

DIGITALES ARCHIV

ZBW – Leibniz-Informationszentrum Wirtschaft
ZBW – Leibniz Information Centre for Economics

Book

The Korea emissions trading scheme : challenges and emerging opportunities

Provided in Cooperation with:

Asian Development Bank (ADB), Manila

Reference: (2018). The Korea emissions trading scheme : challenges and emerging opportunities. Mandaluyong City, Metro Manila, Philippines : ADB.
doi:10.22617/TIM189641-2.

This Version is available at:
<http://hdl.handle.net/11159/2797>

Kontakt/Contact

ZBW – Leibniz-Informationszentrum Wirtschaft/Leibniz Information Centre for Economics
Düsternbrooker Weg 120
24105 Kiel (Germany)
E-Mail: [rights\[at\]zbw.eu](mailto:rights[at]zbw.eu)
<https://www.zbw.eu/econis-archiv/>

Standard-Nutzungsbedingungen:

Dieses Dokument darf zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden. Sie dürfen dieses Dokument nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, aufführen, vertreiben oder anderweitig nutzen. Sofern für das Dokument eine Open-Content-Lizenz verwendet wurde, so gelten abweichend von diesen Nutzungsbedingungen die in der Lizenz gewährten Nutzungsrechte.

<https://zbw.eu/econis-archiv/termsfuse>

Terms of use:

This document may be saved and copied for your personal and scholarly purposes. You are not to copy it for public or commercial purposes, to exhibit the document in public, to perform, distribute or otherwise use the document in public. If the document is made available under a Creative Commons Licence you may exercise further usage rights as specified in the licence.



THE KOREA EMISSIONS TRADING SCHEME

Challenges and Emerging Opportunities

NOVEMBER 2018

THE KOREA EMISSIONS TRADING SCHEME

Challenges and Emerging Opportunities

NOVEMBER 2018



Creative Commons Attribution 3.0 IGO license (CC BY 3.0 IGO)

© 2018 Asian Development Bank
6 ADB Avenue, Mandaluyong City, 1550 Metro Manila, Philippines
Tel +63 2 632 4444; Fax +63 2 636 2444
www.adb.org

Some rights reserved. Published in 2018.

ISBN 978-92-9261-406-5 (print), 978-92-9261-407-2 (electronic)
Publication Stock No. TIM189641-2
DOI: <http://dx.doi.org/10.22617/TIM189641-2>

The views expressed in this publication are those of the authors and do not necessarily reflect the views and policies of the Asian Development Bank (ADB) or its Board of Governors or the governments they represent.

ADB does not guarantee the accuracy of the data included in this publication and accepts no responsibility for any consequence of their use. The mention of specific companies or products of manufacturers does not imply that they are endorsed or recommended by ADB in preference to others of a similar nature that are not mentioned.

By making any designation of or reference to a particular territory or geographic area, or by using the term “country” in this document, ADB does not intend to make any judgments as to the legal or other status of any territory or area.

This work is available under the Creative Commons Attribution 3.0 IGO license (CC BY 3.0 IGO) <https://creativecommons.org/licenses/by/3.0/igo/>. By using the content of this publication, you agree to be bound by the terms of this license. For attribution, translations, adaptations, and permissions, please read the provisions and terms of use at <https://www.adb.org/terms-use#openaccess>.

This CC license does not apply to non-ADB copyright materials in this publication. If the material is attributed to another source, please contact the copyright owner or publisher of that source for permission to reproduce it. ADB cannot be held liable for any claims that arise as a result of your use of the material.

Please contact pubsmarketing@adb.org if you have questions or comments with respect to content, or if you wish to obtain copyright permission for your intended use that does not fall within these terms, or for permission to use the ADB logo.

Notes:

In this publication, “\$” refers to United States dollars.

ADB recognizes “Korea” as the Republic of Korea.

Cover illustration by Jan Carlo Dela Cruz.

Corrigenda to ADB publications may be found at <http://www.adb.org/publications/corrigenda>



Tables, Figures, and Box	v
Foreword	vi
Preface	viii
Acknowledgments	x
Executive Summary	xi
Abbreviations	xiv
Currency Equivalents	xiv
1. National Context	1
1.1. Greenhouse Gas Emissions Trends in the Republic of Korea	1
1.2. Low Carbon Green Growth Strategy Pre-Paris Agreement	2
1.3. Nationally Determined Contribution	3
1.4. The 2030 Roadmap	4
1.5. Role of the Emissions Trading System	6
2. Establishment of the Korea Emissions Trading Scheme	7
2.1. Establishment Process	7
2.2. Institutional Framework	9
2.3. Target Management System	11
3. Design of the Korea Emissions Trading Scheme	12
3.1. Coverage	13
3.2. Cap Setting	14
3.3. Allowance Allocation	14
3.4. Annual Reporting	18

4. Korea Emissions Trading Scheme Carbon Market and Its Mechanisms	20
4.1. Emission Trading Overview	20
4.2. Stabilization Mechanism	20
4.3. Flexibility Mechanisms: Banking and Borrowing	21
4.4. Korea Offset Program	22
5. Korea Emissions Trading Scheme Performance	26
5.1. Trends in Phase I	26
5.2. Arrangements for Phase II	30
6. Korea Emissions Trading Scheme Assessment	31
6.1. Challenges	31
6.2. Lessons Learned	32
6.3. Future Directions and Opportunities	35
References	39



Tables, Figures, and Box

TABLES

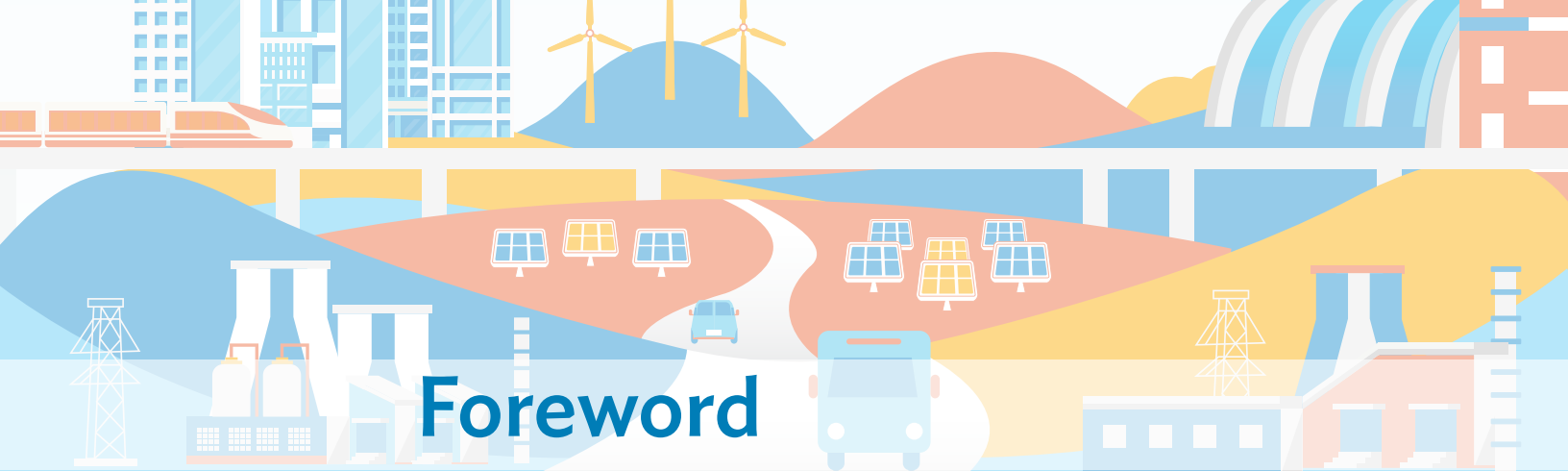
1	Greenhouse Gas Emissions by Sector	1
2	Reduction Target by Sectors	5
3	Summary of Korea Emissions Trading Scheme Setup Steps	8
4	Korea Emissions Trading Scheme Institutional Oversight	9
5	Korea Emissions Trading Scheme Governance in Phase I and Phase II	10
6	Sectoral Target Reduction Rates	14
7	Key Characteristics of Korea Emissions Trading Scheme Phases	15
8	Korea Emissions Trading Scheme Sectoral Allowance Allocation and Emission Performance, 2015	17
9	Korea Emissions Trading Scheme Annual Compliance Cycle	19
10	Domestic Methodologies for Offset Projects	24
11	Evaluation of the Korea Emissions Trading Scheme	31

FIGURES

1	Sectoral Greenhouse Gas Emissions, 2014	2
2	Korea Emissions Trading Scheme Timeline	12
3	Korea Emissions Trading Scheme Allowance Distribution, 2015	16
4	Energy-Intensive and Trade-Exposed Sectors Criteria	18
5	Conversion of Korea Offset Credits Into Korea Credit Units	23
6	Korea Emissions Trading Scheme Trading in Phase I	27
7	Share of Allowances by Type, as of January 2017	28
8	Allowance Price in Phase I by Type	29

BOX

1	Highlights of the Master Plan for the Korea Emissions Trading Scheme	8
---	--	---



There has never been a more critical time than ever for countries to be accelerating their efforts to cut greenhouse gas emissions. Urgent action is needed at a global scale to achieve the Paris Agreement goal to limit temperature rise to less than 2 degrees Celsius (°C), while aspiring to 1.5°C. It is alarming that the collective ambitions under current nationally determined contributions (NDC) are insufficient to meet the goal. The Intergovernmental Panel on Climate Change (IPCC) has recently stated that even a rise of 1.5°C will have major consequences to human health and well-being, and ecosystems, yet the achievement of this target will require “rapid and far-reaching” transitions in land, energy, industry, buildings, transport, and cities (IPCC 2018).

Successful global efforts to tackle climate change will be especially important for Asia and the Pacific, as the impacts of climate change will be felt acutely in the region. Rising sea levels and extreme weather events of higher frequency and increased intensity pose serious threats to the health and safety of over four billion people and particularly put the poor at risk.

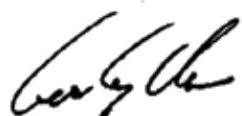
To the Asian Development Bank (ADB), scaling up support to its developing member countries (DMCs) to tackle climate change, build climate and disaster resilience, and enhance environmental sustainability is a key operational priority of the recently launched Strategy 2030. ADB has committed to mobilize \$80 billion of climate finance from its own resources cumulatively from 2019 to 2030 and aims to achieve 75% of its committed operations supporting climate change mitigation and adaptation by 2030.

The achievement of even the current NDCs will require DMCs to implement strong policies across many, if not all, sectors to create the required financial incentives for public and private sector investments in cleaner technologies, and to address other barriers to such investments. ADB has been supporting its DMCs to use market-based approaches and will continue to contribute to the development of post-2020 carbon markets.

There is a growing momentum for emissions trading worldwide, recognizing its potential to deliver cost-effective mitigation toward achieving NDC ambitions. Globally, 19 emissions trading systems (ETSs) are operating at national and subnational levels. In Asia and the Pacific alone, 13 ETSs are operating, including national systems in Kazakhstan,

New Zealand, and the Republic of Korea, as well as subnational systems in Japan and the People's Republic of China, while a national ETS in the People's Republic of China launched late last year is currently under development.

For DMCs to realize the benefits from developing their own ETSs, and in linking them internationally, it is essential that policy makers learn from experiences in other jurisdictions. Within Asia and the Pacific, insights into the design and implementation of the Korea Emissions Trading Scheme can provide valuable lessons. ADB has developed this knowledge product to offer these lessons and it is my hope that it will help countries that are designing or considering an ETS, and contribute to the ongoing development of carbon markets under the framework of the Paris Agreement.



Woochong Um

Director General
Sustainable Development and Climate Change Department
Asian Development Bank



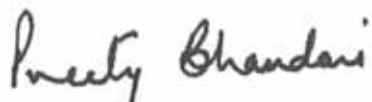
The effort of the international community to mitigate climate change and to support vulnerable countries to manage its effects reached a milestone in December 2015. The 194 Parties to the United Nations Framework Convention on Climate Change (UNFCCC) adopted a new climate change regime, the Paris Agreement. Under this agreement, all Parties have committed to achieving their own Nationally Determined Contributions (NDCs), involving the declaration of national emission reduction targets.

The NDC of the Republic of Korea (ROK) includes a target to reduce greenhouse gas emissions to 37% below the business-as-usual level by 2030. The NDC also states that the ROK will use carbon credits from international market mechanisms toward achieving this target. The most recent national roadmap states that savings of 32.5% will be achieved through domestic reductions and the remaining 4.5% will be fulfilled through a combination of international credits representing savings made overseas and forestry management projects.

The Korea Emissions Trading Scheme (KETS) forms a central part of the country's mitigation policy response. It is the third-largest carbon market in the world and the second nationwide carbon market in Asia. The system began in 2015 and is now in its second phase, which runs from 2018 to 2020. There are a number of challenges that the KETS has faced during its preparation and implementation, which have led to changes in the governance and design of the system. The policy experiences and challenges with the KETS to date provide valuable lessons for policy makers in other countries who are considering or designing emissions trading systems or other carbon pricing mechanisms, as part of their own NDC policy packages.

This knowledge product presents a factual overview of the design and implementation of the KETS. It places emphasis on the lessons learned from the KETS to date, and how these could be useful to other DMCs. It also considers linking opportunities for KETS and examines the potential future role of the system within international market mechanisms.

By sharing experiences of the KETS, this knowledge product aims to contribute to the ongoing development of emissions trading systems in the region, helping policy makers to build a deeper understanding of the practical implications of implementing a complex policy instrument across a part of or the whole economy.



