Korean Emissions Trading Schemes

An Economic Analysis

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The global imperative to address climate change has led to the sets of policies, initiatives, or strategies being implemented by governments or organizations to mitigate the environmental degradation caused by Greenhouse Gas (GHG) emissions. Known as carbon abatement strategies, their goal is to downcurve the amount of GHG produced by human activities. These often include a range of measures aimed at increasing energy efficiency, promoting the use of renewable energy sources, and fostering the adoption of technologies that help capture and store carbon dioxide. Common examples of carbon abatement programs include carbon pricing mechanisms like carbon taxes and emissions trading schemes. South Korea, a heavily industrialized country, pledges to reduce its GHG emissions and achieve carbon neutrality by 2050. To achieve this, The Korean Emissions Trading Scheme (K-ETS) was initiated in January 2015. This market-driven approach, following the cap-and-trade mechanism, is a prominent example within Asia. However, there are several challenges faced since its implementation, which has led to changes in its design and governance. This research paper seeks to comprehensively analyze the history, outcomes, and potential efficient reforms of the K-ETS since its inception.

South Korea, with a population of 51.7 million and one of the top 10 GHG emitters, pledged allocation of the equivalent of 2% of their Gross Domestic Product (GDP) per year to fight excessive carbon emissions.[1] "'Instead of saying you first',

1 "South Korea Population," n.d., https://tradingeconomics.com/south-korea/population; Carni Klirs, "Greenhouse Gas Emissions over 165 Years," World Resources Institute, March 22, 2019, https://www.wri.org/data/greenhouse-gas-emissions-over-165-years.

said Lee Myung-bak, former president, South Korea would henceforth act 'me first.'"[2] Post-war, the country's rapid industrialization was driven by an economy steering heavy industry and fossil fuels. Industry accounts for 37% of their GDP and 80% of exports; for instance, the GDP in the most important industrial city, Ulsan, is 75% higher than the national average. "But as South Korea joins the rest of the world in the effort to curb climate change, its centers of heavy industry are turning from drivers of growth into liabilities."[3] Over the years, the country's economic and industrial development has grown linear with the country's GHG emissions (see image 1).[4] It is argued that South Korea would have to reduce carbon emissions by an average of 5.4% a year to achieve its carbon neutrality target. In comparison, the EU and United States must reduce their emissions by an average of 2% and 2.8% respectively; indicating that South Korea still has a significant journey ahead to attain its sustainability goals.[5] Under the 2009 Copenhagen Accord, South Korea committed to reducing its GHG emissions to 30% below its business-as-usual (BAU) levels by 2020. To enable this transition, the Framework Act on Low Carbon Green Growth was established in 2010, and subsequent discussions of the potential role of an Emissions Trading Scheme (ETS) started. Information on its development and national allowances were announced in 2014 and will be initiated in January 2015.[6] The K-ETS operates on the principle of cap-and-trade covering about 74% of South Korea's national GHG emitters (as of 2020), and targets GHG such as Carbon Dioxide, Methane, Nitrous Oxide, Perfluorocarbons, Hydrofluorocarbons and Sulfur hexafluoride (CO2, CH4, N2O, PFCs, HFCs, SF6, respectively). The program includes 684 of the country's largest emitters in the power, industrial, buildings, waste, transport, and domestic aviation sectors (as of 2021) and aims to achieve carbon neutrality by 2050.[7]

The cap-and-trade principle sets a limit on total allowable emissions produced by sectors and creates permits/allowances that represent the right to emit a specific quantity of pollutants. These are issued by governments to regulate firms, they are auctioned, distributed freely, or traded between entities. Permit prices reflect the opportunity cost at the margin of a firm's emissions and are imposed by the market. However, these prices can be very volatile and can decrease rapidly over time, which can cause a significant trade-off in the program.[8] In the K-ETS, the allocation of per-

2 "South Korea, Having Sworn to Lead the Green Transition, Is Holding It Up," *The Economist*, June 22, 2023, https://www.economist.com/asia/2023/06/22/south-korea-having-sworn-to-lead-the-green-transition-is-holding-it-up.

