果ガス排出量取引制度、内部炭素価格、韓国

<sup>2</sup> See below paper: ディスカッションペーパー No.20 「韓国温室効果ガス排出量取引制度の第 1 期及び 2 期の運営動向」 ([https://www.econ.kyoto-u.ac.jp/renewable\\_energy/stage2/contents/page0266.html](https://www.econ.kyoto-u.ac.jp/renewable_energy/stage2/contents/page0266.html))

## 1. Introduction

The Republic of Korea (hereafter, ‘S. Korea’) posited the greenhouse gas (GHG) Emission Trading Scheme (ETS) as a key measure in its climate change policy, whilst its energy and GHG mitigation instruments had mainly been based on voluntary approaches. Through Korean ETS (K-ETS), the government expects to achieve its GHG mitigation target cost-effectively and bring about a paradigm shift in the domestic industry toward sustainable economic development by providing incentives for companies to reduce their GHG emissions and encourage low carbon investment.

Given the accountability of industry regarding energy consumption and GHG emissions in S. Korea, its engagement has become essential to progress in and actual success of climate policies. Despite this, the new instrument based on a market mechanism has been met with firm resistance. For example, major business organisations such as Federal Korea Industry have issued several joint statements urging the government to revise its Business as Usual (BAU) estimates, provide more realistic goals for national GHG mitigation by 2020 and in its ETS allocation. Taken together this has resulted in delayed introduction of the scheme (MOEK press, 2012), watered down stringency (MOEK press, 2012), and the reallocation of more allowances (modified Allocation Plan, 2014).

Nevertheless, the Second Phase of the Scheme started in 2018, bringing to an end its 1st phase (2015–2017). Reactions have been mixed, ranging from a positive evaluation of its early stage to denunciation of ETS as a failure (Suk, 2018). However, positive performance has been confirmed in terms of GHG reductions, increased involvement of companies in the carbon market, and in implementation of policy. Upon entering its Second Phase, improvements to its components are being considered in light of its compatibility with other energy policies.

Some core issues relating to K-ETS resulting from the initial stages concern how heavy opposition of business circles can be overcome, how companies responded to K-ETS, as well as how the scheme can be improved operationally. This paper aims to answer above concerns based on the findings of a series of original empirical studies targeting domestic industries for the period from 2012 to 2016 (Suk et al., 2012, Suk et al., 2014, Suk et al., 2016, Suk et al., 2017, Suk, 2017, Suk, 2018 and Suk, 2021). The experiences of industry of K-ETS are believed to act as a good point of reference and gain increasing relevance during roll-out of carbon pricing throughout the national and subnational jurisdictions.

In relation to the above, section 2 of this article overviews the progress in K-ETS policy and section 3 discusses the features of introduction and operation of K-ETS – in particular the key issues, insights, and viewpoints surrounding K-ETS on the business side. In section 4, the corporate response to K-ETS from two angles, carbon management implementation and carbon market participation, are summarised. In addition, the latest findings of large-sized companies’ carbon management through on-site hearing are discussed. Section 5 concludes the discussions.



## 2. Progress in K-ETS policy over the past 10 years

S. Korea was exempted from the GHG reduction obligation in the first commitment period of the Kyoto Protocol (2008–2012). However, it was widely understood that it would be classified into the group with obligations for GHG reduction in the second commitment period (post-2013) and that preparations therefore should begin.

Therefore, S. Korea embodied climate change policies by positing the GHG emission trading scheme (ETS) as a cost effective measure in the Comprehensive Basic Plan for Climate Change (2008-2012), established in September 2008, and adopted quantifiable emissions reduction targets for 2020 in 2009. In 2010, the ‘Framework Act on Low Carbon Green Growth’ was enacted which together stated the legal grounds to introduce carbon pricing policies in S. Korea. In the same year, the Greenhouse Gas Inventory & Research Centre (GIR) was established to integrate management of the GHG inventory and MRV (Measurement, Reporting and Verification) system.

Accordingly, a preliminary proposal for S. Korea ETS was first released in November 2010 by the Cabinet, which recommended ETS be introduced from 2013. The proposal was strongly resisted by industry. In April 2011, a second ETS proposal was released reflecting the opinions voiced by industry such as regarding the ratio for free allowance allocation and deferral of the start date to 1 January 2015, and was submitted to the National Assembly (Prime Minister’s Office, 2011). The ETS bill, namely the ‘Act on Allocation and Trading of Greenhouse Gases Emission Allowances’, was finally approved by the parliament in May 2012.

While pilot projects were implemented targeting the public sector in 2010 as well as the industry sector in 2012 by Ministry of Environment of Korea (MOEK), respectively, follow-up measurements were taken promptly for establishing policy institutions, i.e., laws (Enforcement Decree of ETS Act, 2012) and plans (1<sup>st</sup> GHG ETS Basic Plan (2014) and the 1<sup>st</sup> National GHG Emission Allocation Plan (2014)). In 2015, K-ETS, which accounts for 70% of the nation's greenhouse gas emissions, was implemented in earnest. K-ETS was the first nationwide ETS in East Asia and was the largest carbon market globally with a national plan in 2015, except for the transnational plan, EU-ETS. K-ETS has ended its Phases 1 (2015-2017) and Phases 2 (2018-2020) with a planning period of 3 years, and entered Phase 3 of the 5-year period in this year.