Preeti Bhandari

Director, Climate Change and Disaster Risk Management (CCDRM) Division and Chief of CCDRM Thematic Group, Sustainable Development and Climate Change Department
Asian Development Bank



Virender Kumar Duggal

Principal Climate Change Specialist
Fund Manager-Future Carbon Fund
Sustainable Development and Climate Change Department
Asian Development Bank



Acknowledgments

This knowledge product, *The Korea Emissions Trading Scheme: Challenges and Emerging Opportunities*, has been developed by the Asian Development Bank under the regional capacity development technical assistance project for Supporting Low-Carbon Development in Asia and the Pacific through Carbon Markets, implemented by the Technical Support Facility, a component of the Carbon Market Program under the Sustainable Development and Climate Change Department (SDCC).

The publication of this knowledge product was encouraged by Woochong Um, director general, SDCC. Preety Bhandari, director, Climate Change and Disaster Risk Management Division (SDCD) provided overall direction to the knowledge product, which was designed and developed by Virender Kumar Duggal, principal climate change specialist, SDCC.

This knowledge product has been developed on the basis of excellent technical research and report by Elizabeth Jung, emission trading scheme expert, engaged by the Asian Development Bank, which is immensely appreciated. This publication has also benefited from the valuable inputs and contributions of a team of consultants engaged under the Carbon Market Program, which, among others, include Johan Nylander, Kate Hughes, Mark Johnson, and Takeshi Miyata, all of whom are greatly appreciated.

The preparation of this knowledge product has benefited from expert peer review conducted by Seoyoung Lim, manager, Climate Change Policy Support Team, Department of Climate Change Action, Korea Environment Corporation, which is sincerely appreciated.

The timely publication of this knowledge product was made possible with diligent coordination by Grendell Vie Magoncia and committed support by Jan Carlo dela Cruz, Joseph Manglicmot, Layla Yasmin Tanjutco, Lawrence Casiraya, and Joel Pinaroc.



Executive Summary

Under the 2009 Copenhagen Accord, the Republic of Korea (ROK) pledged to reduce its greenhouse gas (GHG) emissions to 30% below its business-as-usual (BAU) level by 2020. To enable this transformation, the Framework Act on Low Carbon Green Growth was established in April 2010. The ROK subsequently committed in its Nationally Determined Contribution (NDC) submitted under the Paris Agreement to reduce its emissions to 37% below BAU levels by 2030, which was written into national law through an amended presidential decree to the Framework Act on Low Carbon Green Growth. Of the 37% emissions reductions to be made, the Government of the ROK plans to reduce 32.5% through domestic action and 4.5% through a combination of credits acquired on the international carbon market, representing savings made overseas, and through forestry management projects.

The potential role of a Korea Emissions Trading Scheme (KETS) has been discussed since 2010 as part of the dialogue around the Framework Act on Low Carbon Green Growth. The legislation enabling the KETS, the Act on Allocation and Trading of Greenhouse Gas Emissions Allowances (ETS Act) and the associated presidential decree, were established on 15 November 2012. To implement the ETS Act, the Master Plan for the Emissions Trading Scheme and the Phase I National Allowances Allocation Plan were announced in 2014. The KETS itself was initiated on 1 January 2015 and is a prominent example of emissions trading being applied within Asia. The scheme covers about 68% of the ROK's GHG emissions and is considered a major national policy for cutting GHG emissions. The scheme is being implemented in phases and is now in its second phase, running from 2018 to 2020.

There are a number of challenges that the KETS has faced during its preparation and implementation, which have led to changes in the governance and design of the scheme. One of the key barriers to successful operation of the scheme was low carbon market liquidity. With a relatively low number of participants and in view of high uncertainty regarding the future dynamics of the carbon price, the KETS market suffered from unwillingness of its participants to sell unused allowances that they preferred to bank for future compliance periods. Additional allowances released by the government were unsuccessful in stimulating the trade, thereby demonstrating that low liquidity observed on the ROK's carbon market could not be solved through balancing supply and demand and required addressing the wider uncertainty linked to the market performance. However, following the slow start, the trading activities kept accelerating throughout the first phase (2015–2017) and, while still representing a relatively low traded emission volume in absolute terms, demonstrated a consistent positive trend.

The ROK's experience gives valuable lessons for policy makers that are considering designing emissions trading systems or are in the process of adopting carbon market policies. These lessons can be summarized into three key points:

- (i) **A clear and consistent signal to the market is necessary.** During Phase I (2015–2017) and particularly following a KETS management restructuring in 2016, the scheme was managed by various government bodies. Four sectoral ministries separately managed the KETS participation of respective sectors in addition to the Ministry of Environment and the Ministry of Strategy and Finance, which held more centralized oversight functions. As a result, in the absence of a single controlling unit, the signals from the government ministries regarding the future of the scheme were not always consistent. This resulted in uncertainty for KETS participants, which led them to be more inclined to hold rather than trade any surplus allowances, affecting market liquidity. Unrestricted banking of allowances exacerbated the negative impact on market liquidity.
- (ii) **A gradual scheme introduction can minimize implementation challenges.** The KETS caused significant changes to the regulatory landscape by placing new obligations on its compliance participants and establishing a new emissions market. As a result, its participants needed time to adapt to the newly established scheme. By gradually introducing the KETS in terms of sectoral coverage and emission market, the impacts of these implementation challenges were minimized.
- (iii) **Close communication with the industry is crucial.** The design of an emissions trading system (ETS) greatly impacts its participants. Continuous and close communication with the industry is essential so that government decisions and regulations can be acceptable to the industry and mitigate concerns surrounding compliance. The process of the KETS implementation clearly demonstrated that industry buy-in is vital to the successful introduction and operation of the scheme.

Despite the inevitable challenges with introducing a substantial new climate change policy, the introduction of the KETS provides positive opportunities for the ROK to meet its international commitments at a low cost through linking the scheme internationally or by encouraging KETS participants to use international carbon offsets. The ROK could use the KETS as the vehicle for meeting its plan to source international emissions credits, which together with forestry management projects would be equivalent to 4.5% of BAU emissions in 2030. By doing so, it could enable the companies covered by the KETS to source credits that would be cheaper than making the emissions reductions themselves.

One possibility is to create direct linkages of KETS with other overseas emissions trading systems, which would require harmonization of the main design aspects of the two systems. Alternatively, an indirect linkage between emissions markets could be made through the common use of emissions reduction credits. One example of this is the use of Clean Development Mechanism credits for compliance in different trading systems. Indirect linkage requires that the standards of integrity, such as additionality and sustainability, in the crediting system meet the level that is acceptable for the system that intends to use the credits.

While ETS linking may bring significant benefits and may become a cost-effective form of GHG abatement in the short term, it can also have certain downsides. It could lead to reduced investment in improving domestic energy or carbon efficiency, which could lock in higher emissions in the longer term and ultimately raise the costs of meeting subsequent targets. It could also lead to failure to realize the co-benefits of national GHG abatement, such as reduced energy costs or reduced localized air pollution. This should be considered as part of designing linking arrangements to ensure a balanced approach between achieving the benefits of linking and supporting domestic action. In addition, the carbon price dynamics will be different in linked systems compared to each system separately, either at the time at which they link or as a result of any unforeseen external events afterward. Therefore, the achievement of any linked trading arrangement would require a number of significant precursors to become successful.

A key future area of collaboration for the ROK could be with countries considering or developing carbon trading systems within Asia and the Pacific, with a view to enabling future linking or the establishment of a regional carbon market. Cooperation with other emissions trading systems may result in a highly beneficial exchange of experiences and, eventually, in system linking. For smaller countries with a limited number of compliance participants, this may lead to improved market liquidity and a higher efficiency of the system, in general. Taking advantage of the global market pricing experience, the KETS is collaborating with a number of countries both in northeast Asia and beyond. In light of potential benefits of such cooperation, future investigation in this area is required.



BAU	business-as-usual
CDM	clean development mechanism
EITE	energy-intensive and trade-exposed
ETS	emissions trading system
GHG	greenhouse gas
INDC	Intended Nationally Determined Contribution
KAU	Korean Allowance Unit
KETS	Korea Emissions Trading Scheme
KCU	Korea Credit Unit
KOC	Korea Offset Credit
KOP	Korea Offset Program
MRV	monitoring, reporting, and verification
NDC	nationally determined contributions
TMS	Target Management System
UNFCCC	United Nations Framework Convention on Climate Change

Currency Equivalents

(as of 19 November 2018)

Currency unit	–	won (KRW)
₩1.00	=	\$0.00089
\$1.00	=	₩1,121.40

1 National Context

1.1 Greenhouse Gas Emissions Trends in the Republic of Korea

Over the last 2 decades, the national greenhouse gas (GHG) emissions of the Republic of Korea (ROK) have grown in line with its economic and industrial development. In 2014, national GHG emissions reached 690.6 million tons of carbon dioxide equivalent (tCO₂e),¹ an increase of 135.6% compared to 1990 levels. The sectoral breakdown of the national GHG emissions is demonstrated in Table 1.

Table 1: Greenhouse Gas Emissions by Sector

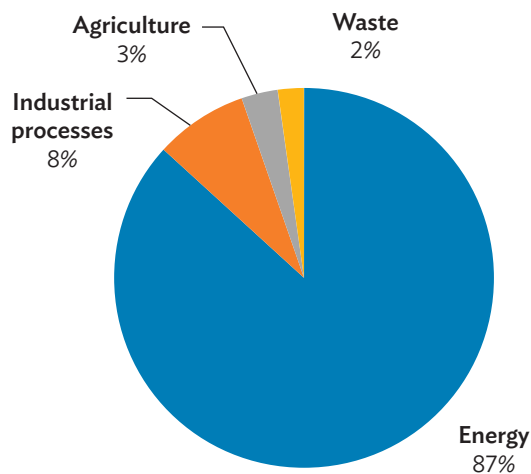
Sector	GHG Emissions (million tCO ₂ e)						Increase 1990–2014 (%)	Change 2013–2014 (%)
	1990	2000	2010	2012	2013	2014		
Energy	241.4	410.4	565.2	597.7	606.7	599.3	148.3	(1.2)
Industrial Processes	19.7	49.6	54.0	51.7	52.0	54.6	177.3	5.0
Agriculture	21.6	21.8	22.4	21.9	21.9	21.3	(1.5)	(2.7)
LULUCF	(34.1)	(58.8)	(54.3)	(44.7)	(42.8)	(42.5)	24.5	(0.7)
Waste	10.4	18.9	15.1	15.8	16.0	15.4	47.8	(3.3)
Total GHG emissions (excluding LULUCF)	293.1	500.6	656.6	687.1	696.5	690.6	135.6	(0.8)
Net GHG emissions (including LULUCF)	259.0	441.8	602.3	642.4	653.8	648.1	150.2	(0.9)

GHG = greenhouse gas, LULUCF = land use, land use change, and forestry, tCO₂e = ton of carbon dioxide equivalent.

Source: Government of the Republic of Korea. 2017. *Second Biennial Update Report of the Republic of Korea*.

From 1990 to 2014, the ROK's annual GHG emissions (excluding LULUCF) grew at 5.7% on average, mostly driven by the increase in energy consumption, particularly in energy-intensive industries such as petrochemical and iron and steel. The energy consumption-related emissions accounted for the largest share of the ROK's total GHG emissions, being responsible for 87% in 2014 (Government of the ROK 2017). Emissions from energy consumption and industrial processes demonstrated the greatest increase since 1990.

¹ The national GHG emissions are measured excluding emissions and carbon sinks originating from land use, land use change, and forestry.

Figure 1: Sectoral Greenhouse Gas Emissions, 2014

Note: Data exclude emissions and carbon sinks originating from land use, land use change, and forestry.

Source: United Nations Framework Convention on Climate Change. 2017. *Second Biennial Update Report of the Republic of Korea*.

Within the energy sector in 2012, the majority of emissions originated from energy generation (44.6%), followed by manufacturing industries and the construction sector (30.0%), and transport (14.4%) (United Nations Framework Convention on Climate Change [UNFCCC] 2012). The main sources of industrial process emissions in 2012 were mineral products, contributing almost two-thirds of the overall emission in the category (Government of the ROK 2017; UNFCCC 2012).

1.2 Low Carbon Green Growth Strategy Pre-Paris Agreement

In 2008, the ROK announced its Green Growth Strategy that would become part of the country's national strategy. As part of this strategy, the Government of the ROK made a pledge under the 2009 Copenhagen Accord to reduce its national GHG emissions by 30% below its business-as-usual (BAU) scenario by 2020. This goal was equivalent at the time to a 4% reduction of total emissions below 2005 levels (Jang et al. 2010; Government of the ROK 2017). This target was set voluntarily as the ROK is a non-Annex I country and therefore was not expected to commit to quantified economy-wide emissions targets. However, as a consequence of both international and domestic pressure, due to its high gross domestic product standing and ambitious growth targets, the ROK also committed to develop a green growth strategy (Hyun et al. 2015).

To achieve its Copenhagen Accord target, the government established a joint task force that consisted of the Greenhouse Gas Inventory and Research Center of Korea (GIR) as well as several relevant ministries (Government of ROK 2017). In addition, the government implemented a Framework Act on Low Carbon Green Growth in April 2010. This act had the specific purpose of providing a legal basis for policies required to protect the environment and combat climate change, so that these measures could endure beyond political cycles. The Framework Act thereby functioned as an umbrella law, combining all the independent and fragmented low carbon and green growth policies into one national goal for green growth (Jang et al. 2010). The Framework Act included the following objectives (Partnership for Market Readiness [PMR] 2015; International Emissions Trading Association [IETA] 2016):

- (i) **Set national greenhouse gas emission reduction targets.** Under the Framework Act on Low Carbon Green Growth, it was decided that the ROK would review the national emissions target as well as develop targets to reduce energy consumption. The task force therefore developed specific emission reduction targets for 25 industries across seven different sectors in 2011. To guide industries and the government to achieve the set goals, the task force developed a roadmap to 2020 with recommended measures and policies. This 2020 Roadmap was published in 2014 (Government of the ROK 2017).
- (ii) **Establish the greenhouse gas Target Management System.** This is a system that sets both energy and emission targets for businesses and public bodies, including the power, industry, transport, building, agriculture, food, and waste sectors (Hyun et al. 2015).
- (iii) **Establish the legal basis for an emissions trading system.** From 2010, the ROK was therefore already committed to implement an emissions trading system (ETS) as the principle policy to reduce emissions in the country (Hyun et al. 2015).