3 Gunsan and Ulsan, "South Korea's Climate Targets Will Mean Remaking Its Economy," *The Economist*, November 13, 2021, https://www.economist.com/asia/2021/11/13/south-koreas-climate-targets-will-mean-remaking-its-economy.

4 Hannah Ritchie, Max Roser, and Pablo Rosado, "South Korea: CO2 Country Profile," *Our World in Data*, May 11, 2020, https://ourworldindata.org/co2/country/south-korea.

5 "Holding It Up," *The Economist.*

6 "The Korea Emissions Trading Scheme," n.d., https://www.adb.org/sites/default/files/publication/469821/korea-emissions-trading-scheme.pdf.

7 "Korea Emissions Trading Scheme", International Carbon Action Partnership, n.d.

8 Gilbert E Metcalf, "Market-Based Policy Options to Control U.S. Greenhouse Gas Emissions," *Journal of Economic Perspectives* 23, no. 2 (April 1, 2009): 5–27.

mits was based on grandparenting and benchmarking at first, and auctioning became available in the second phase. The use of domestic and international offset credits banking and borrowing were introduced but needed to meet specific criteria.

The K-ETS is divided into three phases; the first and second phases consist of three years each, 2015 to 2017 and 2018 to 2020, while the final phase will span from 2021 to 2025. Ongoing phases have seen adjustments to the cap levels and sectors included due to the continuous review for improvement based on stakeholder consultation and market performance. Some of the recent changes include; increasing incentives for emission reductions, encouraging trading and mitigating price volatility, facilitating the conversion of offset credits, strengthening the monitoring, reporting, and verification systems (MRV), and increasing support for small businesses and new entrants.[9]

Additionally, the government also intends to align the cap with the country's updated National Determined Contribution (NDC), which accounts for a total domestic reduction of 32.5% BAU under the Paris Agreement. Also, individualized targets for each sector participating in the program are to be met by 2030, and the K-ETS is anticipated to play a pivotal role in facilitating the nation's attainment of these objectives. However, critics of the K-ETS argue that the emissions cap, initially established using data primarily from highly energy-intensive industries, failed to adequately address broader concerns voiced by environmental organizations and civil society.

For instance, the free allocation of permits during Phase I raised concerns about fairness and sparked controversy, as it seemed that businesses with high emissions were being rewarded for past inefficiencies. While early adopters of emissions-saving technologies were penalized. In 2015, results indicated that the power sector received the highest share of allowances (46%) leading to annual emissions surpassing the established cap by 0.5%. Overall, participants received a total allowance worth 549 million Tco2e, and those who did not have enough allowances were required to buy or trade additional allowances to cover their over emissions of GHG.[10]

Though some entities had a surplus of permits during Phase I, many preferred to bank these instead of practicing trade. Frequent government intervention in the market, resulting in volatile permit prices, and a limited number of participants in the program seem to be the primary factors contributing to this lack of market liquidity. As a result, the government-imposed limitations on banking to encourage the sale of excess permits and enhance liquidity.[11] This strategic move was envisioned to foster a more responsive market and stable permit prices. However, it affects the perceived fairness and predictability of the cap-and-trade system because some entities would need to adjust their carbon management and trading strategies in response to the new regulatory constraints. This leads to a reevaluation of their sustainability practices and impacts their long-term compliance.

Despite the government's intention to assist entities dealing with allowances

9 "Green Policy Platform," Green Policy Platform, n.d., http://www.greenpolicyplatform.org/.
10 "The Korea Emissions Trading Scheme."
11 Environmental Defense Fund, "Republic of Korea: An Emissions Trading Case Study."

shortages and to facilitate inter-firm trade, their release of reserved allowances failed to stimulate trading activities. Uncertain about the policy direction, firms continued to bank allowances, resulting in an oversupply and subsequent reduction in permit prices.[12] This situation, in turn, lessens incentives for companies to invest in new technologies for carbon emission reduction. To prevent the recurrence of these challenges, several recommendations have been proposed. First, a gradual lifting of strict banking regulations is suggested. Second, the provision of extensive information regarding cap targets, allowances, and program development to enhance transparency and certainty. Third, the implementation of automatic market regulation mechanisms to ensure program stability. These measures aim to create an environment where industries are more willing to sell excess allowances, fostering stability without causing drastic shifts that could lead to higher costs.