Meanwhile, in 2015, S. Korea planned to reduce its GHG emissions by 37% from the BAU level by 2030 in its Nationally Determined Contributions (NDC). In order to realise this mitigation target, in 2016, the government strengthened the domestic climate response system and amended the ETS Act and the Enforcement Decree of the ETS Act (24 May 2016), thus augmenting the Scheme’s functionality. In 2017, the new government (President Moon Jae-in, since May 2017) formulated a national energy policy stance of phasing out nuclear and coal power (MOTIE, 2017) and revised the ‘National GHG Emission Reduction Roadmap by 2030’ to include a detailed implementation plan for achieving the reduction targets under the energy transition policy. In recent (October, 2021), the government declared Carbon neutral until 2050 through the Green New Deal (Cheong Wa Dae, 2020).

Amid this trend, the role of the ETS in achieving the mid- to long-term GHG reduction targets is expected to become more central.

The key milestones of K-ETS over the last decade are summarised in Table 1.

**Table 1 Milestones in Progress and Implementation Plan of ETS in S. Korea**

Year	Month	Milestone
2007	December	Established 4 <sup>th</sup> ‘National Countermeasures on Climate Change’
2009	January	Announced ‘New growth engine vision and development strategy’
	November	Pledged ‘National GHG mitigation target by 2020’
2010	January	Enacted the ‘Basic Law on Green Growth’
	July	Implemented pilot project of ETS for public sector
	November	Released preliminary K-ETS proposal
2011	April	Submitted second version of K-ETS proposal to parliament
2012	May	Approved ‘Act on Allocation and Trading of Greenhouse Gas Emission Allowances’
	June	Implemented pilot project for industry and power sector
	November	Clarified ‘Enforcement Decree of ETS Act’
2013	February	Launched ‘Task force’ to develop guidelines and allocation method
	May	Formed ‘Joint working group’ of experts from industry, research institutes, and academia for determining emission allowances
2014	January	Appointed ‘S. Korea Exchange (KRX)’ as carbon trading marketplace Established ‘National GHG Emission Reduction Roadmap by 2020’ and ‘GHG ETS Basic Plan’
	May	Published ‘National GHG Emission Allocation Plan’
	September	Finalised ‘Allowance Allocation Plan’ for the First Phase (2015–2017)
	December	Allocated allowance for each entity
2015	January	1 <sup>st</sup> phase started
2016	June	Announced ‘National GHG mitigation target by 2030’ Reorganised the response system for climate change and ETS
	December	Established a ‘Basic plan for responding to climate change’ and ‘National GHG Emission Reduction Roadmap by 2030’
2017	January	Released ‘2 <sup>nd</sup> Basic Plan’
	August-September	Decided to revise the 2030 National GHG Emission Reduction Roadmap and formed a working group
	December	Released ‘2 <sup>nd</sup> Allowance Allocation Plan(2018–2020)’
2018	January	Revised the government structure: MOEK is the main authority 2 <sup>nd</sup> Phase started
	April	Launched a carbon trading market council
	May	Announced the draft of revised 2 <sup>nd</sup> Allowance Allocation Plan (2019–2020)
	July	Revised the ‘2 <sup>nd</sup> Allowance Allocation Plan’
2019	January	First auction
	December	Announced ‘3 <sup>rd</sup> Basic plan’
2020	September	Announced ‘3 <sup>rd</sup> Allowance Allocation Plan(2021–2025)’
2021	January	Started the 3 <sup>rd</sup> phase

Source: Update of list in Suk (2015) by the author



### 3. Characteristics of ETS introduction and Operation in S. Korea

#### 3.1 Policy paradigm shift in reliance on voluntary action and use of market mechanisms

Previously, energy and climate policies in S. Korea had mainly been based on voluntary or regulation-driven management approaches. In 2008, the government released the ‘National Energy Plan (2008–2030)’, which depicted a roadmap for energy efficiency policies to be gradually transformed from voluntary agreements (VAs) to negotiated agreements (NAs) by extending the scope of the target entities. Of the NAs, the GHG and energy target management system (TMS) and domestic ETS were addressed.

#### 3.2 Introduction of the stepping-stone system: GHG and Energy TMS

A mandatory scheme, the TMS was introduced in 2010 as the first scheme for systematically managing large amounts of national GHG under the Framework Act, and was the forerunner to full-blown introduction of K-ETS. It was designed to cap the energy consumption and GHG emissions of energy-consuming entities and business sites from seven sectors (industry, power, building, transportation, agriculture, livestock, and waste) according to certain criteria, with the target entities of such criteria broadened in scope incrementally, as shown Table 2.

**Table 2 TMS criteria and reduction targets**

Year	Criteria			Participants (Entities)	Projected Emissions (Mt-CO <sub>2</sub> )	Permitted Emissions (Mt-CO <sub>2</sub> )	Target reduction Rate (%)	
	GHG (t-CO <sub>2</sub> )* Energy use (TJ)	Entities	Business sites					
2012 <sup>a</sup>	GHG emissions	125,000	25,000	Total	458	606	598	1.44
	Energy use	500	100	Power Industry	366	585	577	1.42
2013 <sup>b</sup>	GHG emissions	87,500	20,000	Total	480	590	572	3.02
	Energy use	350	90	Power Industry	377	571	554	3.00–3.02
2014 <sup>c</sup>	GHG emissions	50,000	15,000	Total	560	606	589	2.80
	Energy use	200	80	Power Industry	426	583	568	1.05–4.48

Source: <sup>a</sup> MOEK press (2014), <sup>b</sup> MOEK press (2012), and <sup>c</sup> MOEK press (2013)

MOEK performs overall inter-ministry coordination and provides the enabling conditions, such as setting standards and guidelines, as well as managing verification agencies, while the related Ministries determine target entities from each sector, set targets based on negotiations with the entities, and evaluate their performance. Through this, MOEK improves system functionality for national GHG management.