1.3 Nationally Determined Contribution

Following the publication of the 2020 Roadmap, the international discussion on emission targets picked up speed, highlighting the need for the ROK to plan beyond 2020 as well. The development of an Intended Nationally Determined Contribution (INDC), which had to be submitted to the UNFCCC as part of the preparation for the Paris Agreement, required developing targets until 2030, which was set as the ROK's target year. The ROK therefore established a task force with the objective to set a target that could eventually be pledged within the ROK's INDC. This task force included representatives from the Ministry of Environment, Ministry of Trade, Ministry of Industry and Energy, among others, and was chaired by the Prime Minister's Office (PMO).

The INDC target was prepared in several steps. A technical analysis was carried out by a working group including the GIR as well as the Korea Energy Economics Institute (KEEI). In addition, feedback was collected from a wide range of stakeholders via a pool of experts from business and civil society as well as through public hearings and forums. Subsequently, the Committee on Green Growth reviewed all feedback and finalized the INDC target (ROK 2015).

The INDC of the ROK was submitted to the UNFCCC and upon the ratification of the Paris Agreement became its Nationally Determined Contribution (NDC). In it, the ROK pledged to reduce its total national GHG emissions by 37% by 2030 compared to a BAU scenario (ROK 2015). The BAU scenario is based on projections made by the KEEL and GHG Modelling System, which takes into account anticipated changes in population, GDP, global oil prices, and industry developments. The NDC did not specify the contribution to the target that would be required from each sector or from the use of the international carbon market.

1.4 The 2030 Roadmap

To guide the achievement of the domestic savings needed to meet the NDC target, the task force published a 2030 Roadmap in 2016,² which provided a detailed implementation plan for eight sectors. Subsequently, in July 2018, the government published an update to the 2030 Roadmap.

The revised roadmap provides indicative national emissions targets at three yearly intervals to give a pathway to the achievement of the 2030 NDC target. It also provides updated targets for the levels of savings that are required of each sector³. The principal changes within the Roadmap update are an increased reliance on domestic savings, less use of international credits, and increased savings through forest carbon sinks. Total domestic reductions are now 32.5% of BaU, replacing the previous target of 25.7%.

The revised 2030 Roadmap outlined that the largest contribution to domestic emission reductions is expected to come from the industry sector, accounting for 98.6 million tCO₂e (20.5% reduction from its BAU level emissions in 2030). However, as a share of the sector's total emissions, the greatest proportional emissions reductions are expected to come from the buildings sector. A more detailed breakdown of savings by sector are shown in Table 2.

To achieve the domestic NDC target, the original 2030 Roadmap describes seven specific national tasks that need to be carried out. Specific details of the main tasks are as follows (Government of the ROK, PMO 2016):

- (i) **Transition to low carbon energy policy.** This includes energy efficiency and renewable energy measures.
- (ii) **Cost-effective greenhouse gas reduction through the development of a carbon market.** This includes the expansion of a benchmarking system; promoting voluntary reduction activities; and establishment of a monitoring, reporting, and verification (MRV) system.

² Government of the Republic of Korea, Ministry of Environment. 2017. *2030 Basic Roadmap for Reducing Greenhouse Gases*.

³ Government of the Republic of Korea, 2018. *Revised Draft on 2030 Basic Roadmap for Achieving National GHG Mitigation Target*.

Table 2: Reduction Target by Sectors

Sector	BAU (million ton)	Expected emissions (million ton)	Reduction Rate (%)
Industry	481.0	382.4	20.5
Building	197.2	132.7	32.7
Transport	105.2	74.4	29.3
Waste	15.5	11.0	28.9
Public (others)	21.0	15.7	25.3
Agriculture	20.7	19.0	7.9
Fugitive and others	10.3	7.2	30.5

Source: Government of the Republic of Korea, 2018. Revised Draft on 2030 Basic Roadmap for Achieving National GHG Mitigation Target.

- (iii) **Fostering new industries to cope with climate change and expanding investment in new technology development.** This mainly focuses on increased investments in research and development to promote deployment of new low-carbon technologies.
- (iv) **Pursuing a climate safe society.** This includes the establishment of disaster risk and reduction mechanisms.
- (v) **Promoting carbon sequestration and resource recycling.** This includes afforestation and reforestation measures, wastewater reduction measures, and promotion of waste recycling.
- (vi) **Strengthening international cooperation in response to the new climate regime.** This involves developing bilateral cooperation platform with developing countries.
- (vii) **Establishing the base for nationwide implementation.** This includes increasing public awareness of climate change and the promotion of low-carbon lifestyles.

The original roadmap allowed for 11.3% overseas reductions, but instead a target of 4.5% through cooperative approaches was specified in the revision, which would be met through a combination of international credits under Article 6 of the Paris Agreement and forest carbon sinks.

The 2030 Roadmap will be further improved and revised before the submission of ROK's revised NDC by 2020, to be fully aligned with the post-2020 climate change regime. It is also planned to establish a 2050 low-carbon development strategy.

1.5 Role of the Emissions Trading System

Since the establishment of the Framework Act on Low Carbon Green Growth in 2010, the ROK has had plans to develop a carbon market in the country as its principal policy to achieve the necessary emission reductions (IETA 2016). The act became the first legal step for the implementation of the ETS as a means of carbon market development and also set the national GHG emission reduction targets that the ETS would achieve. In addition, the act established the Target Management System that aims to build capacity to collect and verify GHG data in the country to help develop a robust MRV system as a preparatory step to the ETS introduction (Hyun et al. 2015; IETA 2016; Jang et al. 2010).

While the NDC roadmap does not specify the proportion of emission reductions that are planned to be delivered by the ETS, it is expected that the Korea Emissions Trading Scheme will play a key role in helping the country achieve its NDC target (ICAP 2018).



2 Establishment of the Korea Emissions Trading Scheme

2.1 Establishment Process

The implementation of the Korea Emissions Trading Scheme (KETS) was meant to be one of the key steps in achieving the national emission reduction target in line with the pledge submitted to the Copenhagen Accord in 2010. The scheme was originally planned to be launched in 2013. However, the government faced strong opposition from the business sector, which claimed that the national emission reduction target of 30% below its business-as-usual scenario by 2020 was too ambitious and that the emissions trading system (ETS) implementation would inevitably lead to economic recession. In particular, the Republic of Korea's Chamber of Commerce and Industry and the Federation of Korean Industries requested reconsideration of the design and postponement of the ETS launch to 2020. Due to the resistance of the business sector, the start of the ETS was postponed to 2015 (Hyun and Oh 2015).

The KETS was implemented through the Act on Allocation and Trading of Greenhouse Gas Emissions Allowances (ETS Act). It was enacted in November 2012 by presidential decree, thereby creating a legal framework for the scheme. The details of the KETS were then elaborated in the Master Plan for the Emissions Trading Scheme, prepared by the Ministry of Finance and Strategy (MOSF), and the Phase I National Allowances Allocation Plan, prepared by the Ministry of Environment (MOE). These were introduced in 2014. Together, these legal documents outlined the key elements of the KETS design for the first commitment period (2015–2017) and enabled the start of the ETS operation in January 2015. The highlights of the Master Plan are listed in Box 1.

The introduction of the KETS in January 2015 made the Republic of Korea (ROK) the second country in Asia with an established countrywide cap-and-trade system after Kazakhstan (IETA 2016). The KETS remained the second largest cap-and-trade system in the world after the European Union's ETS until the People's Republic of China launched its own system (Lee and Yu 2017).

The KETS was introduced with an aim to efficiently mitigate national GHG emissions using a market-based instrument. It covers about 68% of the ROK's GHG emissions (ICAP 2018) and is positioned as a major policy for cutting GHG emissions in line with the country's national emission reduction targets. Given the complexity of legal and economic arrangements linked to the KETS operation, its preparation went through a series of steps, which are presented in Table 3.

Box 1: Highlights of the Master Plan for the Korea Emissions Trading Scheme

- The basis of the master plan is Article 4 of the Act on the Allocation and Transactions of GHG Emissions.
- Master plans shall be established every 5 and 10 years, linking medium- and long-term comprehensive plans related to the Emissions Trading System.
- The master plan shall be established up to 1 year before the beginning of each planning period (Article 2 [1] of the Enforcement Decree).
- The First Master Plan starts from 2015 to 2024: Phase I is 2015–2017, Phase II is 2018–2020, and Phase III is 2021–2024 (Article 4 [1] of the Act).
- The Ministry of Strategy and Finance is in charge of the master plan, requesting analysis and research from the Greenhouse Gas Inventory and Research Center of Korea (Article 2 [5] of the Enforcement Decree).
- Procedures for implementation the master plan shall be (i) establishing the draft of the Master Plan; (ii) discussing it with the related organizations and holding public consultations; and (iii) approval by the Green Growth Committee and the State Council.
- The allocation plan stipulates the detailed operational standards of the Emissions Trading System such as the total amount of greenhouse gas emission allowances, allocation standards, allocation method, banking, borrowing, and offsetting.

GHG = greenhouse gas.

Source: Government of the Republic of Korea, Ministry of Finance and Strategy. 2014. *The First Climate Change Countermeasure Master Plan*.

Table 3: Summary of Korea Emissions Trading Scheme Setup Steps

Step	Time	Actions
National target setting	January 2014	The national GHG emission reduction target for each year set in 2020 Roadmap and the First Climate Change Countermeasure Master Plan
Calculation of allowance amount and sectoral split	June 2014	Calculations undertaken based on the national and sectoral emission reduction targets in the 2020 Roadmap
Defining liable emitters	July 2014	Definition of the entities mandated to participate announced
Cap calculation and allowance allocation	October 2014	Emission cap and issue allowances to individual firm, considering the sectoral cap
Launch of KETS	January 2015	KETS was officially launched on 1 January 2015

GHG = greenhouse gas, KETS = Korea Emissions Trading Scheme.

Source: Hyun, J., and H. Oh. 2015. *Korea's ETS: An Attempt of Non-Annex I Party Countries to Reduce GHG Emissions Voluntarily*. PMR presentation and article.

The KETS was designed to operate in phases that would allow the evaluation of its operation and where necessary, adjustment of its rules with the beginning of a new phase.

2.2 Institutional Framework

From the outset of the KETS, the MOE was responsible for managing all aspects of the scheme's operation. However, in June 2016, an amendment to the ETS Act was introduced, resulting in a restructuring of the ETS oversight. The MOSF assumed the responsibility for the overall system operation as well as support of the ROK's carbon market. This included the authority to make steps aimed at regulating the volume of allowances in circulation by managing the allowance reserve fund. The responsibilities related to allowance allocation, the compliance process, and communication with the participants were in turn distributed among four sectoral ministries, with each being responsible for a certain emission area (IETA 2016). Their respective responsibilities are illustrated in Table 4.

Table 4: Korea Emissions Trading Scheme Institutional Oversight

Ministry	Area of Responsibility
Ministry of Trade, Industry and Energy	Industrial and power generation emissions
Ministry of Land and Infrastructure Transport	Transportation and construction sector emissions
Ministry of Environment	Waste-related emissions
Ministry of Agriculture, Food and Rural Affairs	Agricultural and food sector emissions

Source: IETA. 2016a. *Republic of Korea: An Emissions Trading Case Study*.

One of the important factors that caused the restructuring of the KETS governance was the interplay between emission reductions, economic growth, and industrial competitiveness. The ROK's economic model places high importance on export- and manufacturing-oriented economic growth. This required passing on part of the responsibilities of the KETS operation to the dedicated industrial ministries so that a more holistic approach to policy development could be employed.

However, from Phase II, which started in 2018, another considerable restructuring of the KETS oversight took place. After disaggregation of the KETS management in 2016–2017, a decision was made to re-consolidate the responsibilities. This time, however, it was done in a way different from that applied in Phase I. The previously distributed KETS governance was returned to the MOE, which have now taken on extended responsibilities. Together with the operation of the KETS, the MOE became responsible for the overall achievement of the ROK's national GHG emission reduction target. This happened as a result of the division of the wider responsibility for (i) the policy coordination for the establishment of the GHG emission reduction target and (ii) the emission performance management, both of which were previously held by the PMO. While the PMO continued holding the policy coordination element, the performance management was transferred to the MOE. Together with this, the management of the national GHG emission statistics was also handed to the MOE, meaning that the Greenhouse Gas Inventory and Research Center (GIR) became reportable to the MOE and was no longer under the supervision of the PMO.

Going forward, the updated KETS master plans will be developed through cooperation of the MOE and the MOSF. The KETS allocation plan, however, will be the sole responsibility of the MOE, which will be supervising the Allocation Decision Review Committee and the GHG Emission Committee. While the sectoral division of the allowance allocation and compliance activities undertaken by four ministries in 2016–2017 was consolidated by the MOE in Phase II, the operation of some of the system elements remained within the sectoral ministries. In this way, the operation of the offset program, which is one of the KETS flexibility mechanisms allowing participants to purchase emission reduction credits from outside of the KETS boundaries, is being managed by the four sectoral ministries in their respective sectors.

To support the MOE with the extended KETS management, the director-level officials from the relevant government bodies, including MOSF; Ministry of Agriculture, Food and Rural Affairs; MOE; Ministry of Land, Infrastructure and Transport; Ministry of Trade, Industry, and Energy, and PMO will create an Inter-Ministerial Working Committee, strengthening cooperation between the relevant ministries and providing advice to the MOE.

The summary of the KETS governance changes are summarized in Table 5.