In Phase II, several transformative measures were implemented to overcome barriers in the carbon emissions market. Notable changes included: the introduction of early action credits, an expedited approval process for overseas emission reductions, and the incorporation of market makers—third parties facilitating allowance trades. The inclusion of third-party participants holds the potential to enhance market liquidity, and efficiency, and stimulate innovation and competition. However, effective implementation necessitates rigorous regulation, supervision, capacity building, and education to curb market manipulation and speculation.

Phase II saw the imposition of limits on banking and borrowing, signaling a shift in the program's approach. Auctioning of allowances became mandatory for specific sectors, with 3% of allowances reserved for auctioning to aid in price discovery. Additionally, while offset credits were capped at 10%, the approved methodologies for generating these credits were expanded.[13] These strategic adjustments aimed to refine the market dynamics, strike a balance between supply and demand, and promote a more stable and responsive trading environment.

Furthermore, according to the Greenhouse Gas Inventory and Research Center of Korea's (GIR) 2020 report, GHG emissions were reduced by 5.7% (554.4 million tons) compared to the previous year; 635 entities met their targets. However, this has been attributed to COVID-19 since the sectors that notably reduced GHG emissions were the aviation and transportation sectors. The transportation sector, for instance, made a significant decrease in emissions of 21.7%, but domestic waste increased by 1.7%. Nevertheless, the average trading price of emission permits per ton increased from KRW 23,914 (USD 18.45) in 2015 to KRW 30,411 (USD 23.46) in 2020.

In addition, the GIR conducted a survey on the program performance, where 84.2% of participants presented a positive perspective on the K-ETS. However, 68% of the entities responded that to meet future caps on emissions, they would primarily use permits and purchase more if needed, instead of adopting green technologies. This opens the door for an examination of whether the cap has been set too high and if per-

12 "The Korea Emissions Trading Scheme."
13 "Green Policy Platform," Green Policy Platform.

mit prices should be elevated to address potential oversupply. Nevertheless, 53.8% of entities have already established an action plan for Phase III to reduce GHG emissions, but in terms of trading, 56.9% answered they would not participate in allowances trade and prefer the banking method.[14]

Furthermore, after the economic impact of COVID-19, economic recovery led to the expansion of facilities and an increase in production which directly increased GHG emissions. According to the GIR 2022 report, by 2021, total certified emissions rose to 591.0Mt. However, it is argued that this is due to the entry of new entities in the sectors involved in the K-ETS program. The start of Phase III amounted to allowances of 584.8 Mt (97.5% was freely allocated, while 2.5% was auctioned) but trading price per ton fell by 24% in 2022. Nonetheless, permits traded via auction accounted for the highest proportion of all emissions permits, a big difference from what we saw in Phase II. Banking behavior has decreased over time, as well as the number of entities who do not want to engage in permit trading. Moreover, 38.5% of entities covered responded to have actively invested in the K-ETS by reducing emissions by applying low-carbon technologies.[15] However, this has resulted in costs increasing and a lack of corporate competitiveness and corporate profit.

Entities involved in the K-ETS have asked for help mitigating the costs of new technologies to reduce emissions and to actively use the revenue from penalties for exceeding allocated limits (KRW 100,000 (USD 77.40) per ton). Currently, the program has generated revenue of KRW 1,092.6 billion (USD 845.2 million) from penalties. This revenue has been used as a climate response fund that includes support to mitigation equipment, low-carbon innovation, and technology development for small- and mid-sized companies.[16]

Altogether, the K-ETS aims to achieve multiple objectives, such as placing South Korea at the forefront of the global effort to mitigate climate change, reducing its dependence on imported fossil fuels, and enhancing its competitiveness in the clean energy sector. Though there are challenges in the reform when transitioning to a low-carbon economy, there are opportunities for its development.

