

Liberalizing Markets for Environmental Goods and Services

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I. Introduction

A concerted international effort is underway to establish standards for the trade in environmental goods and services. The goal is to promote a fair and open marketplace that contributes to global efforts toward carbon neutrality and sustainability.

The World Trade Organization (WTO) launched negotiations on the Environmental Goods Agreement (EGA) in July 2014. These negotiations were initiated under the Doha Ministerial Declaration, which calls for the “reduction, or, where appropriate, the elimination of tariff and non-tariff barriers to environmental goods. The EGA negotiations followed the conclusion of an Asia-Pacific Economic Cooperation (APEC) agreement in 2012 that reduced tariffs on 54 environmental goods, mostly industrial products. However, talks broke down in 2016 due to disagreements over what constitutes an environmental good and how broadly that definition should be applied across different sectors.

The Trade and Environmental Sustainability Structured Discussions (TESSD) was launched in 2021 to address broader issues about freer trade in environmental goods and services. Considering the previous EGA talks were criticized for failing to include services and non-tariff barriers. TESSD covers not only environmental goods but also services and the reduction or elimination of non-tariff barriers, with the aim of creating a “win-win-win” situation for trade, environment, and development. At the 2020 WTO’s Trade Council on Services, Australia, Canada, Mexico, Switzerland, and the UK led the call to expand the negotiations to include environmental services that are not limited to traditional environmental service classifications.

However, it still seems to face similar obstacles in discussing the scope of what constitutes environmental goods and services as they are controversial, because it is not based on scientific, but individual countries’ national interests.

In addition to the WTO negotiations, there are many other ongoing bilateral negotiations and regional cooperation initiatives to develop rules and standards for expanding trade in environmental goods and services. Korea has also participated in these negotiations not only IPEF but also FTA negotiations. As a major importer and exporter of environmental goods with annual trade exceeding \$20 billion, South Korea has a great stake in the outcome of each negotiation.

Participation in these negotiations and cooperation initiatives helps to ensure that Korea's interests are considered in the development of new rules and standards for trade in environmental goods and services. It also helps to promote the liberalization of trade in environmental goods and services, which can benefit Korean businesses and consumers.

However, the recent discussions on market liberalization for environmental goods and services are more complex than past discussions. First, the scope of discussion is broader, both in terms of quantity and quality. Second, more countries are participating in the discussions. Also, the Korean government has changed its stance to actively contribute to the negotiations. Therefore, it is necessary to

analyze the impact of market liberalization based on these changed factors.

This study first explores the status and practices of environmental goods and services liberalization. After analyzing the ex ante and ex post impacts of environmental market liberalization, we suggest policy implications that could assist the Korean government in crafting relevant policies.

II. Environment Goods and Services Markets¹

1. Environmental Goods

To promote trade in environmental products, negotiations are being held simultaneously in the World Trade Organization (WTO), in multilateral negotiations, and in regional and bilateral trade agreements. As tackling climate change becomes an increasingly important trade issue, increasing access to advanced environmental technologies through freer trade in goods and services is becoming more imperative.

The negotiation process reflects the competing interests of countries. Developed countries with high environmental standards and mature markets, such as the US and EU, are leading

¹ In this research, we define environmental products as having two categorized characteristics. First, they are products that are necessary to achieve environmental goals. A typical example is when the product is used to measure and treat environmental pollution factors. Second, eco-friendly products that emit less pollution in all stages of production, use, and disposal. We construct an HS6 code list that encompasses Monteiro (2016) and Sauvage (2014) Combined List of Environmental Goods. In defining

environmental services, we follow the global trend of expanding the classification from CPC 94 activities, which include resource management and pollution control in addition to environmental protection, to environmental related services such as architectural design services, engineering services, urban planning and landscape architecture services, management consultancy services, technical inspection and analysis services, etc.

the issue in multilateral, regional, and bilateral negotiations. The UK-New Zealand and Singapore-Australia bilateral negotiations have produced open lists of environmental goods and services, which have led to trade and environmental goods discussions in other negotiations, such as the Indo-Pacific Economic Framework (IPEF) and the Asia-Pacific Economic Cooperation (APEC).

The global average most-favored-nation (MFN) ad valorem tariff rate in 2020 was 3.7 percent for all goods, but only 2.6 percent for environmental goods. The average minimum ad valorem tariff rate was 2.3 percent for all goods and 1.7 percent for environmental goods. The US, EU, China, and Korea all have tariffs on environmental goods that are mostly in the 5 percent range. For HS code 6-unit products with a minimum ad valorem tax rate of 5 percent or less, the US, EU, and Korea have coverage rates of 96 percent, while China's coverage rate is lower than 50 percent.