Table 5: Korea Emissions Trading Scheme Governance in Phase I and Phase II

Item	Phase I	Phase II
Establishment of the national GHG target and the performance management	Policy coordination: Prime Minister's Office	Policy coordination: Prime Minister's Office Policy development: Ministry of Environment
Management of the national GHG emission statistics	Prime Minister's Office	Ministry of Environment
KETS basic plan development	Ministry of Strategy and Finance	Ministry of Strategy and Finance Ministry of Environment
KETS allocation plan development	Ministry of Strategy and Finance	Ministry of Environment
KETS operation in allocation	Ministry of Agriculture, Food, and Rural Affairs; Ministry of Environment; Ministry of Land and Infrastructure Transport; and Ministry of Trade, Industry, and Energy	Ministry of Environment
KETS operation in emission certification	Ministry of Agriculture, Food, and Rural Affairs; Ministry of Environment; Ministry of Land and Infrastructure Transport; Ministry of Trade, Industry, and Energy	Ministry of Environment

GHG = greenhouse gas, KETS = Korea Emissions Trading Scheme.

Source: Based on interviews with officers in the Greenhouse Gas Inventory and the Research Center and the Ministry of Strategy and Finance; Oh, I.-Y. 2017. *Recent Status of KETS and Changes in Phase 2. Presentation at the 2nd Forum of Carbon Pricing Mechanism in [the Republic of] Korea, [People's Republic of] China, and Japan.*

2.3 Target Management System

The success of any new ETS can be strongly influenced by the preexisting level of capabilities within the organizations that will be involved. ETSs are complex policies involving allowance trading; emission performance management; and detailed monitoring, reporting, and verification procedures. Prior experience or capacity building for future ETS participants can encourage the stakeholder support and participation in the system. This includes experience in monitoring and reporting of GHG emissions, engagement with external verifiers, familiarity with carbon markets and their operation, as well as knowledge of energy and emission management approaches.

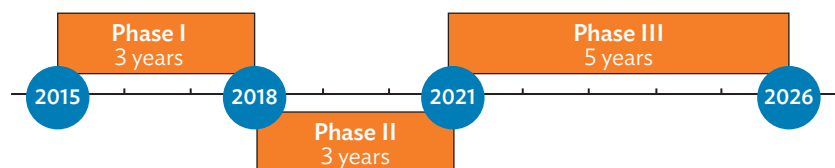
In the ROK, the Target Management System (TMS) introduced in 2012 became an important stepping stone for implementation for both the complying entities and the government, and smoothed the transition into the ETS of the KETS (Hyun et al. 2015; IETA 2016; Jang et al. 2010). The TMS required annual mandatory reporting against firm-specific emission reduction targets from companies that were expected to be included in the KETS. The TMS did not involve any carbon pricing elements but gave businesses in the ROK time to understand the process and build internal emission management and reporting capacity without any additional economic burden. The collection of emission data through the TMS was also valuable because it allowed the government to gather the necessary information that later informed the cap setting and allowance allocation for the KETS.

3 Design of the Korea Emissions Trading Scheme

The Korea Emissions Trading Scheme (KETS) caps greenhouse gas (GHG) emissions from participants within the scheme and involves the issuance of a corresponding number of emission allowances, where each allowance represents 1 ton of carbon dioxide equivalent (tCO₂e) permitted to be emitted. Participants must measure their annual emissions and surrender allowances to cover their emission responsibility. Participants that emit less than their allocation can sell their excess allowances, while those who do not have enough allowances to cover their annual emissions need to buy them. This creates the direct economic incentive for emission reduction. At the same time, the cap limits the GHG reductions to target levels.

The KETS was implemented in phases to allow a progressive evaluation and revision to its design, which is reflected in updated master plans. This enabled the design of the system to be refined, but also means that there is greater regulatory uncertainty as the system rules are subject to change.

Figure 2: Korea Emissions Trading Scheme Timeline



Source: Author.

Figure 2 illustrates how the phases of the KETS were defined (ICAP 2018), with the phase length increasing from 3 years to 5 years in Phase III.

To describe the KETS design, each main element is explained in the following sections. The coverage, cap, allowance allocation mechanism, and annual reporting regime, when defined correctly, create the framework to underpin the required carbon price for efficient emission abatement.

3.1 Coverage

The first step in the emissions trading system (ETS) design is defining its coverage by outlining business sectors and any other categories of emitters that will be included. The KETS has one of the widest coverages of any ETS globally. It includes power generation, industry, buildings, transport, aviation, and waste. The only system that includes additional sectors compared to the KETS is the New Zealand ETS, which also covers forestry (ICAP 2018c).

Once the participating sectors are selected, participation thresholds need to be confirmed to identify emitters that have to comply with the system. In the KETS, the participation thresholds are primarily based on each entity's contribution to the national GHG emissions; however, their capacity to measure GHG emissions and participate in the system are also considered. As a result, the KETS requires mandatory participation from all companies within the covered sectors with average annual GHG emissions equal or greater than 125,000 tCO₂e over 3 consecutive years, or business sites with annual average GHG emissions equal or greater than 25,000 tCO₂e over 3 consecutive years. Any entity, regardless of their emissions level, may apply for voluntary participation.

A notable characteristic of the KETS compared to many other ETSs is that it includes not only the power generation sector, but also indirect emissions from electricity use. The reason for this is that the electricity price in the Republic of Korea (ROK) is rigid and controlled by the government, so would not automatically provide carbon cost pass-through in the electricity price. Therefore, while the carbon-efficient electricity generation is incentivized through the inclusion of power stations, the efficient use of that electricity is encouraged by including electricity consumption in the system's boundaries and thereby providing a direct price signal to electricity consumers. Another reason for the inclusion of electricity in the scope of the KETS was that the Target Management System (TMS) included electricity and therefore maintaining the same scope would reduce confusion for participants (Hyun and Oh 2015).

However, by covering electricity in this way, the emissions are counted twice. Since the amount of generated electricity is directly dependent on the economic situation, at the time of economic growth with higher power consumption, the KETS design would amplify the shortage of allowances in both power generation and industrial sectors. At the time of economic recession, it would in turn result in a surplus of available allowance due to the same principle.

For Phase 1, there were 534 entities in 23 business categories across five sectors selected for mandatory participation in the system. The number of covered entities in 2016 increased to 603, and subsequently reduced to 599 by the end of Phase I. The KETS covers all six Kyoto Protocol GHGs: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.

3.2 Cap Setting

The emission cap provides an upper limit of the aggregated GHG allowance budget for covered entities. For the KETS, it was not an easy task and the process had to go through a number of steps (Hyun and Oh 2015). Given that the ROK's economy is very carbon intensive, defining an emission reduction target that would demonstrate the ROK's climate change commitment to the international community as well as meeting the needs of national industries, appeared to be particularly challenging. This issue was faced by the government in relation to establishing the national 2020 emission reduction targets, which were to become the basis for the KETS cap. After extended analysis and consultations, the issue of the target ambition was addressed by defining the target against a business-as-usual (BAU) scenario. The overall commitment of a 4% reduction compared to 2005 was turned into a 30% reduction compared to the 2020 BAU emissions, which allowed for the growth in each sector and set expectations for sectoral emissions reductions. The ETS cap was then established in line with the national emission reduction targets and was based on sectoral emission reductions (Table 6).

Table 6: Sectoral Target Reduction Rates (%)

Category	Industry ^a	Transportation	Building	Agriculture, Forestry, Fishing	Waste Management	Public Sector
Sectoral reduction rate compared to 2020 BAU emission	18.5	34.3	26.9	5.2	12.3	25.0

BAU = business-as-usual.

^a The reduction target for industrial energy is 7.1%.

Source: Government of the Republic of Korea, Ministry of Environment. 2014. *Roadmap to Achieve the National Greenhouse Gas Reduction Targets*.

However, the ROK's cap setting approach was heavily criticized as sectoral emission reductions were derived from the data collected from the industries through the TMS and consultations with businesses and particularly very energy-intensive industries. This bottom-up approach resulted in a cap that critics stated did not fully take into account the concerns of environmental organizations and civil society (Narassimhan et al. 2018).

3.3 Allowance Allocation

At the beginning of each phase, the government establishes an allocation plan, in which it defines how emission allowances are to be allocated. The allowance allocation is detailed by sector and by business category, which creates the basis for each participant's allocation. Allowances can be either allocated for free or auctioned within the KETS. The approach has evolved between phases, as shown in Table 7. Apart from the allowances allocated or auctioned to participants, a small share of allowances is also set aside in the new entrant reserve.

Table 7: Key Characteristics of Korea Emissions Trading Scheme Phases

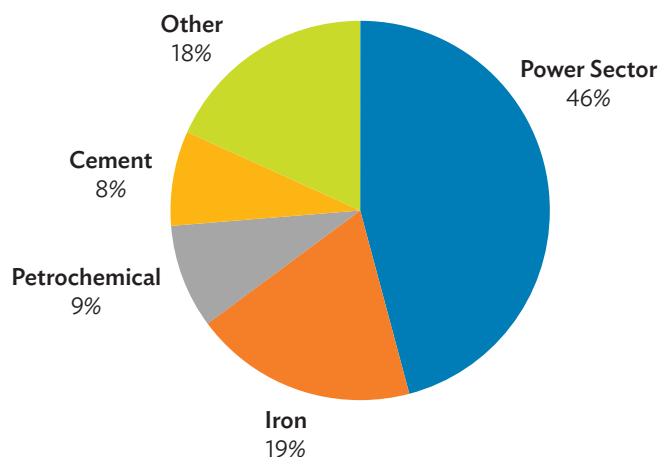
Characteristic	Phase I	Phase II	Phase III
Major Goal	<ul style="list-style-type: none"> Building up operational capacity Ensuring the smooth launch of the system 	<ul style="list-style-type: none"> Considerable emission reduction 	<ul style="list-style-type: none"> Meeting the emission reduction target
Institutional Operation	<ul style="list-style-type: none"> Enhancing the flexibility of the system (e.g., offset credits use) Establishing the basis for accurate MRV 	<ul style="list-style-type: none"> Expanding the scope of the system Increasing the emission reduction target Upgrading standards for emissions reporting and verification 	<ul style="list-style-type: none"> Encouraging all entities to reduce emissions voluntarily Increasing flexibility in supply of credits through participation in third-party trading
Allowances	<ul style="list-style-type: none"> 100% free allocation Utilizing experiences from Energy and Greenhouse Gas Target Management System 	<ul style="list-style-type: none"> 97% of allowances distributed for free, 3% auctioned Improving allowance allocation approach 	<ul style="list-style-type: none"> Less than 90% of allowances distributed for free, more than 10% auctioned Implementing improved allowance allocation approach

MRV = monitoring, reporting, and verification.

Source: Government of the Republic of Korea, Prime Minister's Office. 2015. *The First Climate Change Countermeasure Master Plan*.

Phase I. In Phase I, the overall cap was set at 1,687 million tCO₂e (Hyun and Oh 2015). It was decided that all allowances would be allocated for free to covered entities to ensure the smooth introduction of the system, and not cause excessive economic pressure on the industries involved. The allocation of allowances depended on historical emissions of each emitter. While this approach is relatively easy to implement and avoids sudden large carbon costs for less carbon-efficient businesses, it inevitably raises the question of fairness. High-emitting businesses are seen as being rewarded for past inefficiencies, and early movers are penalized for emissions savings investments made before the system started. To address this, most ETSs tend to move to allocation approaches based on the carbon intensity of production in a certain sector or subsector, such as benchmarking. In Phase I of the KETS, three sectors (grey clinker, oil refinery, and aviation) received allowances based on the benchmarking approach.

In the first year of Phase I, there were 539,753 allowances distributed among the participating entities. The power generation sector received almost 46% of the total allocation, reflecting the size of the sector and that it was heavily reliant on coal and natural gas, which provide almost two-thirds of generated electricity (Korea Electric Power Corporation [KEPCO] 2017). The energy-intensive industries were also allocated relatively large shares of allowances with iron production receiving 19% of the total, followed by petrochemical industry with 9%, and cement production with 8%. All other sectors received a smaller number of allowances (Figure 3).

Figure 3: Korea Emissions Trading Scheme Allowance Distribution, 2015

Source: Korea Energy Agency. 2017. *Energy Statistics Handbook*.

The results of the first year of the KETS showed that most sectors emitted close to their allocated levels, indicating that they may perceive their level of free allocation to be a target. Overall, the annual emissions were higher than the cap by 0.5%. The allowance allocation and actual emissions are shown in Table 8.

Phase II. Starting from Phase II, a share of free allocation has been replaced by auctioning, whereby companies can purchase a share of emissions from the government. The share of auctioned emissions was set at 3% for Phase II but will increase to over 10% in Phase III. This is expected to make the KETS function as a more dynamic market instrument.

The benchmarking approach that was applied to three subsectors in Phase I was extended to additional subsectors including power generation, group energy, industrial complex, petrochemical, and waste (ICAP n.d. b). In addition to this, changes were made to the sector and subsector classifications by separating public and waste sectors and increasing the overall number of subsectors from 23 to 64. This is intended to support more accurate allowance allocation. For very small subsectors with only one or two installations, benchmarking will not be appropriate and therefore the approach based on each installation's historic emissions will be preserved in these instances. To ensure that the extended application of the benchmarking approach stimulates emission reduction, specific guidelines and benchmarking factors will be prepared for subsectors selected for benchmarking.