Entities in the scheme are required to measure their GHG emissions, submit mitigation plans for each compliance year, and be verified through the MRV system, which has meant inventories for GHG emissions were in place early (Suk 2015). Although the GHG reduction targets in this scheme were not high, results of TMS performance showed that the targets had been achieved and exceeded several times over (MOEK press, 2014). Such results added credibility to the related policy of cap setting measurement for GHG mitigation, which has in turn impacted on government policy decisions related to ETS introduction to a certain extent.



### 3.3 Carbon tax or emission trading scheme?

In the early phase (1990–2000), discussions on carbon pricing policy in S. Korea centred on carbon tax via reform of the energy taxation system. In December 2007, under the Noh government (2003–2007) the Forth Comprehensive Plan on Countermeasures to Climate Change (2008–2012) stipulated establishing a Framework Act of Climate Change (tentative name) by 2009 covering the introduction of a carbon tax as a key measure for GHG reduction (MOEK press, 2005).

The succeeding Lee Myung-bak Government (2008–2012) further advanced the climate change policy of Korea with a green growth strategy as a flagship development paradigm and in 2008 announced the ‘Comprehensive Basic Plan for Climate Change (2008-2012)’, which replaced the Forth Comprehensive Plan on Countermeasures to Climate Change (2008–2012) of the previous regime. As mentioned above, the ‘Comprehensive Basic Plan for Climate Change (2008-2012)’ denoted the ETS as a measure for efficient reduction of GHG, and indicated its full-scale implementation and provisional schedule based on the preparation of a basic plan and pilot implementation. Meanwhile, regarding the carbon tax, it has been proposed to reorganize the current energy tax system in a climate-friendly direction in the mid to long term. Considering the increasing ETS adoption around the world, i.e., European ETS in 2005 as well as the anticipated expansion of the international carbon market in the future, this government has recognised the emerging importance of carbon pricing and changed its political focus from carbon tax to ETS by emphasising linkage with the international carbon market in the future (Special Committee for Tax Reform, 2005). Thus, government-led support and leadership is likely to be a major factor in the introduction of carbon pricing policies, particularly K-ETS in S. Korea.

Whilst Korean companies value maintaining amicable relations with the government and try to avoid disagreement, it appears that, in accordance with the government's national vision and resultant heavy focus on low-carbon policy, they have made a circumvention choice between either accepting carbon pricing, carbon tax, or ETS rather than a unilateral objection. The reason they sided with the latter, ETS, is believed to be that rather than face the inevitable burden imposed by upstream carbon pricing and carbon tax based on the carbon content of fuel consumption, ETS, which is based on downstream carbon pricing of actual emissions, is thought to provide more options to mitigate the burden through negotiation between government and enterprises for allocation of allowances more favourable to them.

After the introduction of K-ETS, discussion on carbon tax was shelved, other than as a means complementing ETS to maximise the effect of GHG reduction or as a countermeasure against air pollutants such as particulate matter 10 or 2.5. However, as S. Korea announced that it aims to be carbon neutral in 2050 by actively responding to climate change in 2020, it would be necessary to include discussions on a carbon pricing policy mix that considers carbon tax in order to bring about long-term and large-scale GHG reductions.



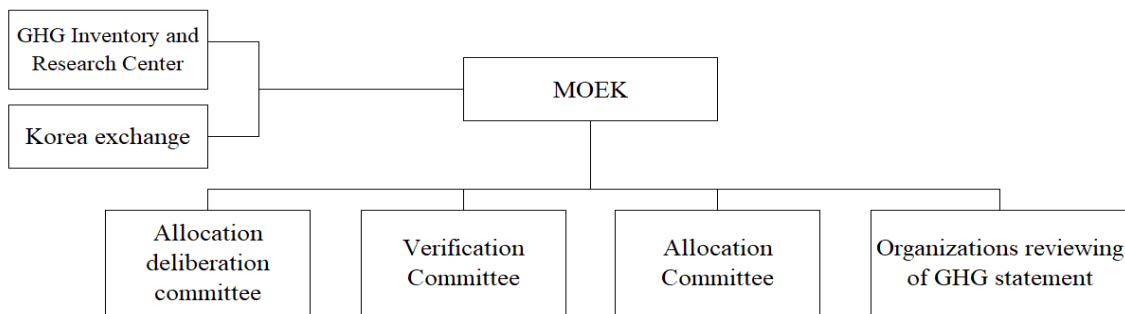
### 3.4 Changes of competent ministry and the latest governance structure

MOEK was appointed as the competent authority in charge of K-ETS under the auspices of the Lee administration, based on its function of pollutant regulation and experience in managing national GHG through the TMS operation. It also performed overall coordination of the scheme, including designating and notifying ETS participants; establishing an emission allowance allocation plan; determining, adjusting, and cancellation of allowance allocation; MRV; operation of the offset programme; operation of the registry; issuing of penalties; and inspection of compliance status.

However, through the initial implementation year, the presence of a power imbalance between the MOEK and ministries as well as limitations in its management system became apparent regarding the handling of the target companies, mainly in the industry and power sectors, which account for over 80% of total targets under K-ETS and in providing support to output growth. The industry side then became vocal, asserting that in spite of the founding precepts of climate change policy and emission trading system in terms of compatibility with the environment and economic development, K-ETS had actually only focused on reducing GHG, at the expense of industry.