Environmental goods play an important role in addressing climate change and other environmental challenges. Trade in these goods is growing rapidly, and Korea is a major player in the global environmental goods market. Trade in environmental goods accounts for 18.6 percent of total trade, with Korea accounting for 5 percent of global trade in environmental goods in 2020. The growth rate of trade in environmental goods is higher than that of total trade, which includes exports and

imports. Total trade grew at an average annual rate of about 2 percent on a global basis between 2017 and 2020, while environmental goods grew at an average annual rate of about 6.5 percent. Among the existing negotiating parties, China, Europe, the US, Japan, Hong Kong, and South Korea are the largest exporters, and China, Europe, the US, Hong Kong, South Korea, and Japan are the largest importers in global environmental goods trade.

Korea's exports and imports of environmental goods are concentrated in Asia, with China being the largest market and source of imports. By sector, renewable energy plants, wastewater management and water treatment, and clean and efficient technologies and products account for a large share of Korea's exports and imports of environmental goods. Import tariffs are zero for all imports of environmental goods from the United States and Europe through FTAs. Most imports of environmental goods from India are also zero-rated (98 percent), compared to 60 percent for environmental goods from China.

Korea's focus on trading environmental goods with Asia, and particularly China, reflects the growing importance of this region within the global environmental goods market. Korea's FTAs with the United States and Europe have helped to reduce trade costs for environmental goods from these markets, while the relatively high import tariffs on environmental goods from China may create a barrier to trade.

2. Environmental Services

In the environmental services negotiations, all WTO members agree on the need for a WTO-wide effort to address global environmental challenges, but there are wide differences in how countries respond to environmental issues.

In order to effectively address transboundary environmental problems, developed countries have proposed the liberalization of the environmental services. This includes the elimination or reduction of trade barriers in environmental services and the reorganization of the existing environmental services classification system.

Developing countries, however, argue for a different approach. They emphasize the public service nature of environmental services and argue that this should be fully considered in market liberalization discussions. Given the economic and technological disparities between developing and developed countries in the field of environmental services, they stress the need for technology transfer and capacity building. In particular, developing countries focus on Mode 4 in the liberalization of environmental services, which is of greater concern to them than other forms of supply. The WTO's negotiations on environmental services have yet to reach a compromise between the positions of the developed and developing country groups, with discussions continuing until 2022.

When looking at the current level of concessions for core environmental services, Canada and New Zealand have the highest level of openness commitments, followed by the United States, while Brazil and India have most of their core environmental services un-concessioned.

In the case of Korea, sanitation and similar services (CPC 9403) are non-concessional, and only a few sectors in the middle category of environmental services are concessional. At the global level, Korea, the US, Australia, Switzerland, Japan, and New Zealand have high levels of concessions for environment-related services, while the EU, Canada, and China have relatively lower levels of concessions.

The size of Korea's environmental services industry grew from KRW 29.4 trillion in 2013 to KRW 34.3 trillion in 2020, with an average annual growth rate of 2.2 percent (Environmental Industry Statistics Survey). As of 2020, the largest sector in terms of revenue is resource cycle management (30.8 percent), followed by water management (30.0 percent), sustainable environmental resources (17.7 percent), environmental knowledge, information, and monitoring (13.7 percent), climate response (3.5 percent), environmental safety and health (1.6 percent), and air management (0.9 percent). Despite the increasing importance of the environment, investment in environmental services in Korea has remained stagnant and the size of

firms is small.

III. The Effect of Environmental Market Regulation on Trade

International efforts to protect the environment can be summarized in two main approaches: The first approach is to introduce environmental measure to regulate the non-environmentally friendly goods and services. This approach aims to reduce the production and consumption of non-environmentally friendly goods and services by imposing costs and restrictions on their production and sale. The second approach is to liberalize the environmental markets by removing tariffs and trade barriers on environmental goods and services and increasing their production and trade. This approach aims to make environmental technologies and solutions more affordable and accessible, and to promote innovation in the environmental sector.

Both of these approaches are important in order to effectively protect the environment and responding climate crisis. In this section, we first analyze the effect of introduction of environmental measures on international trade.

To do this, we use bilateral trade (import) data from UN Comtrade, which covers bilateral trade of 104 countries at the HS2 level. The number of environmental measures for countries around the world provided by the WTO Environment Database (<https://edb.wto.org/>), as an indicator of the strictness of a country's environmental regulations. The analysis period is set from 2010

to 2019. We use the CEPII database for variables indicating whether a country has an RTA or not.

Fixed effect model from Aichele and Felbermayr (2015) are utilized to analysis the effect of environmental measures on trade. This model controls the time-invariant nature of bilateral imports using country pair for each product ($\mu_{i,j}^k$), also trend in time difference is control by time varying fixed effect ($\lambda_{i,t}, \lambda_{j,t}$). Product level time trend is controlled by product-year fixed effect v_t^k . The regression equation is as follows:

$$Y_{i,j,t}^k = \beta_1 X_{i,j,t}^k + \beta_2 DEM_{i,j,t} + \mu_{i,j}^k + \lambda_{i,t} + \lambda_{j,t} + v_t^k + \epsilon_{i,j,t}^k$$

The dependent variable $Y_{i,j,t}^k$ refers to the log imports of product k from country j to country i in year t . $X_{i,j,t}^k$ refers to time-varying explanatory variable. In this analysis, status of trade agreement (RTA) relationship between two countries is used as proxy for the degree of economic integration of the importing and exporting countries. $\epsilon_{i,j,t}^k$ is error term.