Table 8: Korea Emissions Trading Scheme Sectoral Allowance Allocation and Emission Performance, 2015

Industry	Allocated (tCO ₂ e)	Share (%)	Actual (tCO ₂ e)	Share (%)	Performance Compared to Allocation (tCO ₂ e)
Power Sector	247,395	45.83	249,148	45.91	1,753
Mining	200	0.04	185	0.03	(15)
Textile	4,496	0.83	4,146	0.76	(350)
Pulps	7,377	1.37	7,157	1.32	(220)
Refinery	19,313	3.58	18,719	3.45	(594)
Petrochemical	47,832	8.86	49,369	9.10	1,537
Ceramics	6,106	1.13	5,972	1.10	(134)
Cement	43,608	8.08	44,547	8.21	939
Iron	102,568	19.00	101,850	18.77	(718)
Nonmetal	6,800	1.26	7,617	1.40	817
Machinery	1,351	0.25	1,271	0.23	(80)
Semiconductor	11,506	2.13	11,730	2.16	224
Display	10,045	1.86	10,316	1.90	271
Electronics	3,238	0.60	2,964	0.55	(274)
Vehicle	4,283	0.79	4,063	0.75	(220)
Ship construction	2,648	0.49	2,529	0.47	(119)
Telecommunication	3,083	0.57	3,128	0.58	45
Food and beverage	2,654	0.49	2,483	0.46	(171)
Timber	382	0.07	334	0.06	(48)
Building	3,994	0.74	3,912	0.72	(82)
Airplane	1,282	0.24	1,465	0.27	183
Water utility	719	0.13	745	0.14	26
Waste	8,875	1.64	9,002	1.66	127
Total	539,753	100	542,651	100	2,898

tCO₂e = ton of carbon dioxide equivalent.

Source: Korea Energy Agency. 2017. *Energy Statistics Handbook*.

With the introduction of allowance auctioning in Phase II, special provisions for energy-intensive and trade-exposed (EITE) sectors were applied. While this provision for EITE sectors already existed in Phase I, prior to Phase II it made no difference to the allocation process as all allowances were allocated for free. The free allocation to EITE sectors will continue in future phases (ICAP 2016). Figure 4 illustrates the EITE criteria, which is based on additional production cost and trade intensity.

Figure 4: Energy-Intensive and Trade-Exposed Sectors Criteria



Source: International Emissions Trading Association. 2015. *Republic of Korea: An Emissions Trading Case Study*.

The allowance auctions began in 2018 and are open to all KETS-covered entities except those that receive all their allowances for free. The Ministry of Environment (MOE) prepares and publishes the list of eligible bidders. The auctions are held monthly and a number of conditions are imposed to keep the price within reasonable limits. Particularly, the auctioned allowances are subject to a price floor and no bidder is allowed to purchase more than 30% of the auctioned amount in any auction. The latter provision was added to avoid speculation on the market.

Phase III. In line with the announced plans, the share of the free allocation will continue to decrease in Phase III, further strengthening the internalization of carbon costs for the participating companies. It was announced that the share of auctioned allowances will be greater than 10% from 2021 onwards.

3.4 Annual Reporting

Compliance steps. The participants have to undertake a number of annual steps to ensure compliance with the KETS (Table 9). At the end of the reporting year, each participant must compile an emission report detailing its emissions from all covered emission sources. This report has to be verified by an accredited third-party verifier and submitted to the government within 3 months from the end of the reporting year. This report will then be reviewed by the MOE's Certification Committee. If a liable entity fails to report its emissions correctly, the Certification Committee may decide to disqualify the report (ICAP 2018a).

Once the report is approved, the complying entity may proceed to surrendering allowances to cover its GHG responsibility. This can be done with allowances received through free allocation, purchased on the carbon market, borrowed from the following compliance period, or banked from previous compliance years. The last two options were introduced to provide flexibility within the system.

Table 9: Korea Emissions Trading Scheme Annual Compliance Cycle

Step	Deadline	Actions
ETS reporting period	January–December (reporting year)	<ul style="list-style-type: none"> Compliance entities perform business activities, undertaking emission reduction activities Trading of allocated emission credits
Reporting and verification	March (following year)	<ul style="list-style-type: none"> Annual emission report needs to be submitted The report must be verified by a third-party verifier
Certification	May (following year)	<ul style="list-style-type: none"> Emissions reports are reviewed and certified by the Certification Committee (Ministry of Environment)
Annual reporting and allowance surrendering; borrowing and banking	June (following year)	<ul style="list-style-type: none"> Allowances surrendered Banking—excessive allowances saved for future years (if applicable) Borrowing—extra allowance borrowed from previous years (if applicable)

ETS = emissions trading system.

Source: ICAP. 2018a. *Korea Emissions Trading Scheme*.

Using offset carbon units is another flexibility mechanism that may be used to fulfill KETS obligations. This is explained in detail in Section 4.

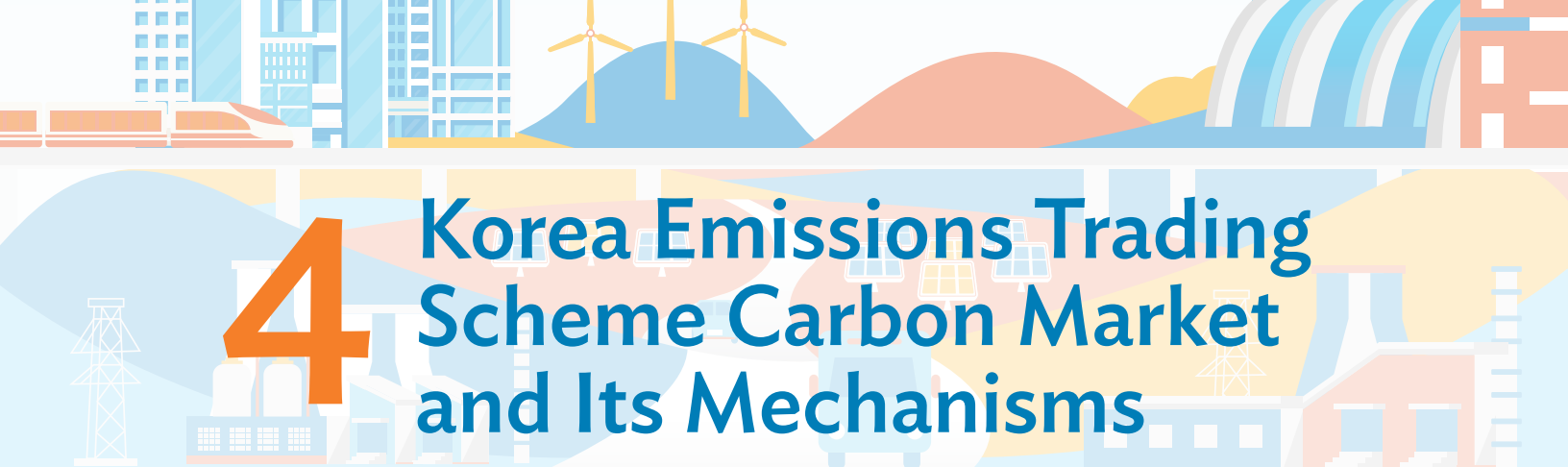
Monitoring, reporting, and verification. The KETS phases were designed to build the necessary capacity for third-party verifiers, where the concept was to move from the setup of national MRV mechanisms in Phase I through regular updates in Phase II to the adoption of international MRV standards in Phase III (GIR 2017b).

In parallel with development and updates of the standards, the necessary capacity building for the verification bodies and verifiers is taking place. All verifiers need to be accredited by the MOE. They must meet the list of qualifications designated by the MOE and hold international standards, such as ISO 14065:2013⁴ or IAF MD 6:2014.⁵ Accredited verifiers include government agencies, industrial associations, research institutes, and private auditors. Many of them are also accredited as designated operational entities of the Clean Development Mechanism.

Compliance enforcement. The penalty for noncompliance with the KETS is an administrative fine not exceeding three times the average market price per unit of tCO₂e for that year. The maximum penalty is W100,000 per ton of carbon dioxide equivalent, or approximately \$91 per tCO₂e.

⁴ ISO 14065:2013. Greenhouse gases: Requirements for Greenhouse Gas Validation and Verification Bodies for Use in Accreditation or Other Forms of Recognition.

⁵ IAF Mandatory Document for the Application of ISO 14065:2013.



4 Korea Emissions Trading Scheme Carbon Market and Its Mechanisms

4.1 Emission Trading Overview

An efficient carbon market is crucial to the delivery of a carbon price signal against which participants can invest in emissions reductions. In the Korea Emissions Trading Scheme (KETS), the emission allowances held by participants can be traded on the emission permit exchange. The Korea Exchange was designated for emission permit trading. Allowances issued to and traded by the participating companies are managed through the Emissions Trading Registry System and the Offset Registry System.

The main type of allowances available within the KETS are Korean Allowance Units (KAUs). KAUs are distributed by the government through emission allocation and governmental auctioning, with each KAU equivalent to 1 ton of carbon dioxide equivalent (tCO_2e). Other types of carbon credits are available through the carbon offset program of the Republic of Korea (ROK), which are described later.

In Phase I, only companies that were registered KETS participants and were covered by the emissions cap were allowed to open allowance trading accounts. However, it resulted in a relatively low number of players on the market, which was recognized as one of the potential reasons for limited market liquidity. To address this situation, the government announced that carbon traders, which are also called market makers in the KETS, will be introduced in Phase II to stimulate carbon trading. These will include three banks: the Korea Development Bank, the Export-Import Bank of Korea, and the Industrial Bank of Korea. From Phase II onwards, they will be allowed to hold accounts on the carbon exchange of the ROK and trade allowances as third-party agents (ICAP n.d. b).

4.2 Stabilization Mechanism

To maintain the carbon price within a reasonable range that does not cause unnecessary burden for the complying entities, the government incorporated special provisions for price management within the ETS legislation. For this purpose, the First National Allocation Plan included a provision for the creation of the allowance reserve (88 million tCO_2e) for market stabilization. This reserve serves not only to manage price variability, but also to provide allowances to new entrants and firms that earned early action credits. (PMR and ICAP

2016). The allocation plan outlines conditions under which the government is allowed, but not obliged, to pursue stabilization measures, which include (ICAP 2018):

- (i) The market allowance price of 6 consecutive months is at least three times higher than the average price of the 2 previous years.
- (ii) The market allowance price of the last month is at least twice the average price of 2 previous years and the average trading volume of the last month is at least twice the volume of the same month of the 2 previous years.
- (iii) The average market allowance price of a given month is smaller than 40% of the average price of the 2 previous years.
- (iv) When it is difficult to trade allowances due to the imbalance of supply or demand.

The stabilization measures that the government can apply in case of fulfillment of at least one of the above conditions include

- (i) early allocation(s) from the reserve of up to 25%,
- (ii) setting minimum (70%) or maximum (150%) allowance possession limits,
- (iii) limiting or increasing the borrowing limit,
- (iv) limiting or increasing the ratio of offsets allowed for compliance, and
- (v) temporarily setting of price ceilings and floors.

The government applied these provisions at the end of the first year when it turned out that the overall emissions of the participants were 0.82% higher than the cap. To address this issue, the government supplied additional allowances to the market.

4.3 Flexibility Mechanisms: Banking and Borrowing

To further stabilize the market, banking and borrowing mechanisms were introduced.

Banking. Banking is a mechanism that allows complying entities to retain unused allowances and use them for future periods. In the KETS, allowance banking can be applied without any restrictions. Unrestricted banking was mentioned as one of the reasons slowing down trading activities on the carbon market of the ROK (IETA 2016). The government is currently considering limiting allowance banking in the future, but no official decision has been made.

Borrowing. Borrowing involves participants using allowances from future compliance periods to cover the company's responsibility in the current compliance period. It is made possible because allowances for an upcoming year are allocated before allowances must be surrendered for the previous year, and the new allowances can be used for that surrender. To maintain the necessary economic incentive, borrowing within KETS has annual limits and is not allowed across phases. At the beginning of Phase I, borrowing was allowed only at the level of 10% of the entity's obligation but was later extended to 20%. From Phase II,

borrowing was reduced to 15% and from 2019 will depend on the amount borrowed in the past and will be defined based on the following formula:

$$\text{[Borrowing limit of previous year - ("borrowing ratio" in previous year x 50%)] / entity's emission volume}$$

Any allowances not used for reporting or banking expire after 30 June of the following compliance year. Since banking has no restrictions across phases, complying entities tend to hold excessive allowances rather than taking risks by selling them to the market. Banking and borrowing are processed electronically through the Emissions Trading Registry System, an online inventory system established by the government and operated by the Greenhouse Gas Inventory and Research Center (GIR).

4.4 Korea Offset Program

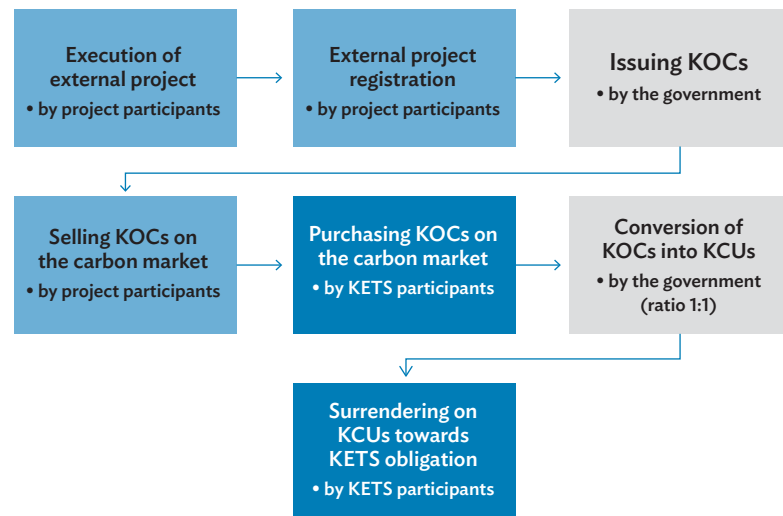
Another flexibility mechanism that was implemented by the government to support the KETS is the use of domestic carbon offsets. As part of this mechanism, the KETS allows carbon offset credits representing emissions savings outside of its boundaries to be used for compliance. The generation and management of these credits is done through the Korea Offset Program (KOP). This program was established to support KETS participants as well as encourage voluntary emissions reductions in other sectors, reduce the costs of achieving the national emission target, and help stabilize the carbon market.