This led, in 2016, to a revision of the ETS Act and the Enforcement Decree of the ETS Act (24 May 2016) in terms of the governance structure of K-ETS, which made the Ministry of Strategy and Finance (MOSF) the most powerful ministry in charge, with competent Ministries (Ministry of trade, industry and energy, Ministry of environment, Ministry of land, infrastructure and transport, and Ministry of agriculture, food and rural affairs) below it and regulating the designated sectors for selection of liable entities, allocation and cancellation of allowance, approval of submission, banking and borrowing, and the offset scheme.

Since this, however, a further authorisational restructure of ETS has taken place (December, 2017) returning key authority to MOEK from 2018 upon regime change as Figure 1. This new strategic governance architecture was designed by the government to overcome the previously revealed weakness of MOEK, thereby also underscoring the importance of achieving the 2030 mitigation target.



**Figure 1 Response system of K-ETS in the Second phase under the MOEK**

(Source: Modified from the GHG ETS Basic Plan, 2017)



## 4. Company perspectives and responses to K-ETS

### 4.1 Business perspectives on K-ETS introduction in the early stage

In connection with the introduction of ETS, whilst the government has emphasised the policy effectiveness and efficiency of using market functions, in that its cost performance for GHG mitigation has twice the efficiency of direct regulation, as well as the anticipated increased status of the country on the international stage due to its exemplary efforts in dealing with climate change, the opinion of industry on the perceived merits differs widely from the government's stance. In response to a survey carried out involving the target entities on the merits of ETS, it was found that S. Korean businesses exhibited strong resistance to the introduction of this new instrument. Empirical studies revealed that businesses indicated low acceptability of carbon pricing policies (Suk, 2017), showed limited affordability of costs originating from the introduction of ETS (Suk et al., 2014), and insisted on delaying the start time to 2020. To be sure, they have adopted, somewhat hypocritically, the view that the government has transferred the entire burden of GHG emissions reduction onto industry.

Industry also raised concerns over the negative aspects of increased production costs, which it saw as a burden on the nation's economy (Suk and Liu, 2015). Furthermore, it asserted that existing regulations are sufficiently strong and effective (Suk et al., 2013a) and also pointed out its good record in abiding by existing regulations as well as high achievements in energy efficiency improvements and GHG mitigation to date, leaving little potential for further enhancement. Companies also concerned that early action of S. Korea would incur significant adverse impacts on domestic industry competitiveness in international markets, considering the slow advances in policy of other major competing economies – a reference to the early 2010s when nationwide ETS had only been introduced in the EU, New Zealand and Australia, with other major economies such as the US, Japan, and China only having regional level ETS. Businesses were also skeptical of the policy effect of GHG mitigation through ETS, particularly the lack of empirical evidence in terms of existing schemes, as well as the unscientifically optimistic interpretation of TMS results. Moreover, it was pointed out that given S. Korea's only minor global share of GHG emissions (about 1.7%), its potential contribution to overall GHG emission reductions was negligible.

Another reason why Korean companies were reluctant to introduce market mechanisms was due to concerns over their lack of readiness or capacity to cope with new mechanisms within such a short time period. In particular, the situation differs according to the size of the company – the smaller the company (i.e., SME; small/medium-sized enterprises), the more passive the company strategy is compared to larger companies. As SMEs only have limited information on carbon markets and carbon prices compared to the larger companies that would be more familiar with market analysis, this implies the smaller companies would both be less able and less incentivised to take part in the carbon market.



## 4.2 Key issues in scheme design and operation of K-ETS from the companies view

When the introduction of the K-ETS was approved and system design announced, the debate moved on to another round, this time regarding institutional matters: ‘ETS scheme design’ and ‘carbon market’. This section discussed some issues in particular related to allowance allocation, indirect emissions, and market liquidity.

Regarding the scheme design of K-ETS, the most important issue was allowance allocation. Generally, the grandfathering method was performed for most industries, except cement, oil refining and air industries in the First Phase. Companies received emission allowances according to their historical emissions throughout 2011–13. However, there was a backlash from industry against the initial allocation plan, which it regarded as unfair due to the insufficient quantity calculated due to underestimated BAU projection of GHG emissions. Above all, industry has argued that the process of allocating and allocating was not transparent and unfair. Some industries pointed out that the government did not fully take into account for plants planned additional new construction. After the scheme started, 243 companies, or 46.3% of the total regulated companies, requested their allocations be increased and the allocation criteria be revised (MOEK, 2015), and several companies even filed class action lawsuits against the ministry’s allocation plan (FKI, 2015).

Under K-ETS, in addition to the direct emissions resulting from economic activities, indirect emissions from the use of electricity or heat from outside sources is to be included in the total emissions (Guidance on Reporting and Certification of Emissions from the GHG Emissions Trading Scheme, 2017). Looking at the emissions of K-ETS companies from 2014 to 2016, indirect emissions account for about 17% of total emissions (GIR, 2018). This is one of the major issues of conflict, since companies pointed out that it represented a double burden of emissions from power use as well as the corresponding surcharge when the power sector transfers the reduction costs to electricity bills. According to KEPCO's estimate for 2014, the expected rate of increase in electricity tariffs for the first phase of the three-year period was about 2.0 to 2.6% (Money Today, 2014). Unlike other carbon markets – for example, EU-ETS – the Korean market includes indirect emissions due to factors such as structural differences in the electricity market that electric utilities can’t pass the price on to consumers and low electricity rates in the present industry. Discussions on this issue are likely to continue into the second period.