First, integrating the K-ETS with other carbon markets has the potential to offer opportunities for cost-effective mitigation. Systems like the European Union Emissions Trading (EU ETS), or the cooperative approaches outlined in Article 6 of the Paris Agreement could not only enhance the environmental integrity and transparency of the K-ETS but also serve to address potential market liquidity challenges.[17] However, this also poses challenges, such as ensuring the compatibility and harmonization of different carbon market rules and standards, as well as addressing the potential risks of double counting and leakage.

For instance, The National Development and Reform Commission of the

14 Greenhouse Gas Inventory & Research Center of Korea, "Greenhouse Gas Inventory & Research Center of Korea," gir.go.kr, n.d., http://www.gir.go.kr/eng/index.do.

15 Greenhouse Gas Inventory & Research Center of Korea, "Greenhouse Gas."

16 "Korea Emissions," International Carbon Action Partnership.

17 "The Korea Emissions Trading Scheme."

People's Republic of China (NRDC) has proposed to the Korean government to create the "Northeast Asia Emission Trading Cooperation Business" to seek opportunities for an Asian carbon market. This is a proposal to establish a platform for cooperation and exchange among the carbon markets in Northeast Asia, such as China, Korea, and Japan. This could create opportunities for enhancing regional cooperation and integration on climate change, potential expansion of the market size and diversity, and reducing the mitigation costs.[18] However, this also faces challenges, such as the differences in gaps in the carbon market development and maturity, as well as the political and economic tensions and uncertainties in the region.

Second, frequent government intervention in the K-ETS development may have undermined the market credibility of the K-ETS permit price in the market. Their adjustment of the allocation plan, issuance of additional allowances, and imposition of price ceilings and floors only created more uncertainty and volatility in the market.[19] The government should balance the need for market intervention with respect for market signals and dynamics, as well as enhance the predictability and transparency of the market rules and regulations so entities increase their trust in the program and cooperate in trading behavior.

Lastly, the government may expand its application of benchmarking within sectors. Benchmarking is a method of allocating emission allowances based on the emission performance of similar entities, rather than on historical emissions or output. The K-ETS currently applies benchmarking to the power sector and some energy-intensive industries, such as cement and oil refining.[6] Expanding the application of benchmarking to other sectors could create opportunities for improving the allocation efficiency and equity. However, this also requires a robust and reliable data collection and verification system for clear and consistent methodology when setting and updating the benchmarks.

In conclusion, the Korean Emissions Trading Scheme (K-ETS) plays a vital role in South Korea's commitment to address climate change and reduce GHG emissions. The nation, marked by rapid industrialization and heavy reliance on fossil fuels, faces the challenge of transforming its growth drivers into sustainable contributors. Despite achievements in emissions reduction during different phases, challenges persist, including concerns about initial emissions caps' fairness and issues related to market liquidity. Looking forward, opportunities for the K-ETS involve potential collaborations with other carbon markets in the region, as it has been proposed Northeast Asia Emission Trading Cooperation Business. The imperative to strike a delicate balance between government intervention and market dynamics as fairness and transparency play a crucial role in the program's effectiveness. As South Korea continues its journey toward sustainability, the K-ETS stands as a dynamic tool with the potential for transformative impact, providing valuable insights for other nations grappling with similar

18 "Carbon market cooperation in Northeast Asia - Asia society," n.d., https://asiasociety.org/sites/default/files/2018-07/FULL REPORT - Carbon Market Cooperation in Northeast Asia.pdf.

19 "The Korea Emissions Trading Scheme."

climate challenges. Despite challenges, the KETS has shown promise in achieving emission reduction goals. A balanced approach to addressing weaknesses and building on strengths is crucial for the program's long-term success.