Carbon credit units. The units used as part of the KOP, Korea Offset Credits (KOC), are credits generated from domestic projects external to KETS. Such projects are referred to as “external” because they are outside the of the KETS boundaries. They can be traded by account holders within or outside of the KETS and have no expiry date, so in effect are bankable beyond KETS phases. KOCs are generated following a step-wise process similar to that of the Clean Development Mechanism (CDM).

To be used for the KETS compliance, KOCs have to be converted into Korea Credit Units (KCU) and can only be owned and traded by KETS participating entities. They are created by the MOE through the exchange of KOCs, on a one-to-one basis, subject to eligibility criteria. This unit conversion was introduced as the means by which the use of offsets within the KETS can be controlled and managed. This means that KETS participants can purchase KOCs and store them on their accounts, trade them or apply for their conversion to KCUs, but the government will need to consider and approve each KOC-KCU conversion to avoid market disruptions with an excessive inflow of offset credits.

The process of conversion of carbon offsets from KOCs to KCUs is shown in Figure 5.

Certified emission reductions (CERs), issued by the CDM, can also be used under the KETS and have to go through the same process but with one additional step. CER units first need to be cancelled in exchange for KOCs, which can then be either used for voluntary carbon footprint offsetting, or further converted to KCUs for KETS compliance.

Figure 5: Conversion of Korea Offset Credits Into Korea Credit Units

KCU = Korea Credit Unit, KETS = Korea Emissions Trading Scheme, KOC = Korea Offset Credit.

Source: Korea Research Institute on Climate Change. 2018. *Introduction to Korea Emission Trading Scheme*.

Korea Offset Program development. A cautious approach was adopted to the permitted use of offsets for compliance within the KETS, that has evolved between phases:

- (i) In Phase I, only offsets from projects within the ROK were allowed. These could be from CDM or KOC projects but had to be generated after 2014. Project types had to be eligible under CDM or originate from Carbon Capture and Storage projects. KETS participants could use carbon offsets of up to 10% of their compliance obligation (i.e., their emission volume).
- (ii) From Phase II, CDM projects from outside the ROK, but developed by companies in the ROK, can be used. A limit of 10% carbon offsets used for compliance continues to apply, but with up to 5% coming from international projects.

Certification procedure. To be eligible to claim carbon offsets under the KOP, an external project needs to be verified by third-party verification entities that are accredited to undertake project verification by the MOE. Once a project has been verified, an application can then be submitted to GIR, which will send it on to the sectoral ministry for review and approval. To pass the approval procedure, the project needs to meet a series of criteria: (i) it should originate from outside on the KETS boundary, (ii) it should be initiated after 14 April 2010, (iii) it should follow one of the approved methodologies, and (iv) it should be implemented on a voluntary basis (MOE 2014; ICAP 2018).

Table 10: Domestic Methodologies for Offset Projects

Category	Project Types
Fuel switch	<ul style="list-style-type: none"> • Fossil fuel → fossil fuel • Fossil fuel → wood pellet • Fossil fuel → chaff • Fossil fuel → wood pellet (rural) • Fossil fuel → district heating
Renewable energy	<ul style="list-style-type: none"> • RE power generation (grid connection) • RE power generation (self-use) • RE power generation (self-employed, rural) • Solar system • Solar system (rural) • Geothermal system (rural)
Waste heat utilization	<ul style="list-style-type: none"> • Unused heat recovery and utilization • Unused heat recovery and utilization (rural) • Unused heat recovery and power generation
Efficiency improvement	<ul style="list-style-type: none"> • Installation of power saving facilities • High-efficiency facility replacement • Replacing high-efficiency lighting in buildings • High-efficiency lighting replacement • Replacing high-efficiency building equipment • High-efficiency thermal insulation materials (rural) • Rural LED installation
Biomass	<ul style="list-style-type: none"> • Collective energy heat supply using woody biomass • Bio CNG vehicle fuel • Sewage treatment plant biogas recovery • Biogas plant (rural) • Biomethane city gas supply
Agriculture	<ul style="list-style-type: none"> • Cultivation of circulating water • Water management during paddy cultivation • Use of slow-release fertilizer • Use of by-product fertilizer
Waste	<ul style="list-style-type: none"> • Production and utilization of thermal energy utilizing waste wood
Forestry	<ul style="list-style-type: none"> • Afforestation and/or reforestation • Using wood products • Forestry restoration project

CNG = compressed natural gas, LED = light emitting diode, RE = renewable energy.

Source: Korea Research Institute on Climate Change. 2018. *Introduction to Korea Emission Trading Scheme*.

As of November 2017, there were 255 approved KOP methodologies including 211 CDM methodologies and 34 domestic methodologies in eight categories of projects. The list of domestic methodologies developed by the government and project participants is presented in Table 10.

The registration and certification procedure of an external project follows three stages: (i) application submission by project participant, (ii) review and validation by the sector's ministry, and (iii) approval by the Certification Committee.

Korea Offset Program and Clean Development Mechanism comparison. Overall, KOP and CDM project preparation and certification processes are very similar. The process for KOP intends to build upon the experiences of the CDM and facilitate the certification process for organizations already familiar with CDM procedures.

Apart from the acceptance of all CDM project methodologies, the KOP project application has the same structure as that of CDM. It includes four main parts: summary and methodological applicability, baseline methodology, monitoring methodology, and references and/or other information. The process of baseline identification was slightly simplified for KOP application and does not explicitly require analysis of barriers, investments, and common practices. However, in practice, the information provided within the KOP application needs to follow the same topics to be approved (Korea Research Institute on Climate Change 2018).

The monitoring principles of KOP apply international standards, corresponding to the United Nations Framework Convention on Climate Change, CDM, and ISO 14064. Pursuing consistency, replicability, transparency, accuracy, and conservativeness, Article 26 (monitoring principles) of the Standard for Validation and Certification of External Projects released by the MOE is defined as follows:

- (i) Monitoring methods shall comply with the registered project plan and the approved methodology.
- (ii) External projects shall be measured in a manner that minimizes uncertainty.
- (iii) Emission reduction of external projects shall be consistent, reproducible, transparent, and accurate.
- (iv) When estimating the data needed to calculate the amount of emission reduction from external projects, the conservative approach should be followed.

The structure of the monitoring report is also very similar to that of CDM, starting from the description of project, followed by the description of its implementation, monitoring system, and data or parameters.



5 Korea Emissions Trading Scheme Performance

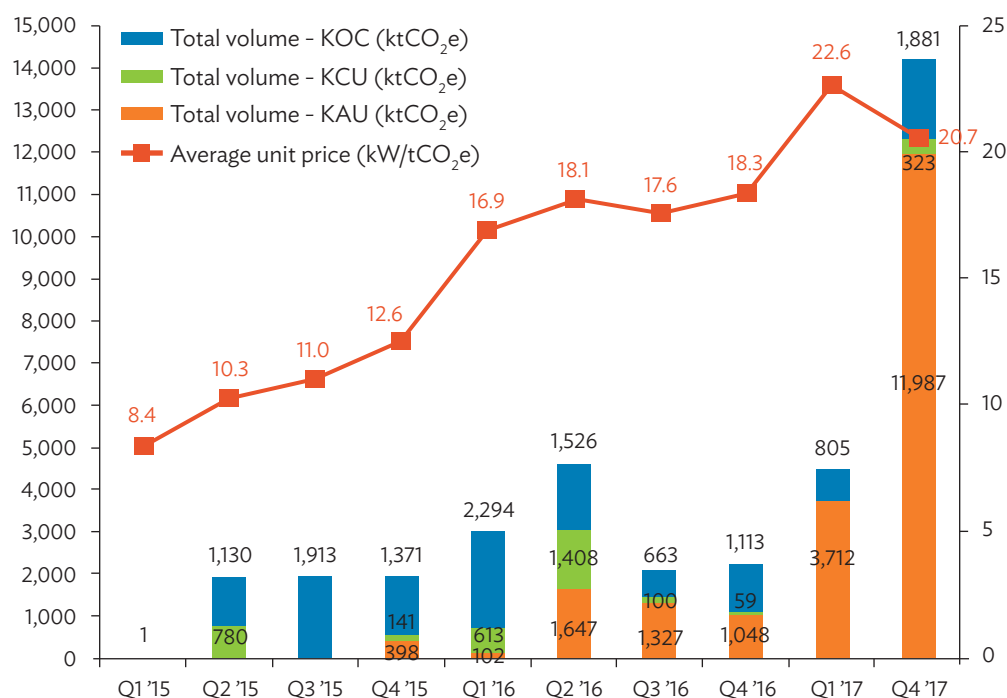
5.1 Trends in Phase I

Trading dynamics overview. In an emissions trading system (ETS), the price varies according to the prevailing market view on the cost of meeting the cap. This provides participants with the economic signal to make the necessary abatement. However, excessive market volatility can hinder these investment decisions. Over the course of the operation of the Korea Emissions Trading Scheme (KETS), the carbon market in the Republic of Korea (ROK) demonstrated dynamics that highlight both the achievements and challenges of the system.

Allowance trading commenced in January 2015, the first year of KETS operation. The participants required some time to get used to the principles of the system's operation and did not need to surrender allowances until the following year. As a result, no transactions occurred until October 2015. After that period, some transactions started taking place, yet the trading volumes grew extremely slowly. By the end of 2015, the total emissions traded on the market reached just over 300,000 tons of carbon dioxide equivalent (tCO₂e), representing only a very small portion of the total 573 million tCO₂e covered by the system in that year (Narassimhan et al. 2017).

As a response to the low trading volumes, the government decided to auction allowances from the reserve fund representing 900,000 tCO₂e in June 2016. At the same time, some companies had a surplus of allowances at the end of the first compliance year, which they sold. These developments caused a slight rise in trading volumes. To further stimulate trade, the government made a decision to raise borrowing limits and simplify rules to earn early action credits. However, even taken together, all these measures had no observable impact on trading activity in the market (Narassimhan et al. 2017 and 2018).

The introduction of offset carbon credits to the market became an additional stimulus to emission trading. In April 2015, the Korea Credit Unit (KCU) was officially listed as a supplemental trading unit to the KETS, which was followed by the listing of the Korea Offset Credit (KOC) in May 2016. This allowed trading to take place not only between the KETS-covered entities, but also project participants managing offset carbon credit projects. By increasing the number of participants in the market, this step incentivized carbon transactions and reduced transaction costs. This became an important development in the ROK's carbon market as the low number of participants and limits on third-party participants (traders) are often mentioned as one of the factors preventing the necessary market liquidity (ICAP 2016).

Figure 6: Korea Emissions Trading Scheme Trading in Phase I

KAU = Korean Allowance Unit, KCU = Korea Credit Unit, KOC = Korea Offset Credit, ktCO₂e = kilotons of carbon dioxide equivalent.
 Source: Greenhouse Gas Inventory and Research Center of Korea. 2017a. *Current Status of the Korean ETS*.

As a result of all these measures and because the system's participants were getting more familiar with the trading rules, overall, Phase I of the KETS demonstrated a steady increase in traded volumes. Based on the data available for 2015–2017 (Figure 6), the trading activity peak was recorded in the second quarter of 2017. The price peaks in the second quarters of each year are consistent with the compliance timeline that requires allowances to be surrendered by participating organizations by 30 June for the previous compliance year. The volume traded in the second quarter of 2017 reached 1.88 million tCO₂e with the overwhelming majority of trades being Korea Allowance Units (KAUs). While the overall volume of allowances traded on the market remained low in absolute terms when compared to the KETS cap, the market has demonstrated steady growth during its first commitment period.

The carbon price also evolved as the market developed. Upon the introduction of the KETS, the carbon price was first recorded at a fairly low level of ₩8,4000 as many KETS participants were demonstrating risk-averse behavior by banking their allowances instead of

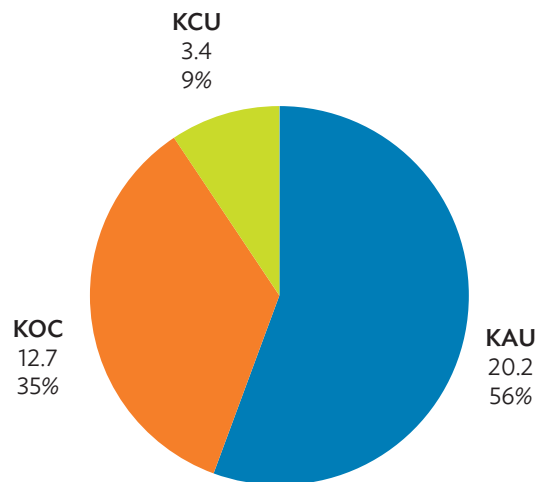
trading them. Yet in the first quarter of 2017, after 2 years of continuous growth, the market price reached W22,600 per tCO₂e. Subsequently, the market saw an inflow of KAUs for sale, which resulted in a consequent price reduction.

With the increase of the carbon price in the ROK, the government announced its plans to permit the share of allowances held in reserve. (ICAP n.d. b). This is intended to increase the number of allowances in circulation and further support carbon trade.

Due to the limited amount of data available to assess the performance of the carbon market in the ROK, it may be too early to draw any definite conclusions, yet the overall dynamics seen so far definitely demonstrates a positive development of the market as a self-regulating mechanism.