Regarding the carbon market, problems of instability and low credit liquidity were foreseen due to the high concentration of GHG emission emitters in some sectors such as power, iron & steel, petrochemical and cement. In actual fact, the number of business sites emitting GHG emissions over 25,000t-CO<sub>2</sub> in the first year of K-ETS – the criteria for a business site to be subjected to K-ETS – was only 525, of which the manufacturing sector’s share was 78%. Although the number of target companies gradually increased to almost 600 in the first year of the 2<sup>nd</sup> Phase, of these, about 40% were accounted for by the top 25 business sites, excluding

the power sector. As a result, the market overall remained stagnant, resulting in only a negligible amount of emissions being traded, through intermittent transactions, in the early phase (Suk et al., 2017). This led to market instability, and as a result, the government adopted measures for market stabilisation during the 1<sup>st</sup> phase, by supplying a market stability reserve to balance the supply and demand (0.9 million allowance, June 1-3, 2016, 5.5 million allowance, 30 May, 2018), easing the borrowing rate (20% increase from 2015 to 2017 only), allocating additional allowances (6.8 million tonnes, January 2017), and strengthening the carryover limit (April 2017). Whilst the need for and side effects of such government intervention in the market have been much debated, one thing is certain, which is that trading liquidity in the current market cannot be assured without government inducement and involvement. However, this requires governmental intervention to clear up any policy uncertainty concurrently with addressing policy consistency and transparency of related policies. Other major issues surrounding K-ETS from the industry side are described and summarised in Table 3.

**Table 3 Major issues of ETS and corporate perspectives**

Issue		Industry views
The necessity of introducing the system		<ul style="list-style-type: none"> <li>Usefulness of the existing regulations and industries' good performance to date</li> <li>Limited potential of companies for energy efficiency and GHG mitigation</li> <li>Weakened industrial competitiveness due to earlier action than major competition countries</li> </ul>
Companies' readiness and capacity		<ul style="list-style-type: none"> <li>Insufficient preparation and lack of capacity for the policy change to market mechanisms</li> <li>Energy and environmental issues are not a priority for the business</li> <li>Start time should be delayed until after 2020</li> </ul>
Policy effectiveness of ETS	CO <sub>2</sub> reduction	<ul style="list-style-type: none"> <li>Ambiguity of the expected contribution of ETS to GHG reductions</li> <li>Minor global contribution of GHG mitigation by S. Korea</li> </ul>
	Economic effect	<ul style="list-style-type: none"> <li>Lack of evidence on the cost effectiveness of the scheme alongside its deep and inevitable impact on industry</li> </ul>
	LCT investment	<ul style="list-style-type: none"> <li>Capital for investment in low carbon technology and R&amp;D will be used to buy credits</li> <li>Creating a market that generates profit through low carbon technology development and investment</li> <li>Lack of preferential supports by government</li> </ul>
	Carbon leakage	<ul style="list-style-type: none"> <li>Domestic deindustrialisation</li> <li>Foreign companies hesitate to invest in S. Korea</li> </ul>
ETS scheme design	Allowance allocation method	<ul style="list-style-type: none"> <li>Underestimated allowance based on underestimated BAU</li> <li>Disclosure of method for calculation of BAU GHG emissions forecast</li> <li>Necessity of revision of sectoral based-allowance allocation method</li> </ul>
	Relationship with existing policy	<ul style="list-style-type: none"> <li>Lack of clarity over measures to avoid double burden with existing regulations</li> <li>Limited recognition of early reduction</li> </ul>
	Indirect emission	<ul style="list-style-type: none"> <li>Double burden</li> </ul>
	System complication	<ul style="list-style-type: none"> <li>Simple manuals or related consulting company services are necessary</li> </ul>
Carbon market	Operation	<ul style="list-style-type: none"> <li>Low credit liquidity and instability of carbon prices due to insufficient supply of allowances and small number of ETS targets</li> <li>Diversification of trading products in the market</li> </ul>
	Government intervention	<ul style="list-style-type: none"> <li>Obstacle of market mechanisms for sound price signal</li> <li>Company relinquishes its decision to participate in the market and relies on incentives from the government's market intervention</li> </ul>
	Carbon market linkage	<ul style="list-style-type: none"> <li>Carbon abatement by purchasing external carbon credits can reduce domestic mitigation motivation.</li> <li>Ambiguity of the possibility and feasibility of market linkage.</li> </ul>

Source: listed by the author based on the several government released materials



### 4.3 Carbon management of S. Korea companies: improvements and determinants

Given the increasing reliance of GHG management on market mechanisms in S. Korea, companies are facing challenges with new legislation and institutional arrangement, as well as the requirement of being accountable for their GHG emissions.

Based on the study by Suk (2018) diagnosing the current status of Korean companies' carbon strategies through categorisation into five strategic stages (passive, reactive, defensive, accommodative, proactive; with clustered related company activities in each stage) using company level data, in terms of the integrated financial strategy of carbon management, Korean companies have yet to reach the stage of proactive management. In fact, their response to carbon pricing appears, on the whole, to still be at an initial stage as far as adopting a systematic and analytic approach goes, which is to say, their response is more akin to compliance, the remit of which remains within the bounds of existing strategies focusing on pollutant reduction targets. They are likely to be affected by the need to appear socially responsible as a part of Corporate Social Responsibility (CSR) or to make a social contribution, without having to exceed this mandate in terms of activities outside of this remit.

Nevertheless, a small proportion of companies, mainly large-sized companies, have advanced to the stage of proactive carbon management (Suk, 2018). There were two times on-site interviews with companies in early time of the K-ETS starting, February in 2015 from power, paper, electronics and chemicals, and information technology sectors, and in the last moment of the 1<sup>st</sup> phase in December in 2018 from the sectors inducing power, electronics, chemicals, food, tire, information technology. Large-sized companies' responses and activities for K-ETS, and several important determinants were identified, which are explained below focusing on the findings in 2018 comparing 2015.

Activities related companies' energy and carbon performance were checked their implementation status by interviewed companies. Comparing to the 2015, the remarkable differences were placed below three activities: (1) establishing a cooperative system between related divisions in two dimensions-horizontal cooperation: General executive + ETS department + Finance department + Strategy and planning department and vertical cooperation: Headquarters + individual sites (actual reduction activities), (2) setting an internal carbon prices and apply them for ROI when investing in low carbon equipment and facilities, and use them to create carbon funds and (3) structuring a carbon market response system for transaction Decision Making System, analysis and identification of periodic carbon market trends and etc.

These changes are in line with the global trend seeking to manage the burdens whilst avoiding reduced competitiveness. Affirmatively this study confirmed that some Korean companies are becoming increasingly aware of the need for carbon management and embedding relevant strategies, for example, internal carbon pricing, into their operations by viewing this as an opportunity to transition to low-carbon business models. The carbon strategies and carbon management practices utilising their carbon options linked with economic value found in such

business circles are of paramount importance. Therefore, as shown in Table 4, it is noteworthy that all of interviewed companies implemented their own ‘internal’ carbon pricing, mainly reflecting the average of market pricing for a certain period of latest 3 months or 1 year, to promote proactive carbon management and make short- and long-term decisions in innovative management and investment related to the introduction of carbon management.

**Table 4 Large-sized companies’ carbon management status under the K-ETS**

Sectors*	Power	Chemical	Electrical	Electronics	Semi-conductor	IT	Tire	Food
Carbon management								
Establishing a cooperative system between related divisions	○	○	○	○	○	○	○	○
Setting the GHG mitigation targets	○	○	○	○	○	○	○	○
Setting the internal carbon pricing	Market price	30,000 won	Market price	Market price	Market price	Market price	Market price	Market price
Applying internal carbon prices to ROI	○	○	○	○	○	○	○	○
Raising a carbon fund using internal carbon prices		○					○	
Construction of emission trading decision-making system	○	○	○	○	○	○	○	○
Analysing and identification of periodic carbon market trends	○	○	○	○	○	○	○	○

\*Sectors to which the interviewed companies are belonging.

Source: the author listed based on the findings through interviews

As carbon reduction doesn’t mean merely pollutant control, and also refers to generating asset value by reducing GHG, the merits of carbon management need to be extended by applying the concept of monetary across the entire spectrum of corporate management decision making, i.e., production, distribution, procurement, supply chain management, communication, and marketing. Doing so would enable companies to take measurable approaches in different scenarios to optimise their management of GHG and to best allocate capital under investment strategies to deliver higher returns. Indeed, a company’s internal carbon price was found to correlate with proactive carbon management, in that companies with a higher internal carbon price are more concerned with carbon pricing policy and strategically elicited a higher level of carbon management (Suk, 2021).

As also found in several empirical studies (Quazi et al., 2001, De Brio et al., 2001, Katsikeas et al. 2016) that ‘top manager’s support’ is the most influential determinant of carbon management, through on-site interviews – it was confirmed that there are positive signals in top managers’ perception and interest. Further, whether a company adopts proactive, strategic carbon management – which leads to better carbon management performance – is to a large



degree determined by the extent the policy is understood by the management. It is notable that even if the policy is not favorable, understanding of the policy enhances the company's response to carbon pricing (Suk, 2017).

In other words, GHG management as a response to K-ETS has become a major agenda item in corporate management since the introduction of the ETS, while it seems energy and carbon related management issues have yet to become so. It is worth noting that some companies have made a point of expanding investment in related projects within their organisations.

Based on the results of the above studies, changes in company performance under ETS are worth highlighting. The pressure and stringency of government policies also acts as a stimulus for proactive corporate carbon management, a finding similar to that of positive coercive effects exhibited among firms in the EU addressing climate change. One noteworthy finding witnessed in the Korean case is that the function of government pressure on corporate energy and carbon management has changed, and acquired more importance as a determinant in ETS compared to before. Hence, in order to encourage the private sector to establish carbon management strategies that look beyond existing standards and norms, the government will need to aim at providing ongoing policy support to improve market function and effectiveness (Suk, 2018).

#### 4.4 Company responses to the K-ETS in the First Phase, and barriers of emission trading

The total allowable emission during the first Phase was 1,690 million tons, of which 1,686 million tons were allocated to the target companies<sup>3</sup>. At the end of the Phase, the amount of allowance submitted from those companies was 1,669 million tons, 17.4 million tons less than the final allowances. There were 3 companies (1 in 2015 and 2 in 2017) that failed to comply the cap obligations, and a penalty was imposed on these companies.

In order to meet the emission cap, companies subject to allocation can utilize trading and flexibility mechanisms (offset, borrowing and carryover) in addition to internal reduction activities (GIR, 2019). It was readily apparent that companies were reluctant to participate in trading in the early stage. As a priority action to make up for the insufficient emissions allowance, companies showed that they tend to cover any lack of allowance via internal management, e.g., environmental equipment expansion, technology development and adoption, and production adjustment (Suk, 2017). However, purchasing emissions via market trading was considered as a low priority alternative. As a result, only a negligible amount of allowance was traded, a total of 86.2 million tonnes during the transaction period of first phase (January 2015–August 2018) (GIR, 2019), 5.2% of the total final-allocated allowance in that period. And, the submitted allowance procured through emissions trading were 58.8 million tons, accounting for 4% of the total allowance submitted.