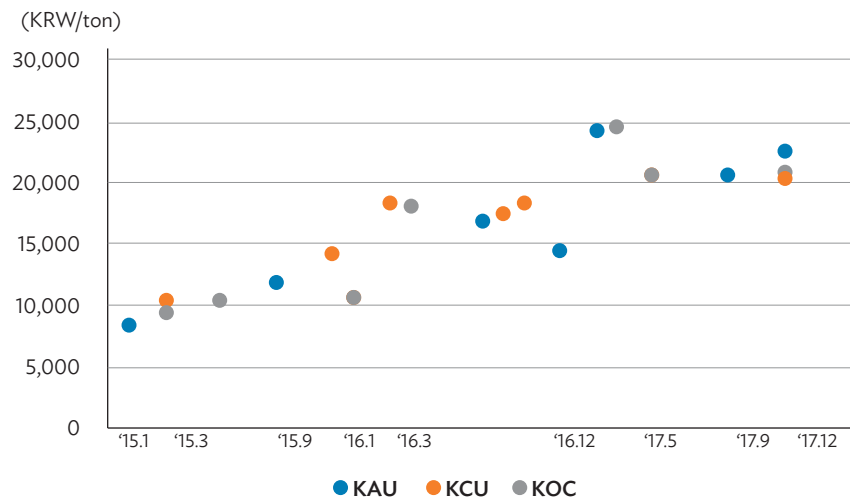
Offset credit trading. In Phase I of the KETS, there was a lack of KAU supply to the marketplace. As a consequence, the KCU and KOC trade volume was approximately five times larger than that of the KAU trade volume in 2015. However, from 2016 onwards, the amounts of KAU trading started to increase, resulting in KAUs being the main type of credit traded on the secondary market. Following this trend, by January 2017, KAUs constituted 56% of the aggregated volume of credit traded in the KETS since its inception (20.2 million tCO₂e). KOCs accounted for 35% of the overall traded volume (12.7 million tCO₂e), followed by KCUs representing 9% (3.4 million tCO₂e) (Figure 7).

Figure 7: Share of Allowances by Type, as of January 2017
(tCO₂e, %)



KAU = Korean Allowance Unit, KCU = Korea Credit Unit, KOC = Korea Offset Credit, tCO₂e = ton of carbon dioxide equivalent.

Source: Greenhouse Gas Inventory and Research Center of Korea. 2017a. Current Status of the Korean ETS.

Figure 8: Allowance Price in Phase I by Type

KAU = Korean Allowance Unit, KCU = Korea Credit Unit, KOC = Korea Offset Credit, KRW = Korean won.

Source: Greenhouse Gas Inventory and Research Center of Korea. 2017a. Current Status of the Korean ETS.

Despite the difference in the amounts and dynamics of trading of different allowance types, their prices remained very close throughout Phase I (Figure 8).

Supply-demand imbalance. During the first year of the KETS, the participants received allowances worth 549 million tCO₂e. As a result of the 2015 performance review, 290 participants did not exhaust their allocated allowances. This resulted in 17 million tCO₂e in excess allowances on the market, however, 227 participants banked their surpluses to later years. Overall, the situation turned out to be the opposite of industry concerns about excessive scarcity, when it argued for a higher cap and larger amounts of allocated allowances.

The remaining participants, however, were required to buy additional allowances to cover their greenhouse gas (GHG) emissions. This shortage was estimated to be 11 million tCO₂e. According to information from the Ministry of Strategy and Finance (MOSF), over three-quarters of these companies borrowed allowances from the future compliance period or purchased them on the market. This market dynamic demonstrates that borrowing became a widely-used option to cover outstanding emissions. There were also 49 companies that filed complaints requesting additional allowances or exemption from the system participation in the first compliance year.

This demonstrates that while there were participants in the system with allowance surpluses and shortages, which should have created the necessary conditions for allowance trading, in practice, active trading in the secondary market was limited, primarily because of banking and borrowing rules.

The overall oversupply of allowances on the market was likely to be caused by a series of factors, such as carbon savings activities of KETS participants, a reduction of economic activity following the economic downturn, and increase of the borrowing rate up to 20%. The intervention of the government in the market, with additional 900,000 tCO₂e released, further increased the number of available allowances.

5.2 Arrangements for Phase II

In June 2017, the MOSF released its second master plan for the KETS, which gave direction to how the system would change in Phase II. This master plan was developed in accordance with the ROK's 2030 Nationally Determined Contribution target of 37% emissions reduction, where the targets for domestic emission reduction had been raised.

The master plan includes a number of steps that were designed to facilitate carbon trading on the ROK market. These steps included expanding rules for early action credits, moving forward the date for approval of overseas emission reduction, and introducing market makers. One important change that is expected to help incentivize emission trading is the reduction of the borrowing limit from 20% in the first year of Phase II to 15% going forward. The introduction of mandatory auctioning of 3% of allowances is also supposed to help the KETS participants accept the market price as part of the system and not see the KETS as merely a compliance exercise involving reporting emissions and surrendering allowances previously allocated for free.

In addition, the use of offset credits for compliance is limited to 10% of each participants obligation, but the number of approved methodologies for offset projects have further expanded (thereby possibly increasing supply). Also, the report procedures for small-size offset projects below 100 tCO₂e are simplified to reduce the administration costs for project participants.

In an attempt to stimulate further carbon trade in Phase II, the government also enabled access to the market to three banks (market makers). These banks will be able to hold accounts on the Emission Trading Registry System and trade carbon allowances.

The Korean government finalized the Allocation Plan for Phase II in July 2018, however the allocation for each entity under the KETS has not yet been completed. It is therefore not yet possible to make a comparison with Phase I.

6 Korea Emissions Trading Scheme Assessment

6.1 Challenges

Being an energy-intensive growing economy, the Republic of Korea (ROK) made an ambitious step by deciding to implement an emissions trading system (ETS) as one of the means to achieve its greenhouse gas (GHG) emission reduction commitment. It had to face a number of challenges during the system implementation.

Barriers to market liquidity. Following the first year of the operation of the Korea Emissions Trading Scheme (KETS), the Korea Energy Economics Institute (KEEI) undertook a review of the system, which is summarized in Table 11. The main barriers to the successful functioning of the system were identified as high transactional costs, primarily caused by a low number of participants; domination of the market by some corporate groups; stringent regulations of the electricity generation sector; and high uncertainty linked to fluctuating economic performance of the country and particular sectors. While Chapter 5 demonstrated that after the first year of the system the situation on the market started to improve, there are still some significant barriers to market liquidity.

Table 11: Evaluation of the Korea Emissions Trading Scheme

Types of Market Distortion	Possibility of Market Distortion	Main Factor
Transaction cost	High	<ul style="list-style-type: none"> A small number of market participants skewed distribution to energy intensive industry Heterogeneous market participants
Market dominant power	High	<ul style="list-style-type: none"> High market concentration Collaborative actions by some groups (especially KEPCO and its subsidiaries)
Regulation	Average	<ul style="list-style-type: none"> Fixed retail price of electricity RPS system
Uncertainty	High	<ul style="list-style-type: none"> Inclusion of indirect emissions Economic fluctuation

KEPCO = Korea Electric Power Corporation, RPS = Renewable Portfolio Standard.

Source: Korea Energy Economics Institute. 2015. *Market Distortion Factors of KETS and Its Policy Implication*.

The liquidity issues in the Phase I were attributed to several design elements of the system. Banking of Korean Allowance Units (KAUs) was not restricted either within or across the system's phases. This may have caused companies covered by the KETS to bank most of their surplus allowances to avoid the risk of needing to purchase more expensive allowances in subsequent years if they then exceed their free allocations. Together with the policy uncertainty linked to the newly introduced system and lack of preparedness from the side of KETS participants (Suk et al. 2017), unlimited banking, to a large extent, prevented significant increases in the level of trading activities on the market.

Going forward, the consequences of early year surpluses of allowances may have continued impacts, since participants with banked allowances may use them instead of taking abatement action, which would ultimately lead to delayed action across the economy. It is important that the signals about longer-term deeper emissions reductions lead companies to take early action to reduce their emissions so that they remain on the required trajectory.

In addition to the unrestricted banking rules, the liquidity issues in the KETS have been attributed to the government releasing some of the allowance credit reserve to the market, intended to avoid a shortfall (and the penalties that companies would have to pay) and stimulate the market. However, when taken together with the existing surplus of allowances it led to further hoarding of allowances, and banking, rather than encouraging participants to go on the market.

This situation is very closely linked to the discussion of supply–demand balance considered in Chapter 5. As Phase I has demonstrated, an increase of allowances in circulation is not able to address the problem of low market liquidity as long as participants are not willing to sell them on the market. Addressing this problem requires providing certainty in the overall policy direction, ensuring the stability of market prices, and implementing automatic market regulation mechanisms. The provisions that are already laid out for the intervention of the government in the KETS allow for the regulation of the amount of allowances on the market, but their effectiveness is yet to be assessed.

Capacity development to encourage more rational market behavior will be important. Extensive information sharing, development of in-house expertise in participating companies, as well as external consultancy services to support them will help the market evolve.

6.2 Lessons Learned

Based on the analysis presented in this report, literature review, and expert interviews,⁶ the lessons learned from the KETS implementation can be summarized as follows.

- (i) **A clear and consistent signal to the market is necessary.**
 - (a) Policy commitment and market stability are necessary to ensure market liquidity. The liquidity of carbon markets does not only focus on the amount of

⁶ In total, eight face-to-face or phone interviews were conducted with two government officials, two government agencies, one consulting company, two covered entities, and one financial institution from March to December 2017. The interview discussion focused on (i) challenges in preparation of implementation of KETS, (ii) challenges in operation during Phase I, and (iii) experiences in communication facilitation between government and the industry.

allowances in circulation and the balance of supply and demand, but requires ensuring policy certainty and market stability to encourage participants to sell their allowances. If trading is seen as a risky activity and banking is allowed, participants may be much more likely to save their allowances for future periods.

The ROK experience. The ROK's situation has demonstrated that consistent policy and market price stability are required to reduce the uncertainty linked to the future of the system and, consequently, to encourage participants to sell excess allowances rather than bank them.

- (b) Clarity on management arrangements is needed for effective operation of the system. Emissions trading policy is relevant to the role of many government ministries. For instance, in the role of the policy in cutting emissions, delivering other environmental co-benefits, impacting industrial competitiveness or energy prices, or in the impact it has on government revenues (e.g., through auctioning allowances). A clear definition of responsibilities, a process or engagement across ministries, and consistent messaging to the market are all important.

The ROK experience. The KETS management arrangement went through a number of transformations in an attempt to find the most beneficial way to manage and oversee the system. The responsibilities were variously disaggregated and aggregated and the number of involved government bodies resulted in unclear or even conflicting policy signals. While arguably a necessary evolution during the early phase of the system, this experience increased regulatory uncertainty.

- (c) In the situation of the market uncertainty, unrestricted allowance banking may harm not only the market liquidity, but also future emission reductions. When participants have no restrictions on banking allowances, they may want to bank allowances to avoid the risk of higher future compliance costs should allowance prices rise. When this is done to a great extent across a system, it can lead to delayed abatement. A clear expectation of future abatement needs can help address this.

The ROK experience. The unrestricted banking of allowances in the ROK resulted in most of its participants banking excess allowances for future periods. For example, allowances unused in Phase I were kept for Phase II compliance when targets are more stringent.

(ii) **A gradual system introduction can minimize implementation challenges.**

- (a) An extensive preparatory period may be required. With an ETS being a relatively complex policy instrument that requires significant internal capacity from its participants, its introduction requires an extensive preparatory period for the participants to familiarize themselves with the rules and prepare for compliance actions.

In addition, complementary policy measures aimed at reducing nonpricing barriers to low carbon investment and supporting an ETS implementation include capacity building, provision of information, and access to capital.

The ROK experience. The first master plan and allocation plan of the ROK were published in the fourth quarter of 2014, with the system launch scheduled about 2 months later. With such a limited time for preparation, many participants were not fully prepared to join the new system.

(iii) **Close communication with industry is crucial.**

- (a) Stakeholder engagement is crucial for successful ETS introduction. In a developing economy that has significant reliance on energy-intensive industries, the introduction of a carbon pricing instrument may appear to be a very sensitive issue that is likely to face strong opposition from the national industries. To address this issue and gain stakeholder support, it is crucial to put in place stakeholder engagement methods including public hearings, industry meetings, and other forms of stakeholder consultations.

The ROK experience. It took the ROK over 2 years to gain agreement from the industry to launch the KETS. Going forward, stakeholder engagement methods should be incorporated for introduction of major changes of the system. Public hearings and industry consultations continue to be frequently organized to provide support for KETS participants. The four sectoral ministries organize technical support seminars dedicated for specific industries. In cooperation with the government, a consulting center for small and medium-sized enterprises is operating.

In addition to this, the Greenhouse Gas Inventory and Research Center of Korea is conducting annual stakeholder surveys covering approximately half of the KETS participants in each sector to gain their feedback and suggestions related to the system operation. The results are thoroughly reviewed by the government with the intention to implement improvements where it is feasible and reasonable.

- (b) Efficient information sharing and capacity building for smaller participants is required. Smaller ETS market participants can especially struggle from a lack of resources to gather policy and market information and limited experience in allowance trading.

The ROK experience. The collected participant feedback has shown that smaller participants often did not recognize that carbon trade can be a financial opportunity, thus the KETS was often omitted from the work of their financial divisions or management strategies.

To address this situation, an integrated online platform on KETS is being developed to provide integrated information and support the system's participants, particularly those with limited capacity to manage an ETS compliance process. The Korea Environment Corporation, which is a public organization, launched a pilot project to issue a bi-weekly newsletter (e-mail and paper distribution) on the latest market status and relevant news. This newsletter is open to the public and anyone can subscribe to receive it.

(iv) **International cooperation may become a successful development of the national policy.**

- (a) International cooperation may unlock further emission reduction opportunities. Cooperation with other ETSs may result in highly beneficial exchange of experiences and, eventually, in system linking. For smaller countries with a limited number of participants, this may lead to improved market liquidity and higher efficiency of the system, in general. While ETS linking is a complex transformation that needs to be very carefully designed to not cause disruption to either of the carbon markets, these opportunities should be monitored.