The chief reason for lack of participation in the system on the part of companies is the

<sup>3</sup> The allocation method and the results of the First phase is described in detail in the following paper reported by the same author as this paper. ディスカッションペーパー No.20 「韓国温室効果ガス排出量取引制度の第1期及び2期の運営動向」  
([https://www.econ.kyoto-ac.jp/renewable\\_energy/stage2/contents/page0266.html](https://www.econ.kyoto-ac.jp/renewable_energy/stage2/contents/page0266.html))



allowance issue. Companies evaluated their allowance to be insufficient and therefore did not sell their surplus allowances, and instead tended to carry them over to the following year as they believed the price of carbon in the market would rise due to the limited supply of allowances, while the demand would rise due to the planned increase in reduction burden (Suk et al., 2017). Another main reason of deactivation of K-ETS in the early phase may be the lack of familiarity with market-based instruments for pollutant reduction. As mentioned in the above section, Korean companies do not consider the asset value of carbon allowances in optimising their management of GHG under the market mechanism. Instead, companies perceived ETS to be merely a compliance mechanism used to meet the pollutant reduction target. They felt less incentive to trade but adopted a strategy more orientated to compliance with the scheme and aimed for balanced accounts only (Suk et al., 2017). The uncertainty of price and policy direction has also led companies to retain a surplus allowance, which in turn caused a shortage of supply in the market. Nevertheless, the annual trading volume increased by nearly 7 times from 5.7 million in 2015 to 39.2 million in 2018 (till August). Similarly, the number of transactions (2,733 in total) also increased year by year from 126 in 2015 to 1,139 in 2018, implying that market participation gradually expanded (GIR, 2019).

As seen in the earlier EU-ETS market, 6 times as many amount of allowance was traded through bilateral OTC (Over-the-counter) negotiation in this Phase of K-ETS (GIR, 2019). Based on interviews with companies participating in emissions trading in Korea, several reasons were raised for this behaviour – i.e., procedural convenience of large-volume transactions via use of OTC rather than the KRX, which has a max trading cap of registerable allowances at any one time of 5000t-CO<sub>2</sub>, as well as because OTC allows negotiation over price, when compared with the market price, and provides flexible contracts to which extra conditions can be added (Suk, 2017).

## 5. Conclusions

As a cost-effective tool for mitigating GHG, carbon pricing policy is focused on as a way of raising awareness over the negative social costs of generating carbon, which explains why it has been introduced all over the world. Notwithstanding this situation, cultivating the necessary political acceptance for as well as actual implementation of carbon pricing has faced strong opposition from industry. The case of S. Korea in achieving the first national ETS introduction in North East Asia as well as operating the first 3-year phase amidst such resistance has revealed a number of characteristics and noteworthy points.

The main reason behind the introduction of ETS was the government's policy choices and corporate compromises under the corporate climate of Korea, where the relationship with the government is important. In regards to the government's strong drive for paradigm shift in energy and GHG policy principle on the use of market mechanisms as a core measure to mitigate GHG, from the industry side, strong resistance to ETS introduction was noted, which reflected on the low level of policy acceptance due to concerns over degraded business



competitiveness. However, rather than maintain steadfast opposition to the introduction of carbon pricing right until the end, Korean companies have cooperated the government's policy direction by choosing, as their next best option to introduction of carbon pricing, ETS. In response, the government largely incorporated the opinions of companies, for example, by extending the introduction period of the system and by relaxation of system constraints.

Another important issue regarding ETS is the structure of governance determining the main ministry overseeing this system. In S. Korea, after having undergone two changes, responsibility now rests with MOEK. MOEK has thus been authorised to undertake institutional design and operation, with an emphasis on reducing GHG emissions. However, it was found that several ministries are involved in ETS and therefore that cooperation between these ministries is essential to the operation of the emission trading system. A lesson learnt of ministerial changes in S. Korea was that such frequent ministerial reorganisations have led to a certain degree of policy uncertainty for companies, which hinders company decision making in terms of market participation, i.e., carbon pricing in trading decisions, as well as long term investment planning (Suk, 2017, and Suk, 2018).

Meanwhile, regarding companies' perspective on K-ETS in the early phase, it was revealed that companies under K-ETS perceived the GHG mitigation as a duty and to do so they used the internal activities but low priority to trade the credit in the market, meaning that they view the cap implicit in their allowance allotment as a mere matter of compliance and tended to take a wait-and-see attitude for carbon market participation (Suk et al., 2017). The practices of Korean companies in carbon management tend to concern only conventional energy and environmental management practices in the early stage, and deviate only minimally from the conventional energy and environmental management-oriented activities found prior to the introduction of ETS (Suk, 2017). In the beginning of ETS, for Korean companies in general, carbon management activities are not integrated into overall business operations and strategies in relation to financial planning that provides a measurable approach for business profits (Suk, 2018). Nonetheless, observations that increased awareness and interest among the top manager level are worth noting, while executives' perceptions and intentions were found to be the most important determinant of corporate carbon management. Especially, it also confirmed that the large-sized companies are responding to emissions trading schemes at a mature stage and are adopting proactive carbon management by setting internal carbon prices.