The ROK experience. As part of sharing their carbon pricing experience, the People's Republic of China, Japan, and the ROK held a forum where they explored ways for cooperation and possible options for linkages of the regional markets. In addition to monitoring the options for linkages of markets, the Government of the ROK is cooperating with the European Union (EU) ETS authorities for carbon pricing experience sharing. As a result of this cooperation, in July 2016, the EU–ROK cooperation project was launched to support the implementation of the KETS. This project aims to share the EU experience and knowledge on ETS operation with key stakeholders in the ROK.

In preparation for Phase II, the government has demonstrated that it is actively considering the experience of the system and continuously looking for ways to improve it. While there might still be more to do, the progress made to date in multiple areas of the KETS operation gives reasons to expect further improvements of the system.

6.3 Future Directions and Opportunities

The KETS has been established as a major domestic climate change policy and through its initial phases and policy revisions, has evolved into a stronger system. It is anticipated that it will continue to play a significant role in enabling the ROK to meet its domestic and international objectives. To do this, it will be required to incentivize increased, more expensive abatement, possibly from additional sectors. The higher cost of abatement, together with the ROK seeking to achieve a part of its Nationally Determined Contribution

(NDC) through international projects, highlight the importance of the further evolution of the KETS to consider the increased use of offsets, international carbon market linkage, and engagement through the Paris Agreement Article 6 mechanisms. In this way, the ROK can play its part in international climate change efforts while minimizing the cost impacts for its domestic industries.

According to the 2030 Roadmap, the national target of 37% is planned to be achieved through a combination of 32.5% emissions reductions domestically and 4.5% through cooperative approaches. This cooperative approach comprises international credits under Article 6 of the Paris Agreement and enhanced forest carbon sinks. The Paris Agreement Article 6 provides a framework for the global carbon market, in particular through Article 6.2, which establishes cooperative approaches in which internationally transferred mitigation outcomes can be used. This provision allows for direct, or indirect linkage of ETS. Likewise, Article 6.4 establishes a mechanism for mitigation and sustainable development, which can be a means for countries to support emissions reductions initiatives overseas. In either instance, surrendering of units for compliance in the KETS would need to be done in such a way that they accrue as benefits to the government when it reports against its NDC commitments. The process of developing these Article 6 mechanisms is ongoing and intends to ensure, among other things, the avoidance of double counting.

From the perspective of the KETS, these mechanisms open up the possibility of carbon market linkage, possibly within Asia and the Pacific. There are various models for this. ETSs could be linked directly, in which unrestricted mutual recognition of each other's allowances is permitted, or with restrictions on the number and type of allowances that can be used from linked systems. In any case, direct linking would require harmonization of the main design aspects of the two systems.

Alternatively, an indirect linkage between emissions markets could be made through the common use of emissions reduction credits. The use of Clean Development Mechanism credits for compliance in multiple different trading systems (including the EU ETS and New Zealand's ETS) is an example of this. Indirect linkage requires that the standards of integrity (e.g., additionality and sustainability) in the crediting system meet the level that is acceptable for the system that intends to use the credits.

While linking may bring significant benefits and become a cost-effective form of GHG abatement in the short term, it can have two downsides. It can lead to reduced investment in improved domestic energy or carbon efficiency, which could lock in higher emissions in the longer term and ultimately raise the costs of meeting subsequent targets. It could also lead to failure to realize co-benefits of the national GHG abatement such as reduced energy costs or reduced localized air pollution.

In addition to this, linking could affect the price of allowances within the KETS. If prices become very high, it could raise concerns about costs to businesses and individuals. On the other hand, if prices were to become very low, it could provoke concerns about the failure to realize abatement that may be desired within the ROK. For direct linking, allowance

prices would be influenced by the relative ambition and cost of abatement within the linked systems. Any mechanisms to limit extreme prices would need to be agreed upon within a common framework. For use of credits under indirect linking, which would be voluntary, the concern would be potentially low credit prices, leading to a failure to realize the desired domestic abatement. This could be addressed by applying limits on the use of credits.

Therefore, with the significant potential benefits of carbon linking, its implementation has to be carefully assessed and planned. The achievement of any linked trading arrangement would require a number of significant precursors, which include

- clarity on the rules for international transfer of mitigation outcomes under Article 6 of the Paris Agreement;
- the presence of, and engagement with suitable candidate ETSs, which would either exist already or be planned;
- the development of a dialogue in which the necessary alignment of potentially linked trading systems is pursued;
- the development of KETS participant attitudes to offsetting, to move away from the current focus primarily on achieving domestic savings; and
- a robust market system under linkage to ensure that price volatility, or excessively high or low prices, does not diminish the value of the carbon price as an incentive for long-term emissions abatement in the ROK.

So far, it is unclear if linkage can actually be a viable option to achieve the national target in 2030. Since the plan and scope for utilization of overseas reductions is not yet established, direct or indirect linkage of the KETS with other ETSs is not yet elaborated. However, it is clear that there remains a future opportunity for the KETS to link with other systems to achieve the overseas target. Furthermore, linking could have a more significant role in the longer term, and early engagement with partners toward that aim can be very beneficial in helping achieve the necessary alignment of new trading systems at the design stage.

In summary, a key future area of collaboration for the ROK could be with countries within Asia and the Pacific considering or developing carbon trading systems, with a view to enabling future linking or the establishment of a regional carbon market. This collaboration could involve knowledge exchange and technical dialogue to support new ETS development in the region. To realize the benefits of potential linking, the following challenges and opportunities are identified for further investigation:

- how to integrate systems representing different types of national emission reduction targets,
- how to harmonize preferences for achieving the targets by country or sectors,
- how to factor in different economic and political systems among participating countries,
- how to reconcile industries' competitiveness under regional ETSs if some industries are not involved,

- how to have a technical understanding of new regional ETSs,
- how to combine the effect of regional emissions trading system with each country's NDC,
- how to share the lessons learned of each country from domestic and international emissions trading systems, and
- how to enhance the capacity of participants at the regional level.



References

Government of the Republic of Korea. 2012. Enforcement Decree of Act on the Allocation and Trading of Greenhouse Gas Emission Permits.

———. 2017. Second Biennial Update Report of the Republic of Korea. Submitted to the UNFCCC. https://unfccc.int/sites/default/files/2nd_biennial_update_report_republic_of_korea_eng.pdf.

Government of the Republic of Korea, Ministry of Environment. 2014a. *Phase I National Allowances Allocation Plan*.

———. 2014b. *Guideline for Feasibility Study and Verification of Emission Reduction of External Projects*.

Government of the Republic of Korea, Ministry of Trade, Industry, and Energy. 2017a. *Stabilization Measures of Domestic Emission Trading Scheme*.

———. 2017b. *KETS Phase I 3rd Compliance Year Change in Allowances Allocation Plan*.

Government of the Republic of Korea, Prime Minister's Office. 2014. *The First Climate Change Countermeasure Master Plan*.

———. 2016a. *A Study on GHG Emission Reduction via International Market Mechanism*.

———. 2016b. *Basic National Roadmap for Greenhouse Gas Reductions by 2030*. <http://www.me.go.kr/home/web/board/read.do?pagerOffset=0&maxPageItems=10&maxIndexPages=10&searchKey=&searchValue=&menuId=286&orgCd=&boardId=878980&boardMasterId=1&boardCategoryId=&decorator>.

———. 2017. *Phase II National Allowance Allocation Plan*.

Greenhouse Gas Inventory and Research Center of Korea. 2017a. *Current Status of the Korean ETS*. https://www.thepmr.org/system/files/documents/PMR_Country%20presentation_20%20Mar%202017_EN_final_revised.pdf.

———. 2017b. The Latest ETS Trends in Korea and the Future of Offset Credits. Presentation at 2017 International Modeling Conference. Seoul, Republic of Korea. 17 June.

Hyun, J., and H. Oh. 2015. Korea's ETS: An Attempt of Non-Annex I Party Countries to Reduce GHG Emissions Voluntarily. PMR presentation and article. https://www.thepmr.org/system/files/documents/KETS_HyunOh1.pdf.

Intergovernmental Panel on Climate Change (IPCC). 2018. *Global Warming of 1.5°C*. http://www.ipcc.ch/pdf/special-reports/sr15/sr15_draft.pdf.

International Carbon Action Partnership (ICAP). 2018a. *Korea Emissions Trading Scheme*. https://icapcarbonaction.com/en/?option=com_etsmap&task=export&format=pdf&layout=list&systems%5B%5D=47.

———. 2018b. Republic of Korea Approves 2030 GHG Roadmap and 2nd Phase ETS Allocation Plan. <https://icapcarbonaction.com/ko/news-archive/567-republic-of-korea-approves-2030-ghg-roadmap-and-2nd-phase-ets-allocation-plan>.

———. 2018c. *Emissions Trading Worldwide: Status Report 2018*. <https://icapcarbonaction.com/en/icap-status-report-2018>.

———. KETS Prepares for the Expansion of Benchmarking. <https://icapcarbonaction.com/zh/news-archive/551-kets-prepares-for-the-expansion-of-benchmarking>.

International Emissions Trading Association (IETA). 2016a. Republic of Korea: An Emissions Trading Case Study. http://www.ieta.org/resources/2016%20Case%20Studies/Korean_Case_Study_2016.pdf.

———. 2016b. GHG. Greenhouse Gas Market 2015/16 Report. *Making Waves*. https://www.ieta.org/resources/Resources/GHG_Report/2015/IETA_GHG_Report_2015_web.pdf.

IETA, Environmental Defense Fund (EDF), and Climate Change Research Institute of Korea (CRIK). 2016. *South Korea: An Emissions Trading Case Study*. Brussels: EDF, CRIK, and IETA. https://www.ieta.org/resources/2016%20Case%20Studies/Korean_Case_Study_2016.pdf.

Jang, M., J. Kim, and S. Suh. 2010. Development and Evaluation of Laws and Regulation for the Low-Carbon and Green Growth in Republic of Korea. *International Journal of Urban Sciences*. 14 (2). pp.191–206.

Korea Electric Power Corporation. 2017. *Annual Report 2017*.

Korea Exchange. Market Data. <http://marketdata.krx.co.kr/mdi#document=070301>.

Korea Energy Agency. 2017. *Energy Statistics Handbook*.

Lee, C. 2017. Korea Offset Program presented at 2nd Forum of Carbon Pricing Mechanism in [the Republic of] Korea, [People's Republic of] China, and Japan.

Lim, E. 2018. A New Amendment to the National Roadmap for Reducing Emissions Relies on Overseas Credits. *Climate Scorecard*. 15 September. <https://www.climatescorecard.org/2018/09/a-new-amendment-to-the-national-roadmap-for-reducing-emissions-relies-on-overseas-credits>.

Narassimhan, E. et al. 2018. Carbon Pricing in Practice: A Review of Existing Emissions Trading Systems. *Climate Policy*. 18 (8). pp. 967–991. <https://doi.org/10.1080/14693062.2018.1467827>.

Oh, H., J. Hyon, and J. Kim. 2016. Korea's Approach to Overcoming Difficulties in Adopting the Emission Trading Scheme. *Climate Policy*. 1 (11). pp. 947–961. <https://www.tandfonline.com/doi/full/10.1080/14693062.2016.1213696>.

Oh, I. Y. 2017. Recent Status of KETS and Changes in Phase 2. Presentation at the 2nd Forum of Carbon Pricing Mechanism in [the Republic of] Korea, [People's Republic of] China, and Japan. Seoul, Republic of Korea. 21 December.

Partnership for Market Readiness and International Carbon Action Partnership (ICAP). 2016. *Emissions Trading in Practice: A Handbook on Design and Implementation*. Washington, D.C.: World Bank.

Republic of Korea. 2015. Intended Nationally Determined Contribution. Submitted to the United Nations Framework Convention on Climate Change (UNFCCC). <http://www.unfccc.int/ndcregistry/PublishedDocuments/Republic%20of%20Korea%20First/INDC%20Submission%20by%20the%20Republic%20of%20Korea%20on%20June%2030.pdf>.

Shim, S. and J. Lee. 2015. *Market Distortion Factors of KETS and Its Policy Implication*. Korea Energy Economics Institute. http://www.keei.re.kr/keei/download/keer/KEER15_14-2_70.pdf.

Suk, S., S. Lee, and Y. S. Jeong. 2017. The Korea Emissions Trading Scheme: Business Perspectives on the Early Years of Operations. *Climate Policy*. 18:6. pp. 715–728. <https://www.tandfonline.com/doi/abs/10.1080/14693062.2017.1346499?journalCode=tcpo20>.

UNFCCC. 2012. Emissions Summary for [the] Republic of Korea. https://unfccc.int/files/ghg_data/ghg_data_unfccc/ghg_profiles/application/pdf/kor_ghg_profile.pdf.

———. 2015. *The Paris Agreement*. 12 December. Paris, France. http://unfccc.int/files/essential_background/convention/application/pdf/english_paris_agreement.pdf.

Yoo, J. I. 2018. *Introduction to Korea Emission Trading Scheme: Korean Offsetting Program*. Korea Research Institute on Climate Change. Presentation at the ICAO Meeting. Montreal, Canada. 7 Feb. https://www.icao.int/Meetings/carbonmarkets/Documents/o4_Session2_Yoo_KETS.pdf.

The Korea Emissions Trading Scheme

Challenges and Emerging Opportunities

This publication presents a factual overview of the design and implementation of the Korea Emissions Trading Scheme, focusing on lessons from its implementation and opportunities under the Paris Agreement. It provides information to assist other countries that are designing or considering an emissions trading system. The contents are relevant as Asia and the Pacific embraces the need for climate action to deliver on its Paris Agreement commitments and many countries explore new emissions trading systems.

About the Asian Development Bank

ADB is committed to achieving a prosperous, inclusive, resilient, and sustainable Asia and the Pacific, while sustaining its efforts to eradicate extreme poverty. Established in 1966, it is owned by 67 members—48 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.



ASIAN DEVELOPMENT BANK
6 ADB Avenue, Mandaluyong City
1550 Metro Manila, Philippines
www.adb.org