The remaining challenge to be addressed in the design and operation of K-ETS is obtaining the understanding of and reaching a compromise with industry, while also improving the system. At this time, the government needs to pay more attention to SMEs. There is presently an information asymmetry concerning carbon pricing and the carbon market, which is largely determined by company size, and which could act as a relative disadvantage for SMEs in terms of their participation in market transactions. Since medium-sized companies account for the largest portion of the total entities and allowances under K-ETS (Suk et al.2017), efforts should be made to overcome this disparity.

Further, this scheme was designed to be progressively upgraded through the Phases. In the 2<sup>nd</sup> and 3<sup>rd</sup> phase ways are being sought to introduce market makers and expand market participants as well as overseas markets linkage in order to maintain stability and ensure liquidity of the carbon market. Thus it would be prudent to closely monitor all related movements in the government's approach and policy, which is increasingly being focused on K-ETS.

## References

- CDP (Carbon Disclosure Project), (2017). Putting a price on carbon: Integrating climate risk into business planning, 12 October 2017 (available at: <https://www.environmentalleader.com/2017/10/174571/>)
- Cheong Wa Dae, (2020). Address by President Moon Jae-in at National Assembly to Propose Government Budget for 2021, 28 October, 2020 (available at : <http://english1.president.go.kr/BriefingSpeeches/Speeches/898>)
- Cuff, M. (2017). Web article. Carbon pricing is becoming the norm for big companies, October 16, 2017 (available at: <https://www.greenbiz.com/article/carbon-pricing-becoming-norm-big-companies>)
- GIR (Greenhouse Gas Inventory and Research Center) (2018) Report on the operational results of the emission trading system (2015-2016) (in Korean)
- GIR (2019) Report on the operational results of the emission trading system (2015-2017) (in Korean )
- Goldstandard (2016). Supply Report Q3 2016: Better information for better decision-making.
- Katsikeas C.S., Leonidou, C.N., Zeriti, A. (2016) Eco-friendly product development strategy: antecedents, outcomes, and contingent effects. *Journal of the Academy of Marketing Science*, 44 (6), 660-684
- KRX (Korea Exchange) (2016). A report of the operating result of the Korea emissions trading market in 2015 (in Korean), January 2016
- FKI (The Federation of Korean Industries) (2015), Industry, demand for re-allocation of emission allowance - Announcement of joint industry position on GHG emission reduction policy (in Korean). Press document, May 20, 2015.
- Lee, S.Y. (2012) Corporate Carbon Strategies in Responding to Climate Change. *Bus. Strategy Environ.* 2012, 21, 33–48.
- MOEK, press (2005) Third Comprehensive Plan for Climate Change in environment sector in preparation for the Kyoto Protocol (in Korean), 2 May, 2005.
- MOEK, press (2012) Management of the GHG emission growth in 2013 lower than GDP growth (in Korean), 16 October, 2012.
- MOEK, press (2013) The reduction target of TMS in 2014, 17Mt-CO<sub>2</sub> (in Korean), 23 October, 2013



- MOEK, press (2014) TMS in 2012 achieved exceeded GHG reduction targets (in Korean), 23 January, 2014.
- MOEK (2014) National GHG Emission Allocation Plan in the First Phase (2015–2017) (in Korean), September 11, 2014.
- MOEK (2015) Press. ‘243 of the 525 ETS target companies have raised an objection to their allocation’ (In Korean). January 15, 2015
- MOEK (2018) Press. ‘The total KAU for 3years is 177.1313 million’ (In Korean). July 11, 2018
- Money Today News (2007), Government determined the 4th Comprehensive Plan on Countermeasures to Climate Change (in Korean), 17 December, 2007 (available at: <http://www.mt.co.kr/view/mtview.php?type=1&no=2007121714032467987&outlink=1>)
- Prime Minister’s Office, Advance notice of proposed rulemaking on GHG trading scheme (in Korean)
- Special Committee for Tax Reform (2005), Study on long-term tax reform (in Korean)
- Quazi HA, Khoo Y, Tan C & Wong P. (2001) Motivation for ISO14000 certification: development of a predictive model, *Omega* 2001, 29(6), 525–542.
- Suk, S.H, Liu X.B., Sudo, K. (2012). A Survey Study of Energy Saving Activities of Industrial Companies in the Republic of Korea, *Journal of Cleaner Production*. Vol. 41, Pages 301-311.
- Suk, S.H., Liu, X.B., Lee, S.Y., Ko, S.J. and Sudo, K. (2014). Affordability of Energy Cost Increases for Korean Companies due to Market-Based Climate Policies: A Survey Study by Sector, *Journal of Cleaner Production*. Vol. 67, Pages 208-219.
- Suk, S.H., Lee S., Jeong Y. (2016). A survey on impediments to implementing low carbon technologies in the petrochemical industry in Korea. *Journal of Cleaner Production*, Vol. 133, pages 576-588.
- Suk, S.H., Lee S., Jeong Y. (2017) *The Korean Emissions Trading Scheme: Business perspectives on the operations*, Taylor & Francis. Climate Policy, DOI: 10.1080/14693062.2017.1346499
- Suk, S.H. (2017) Korean companies’ understanding of carbon pricing and its influence on policy acceptance and practices, *Environmental and Research Economics Review*, Vol 26, Number 4, December 2017: pp. 577-612
- Suk, S.H. (2018) “Determinants and Characteristics of Korean Companies’ Carbon Management under the Carbon Pricing Scheme”, *energies*, Vol.11 (4), 966, 2018
- Suk, S.H. (2021) An empirical study on the company’s internal carbon price and carbon strategies under the emission trading scheme, to be submitted, 2021