The variable of interest in this analysis, $DEM_{i,j,t}$, is the difference between the level of environmental regulation in the importing (i) and exporting countries (j), defined as the number of environmental measures in the importing country in the year (t) minus the number of environmental measures in the exporting country. When the coefficient β_2 has a negative sign, it means that imports decrease when the importing country's regulation is stricter than exporting country.

Table 1. The Effect of Environmental Market Regulation on Trade

	Model 1	All items Model 2	Model 3
log(GDP) exporter's	0.186*** (0.0106)		
log(GDP) Importer's	0.575*** (0.0101)		
RTA	0.0457*** (0.00645)	0.0659*** (0.00755)	0.0580*** (0.00750)
Difference in Environmental Measurements	-6.70e-05*** (5.57e-06)	-0.297*** (0.0932)	-0.290*** (0.0933)
Exporter* Importer* Products FE	○	○	○
Year FE	○	×	×
Exporter*Year	×	○	○
Importer*Year FE	×	○	○
Product*Year FE	×	×	○
Observations	3,798,807	3,835,502	3,835,502

Note: 1) Robust standard errors in parentheses.

2) *** p<0.01.

The results show that high levels of environmental regulation in importing countries are burdensome for exporters, leading to a decline in imports. The coefficient of difference between the environmental regulation (DEM) is statistically significant and negative. This result indicates that as the level of environmental measures in the importing country increases (or decreases) compared to those in the exporting country, imports decrease (or increase).

IV. Economic Impact of Freer Environmental Market

Following on from the previous ex-post analysis of the effect on trade of the introduction of more stringent environmental regulations, this section attempts to ex-ante analysis of impact on international trade of international agreement on a set of market opening measures.

An agreement improving market access to expand trade in environmental goods and services will facilitate trade by lowering the cost of access to environmental goods and services, thereby stimulating the production and distribution of related goods and services.

Participation in agreements facilitates access to regional markets by reducing tariffs and non-tariff barriers, as exemplified by the APEC Environmental Goods Agreement.

To analyze the international impact of agreements that remove tariff and non-tariff barriers, we modify the Antràs and Chor (2018) model, by incorporating trade cost changes in trade in environmental goods and services as well. The scenario for trade cost changes in the goods sector is based on tariff reductions, while the scenario for trade cost changes in the services sector is based on improved market access and lower non-tariff barriers. It is also a new attempt to examine the impact of market opening by changing the composition of countries participating in the negotiations. We select them based on the countries currently participating in the WTO TESSD discussions, and assuming that China, which has a large share of the environmental market and a particularly close trade relationship with Korea, does not participate.

We use the Asian Development Bank's 2019 ADB-MRIO (multi-region multi-industry input output data) and the UNCATD' global tariff and trade data for 2019.

For the environmental goods market, we analyzed three scenarios:

- Scenario 1, only participating countries² reduced tariffs on the environmental goods list to zero.

- Scenario 2, China did not participate in the TESSD.

- Scenario 3, all countries participated in the environmental goods agreement and eliminate the tariff.

The main results were as follows: In scenario 1 case, the result shows that Korea's exports and overall production increase the most. Participating countries' exports and production increase more than non-participating countries' exports and production increase. This is because the environmental goods agreement will reduce tariffs and trade barriers on environmental goods for participating countries, making their goods more competitive in the global market. In Scenario 2 case, we get the result that the welfare growth rate of participating countries decreases when China does not participate in agreement, and Korea's production and exports decrease significantly. In Scenario 3 case, the simulation result shows that when all countries participate in the environmental goods agreement, countries that participated in Scenario 1 experience a larger increase in exports. Korea also experiences a larger welfare effect compared to Scenario 1, and developing countries also experience an increase in production and exports.

For the environmental services market cases, we build following scenarios:

- Scenario 1, participating countries open their environmental service so the trade cost to these

² Austria, Canada, China, EU27, Japan, Korea, Mexico,

Russia, Taiwan, Türkiye, Uk., and the US.

countries will be reduced by 10%.

- Scenario 2, China did not participate in the TESSD.

- Scenario 3, all countries participated in agreement and trade costs for the environmental services will be reduced by 10%.

The results are as follows: In scenario 1 case, participating countries' overall export growth is higher than non-participating countries. Korea's production and export growth are lower than the average of participating countries. In Scenario 2 case, the welfare growth rate of participating countries decreases when China does not participate, and Korea's production and exports decrease too. With Scenario 3, when all countries participate in the environmental services agreement, countries that participated in scenario 1 experience a larger increase in exports, and developing countries experience an increase in production and exports.

The analysis results can be summarized in five points: First, the opening of environmental goods and services markets is expected to have a positive effect on trade and production in participating countries. Second, Korea experienced higher welfare and trade gains from participating in the TESSD negotiations than the average of the participating countries. Third, developing countries have fewer incentives to participate. In terms of the overall negotiation, developing countries that do not participate in the TESSD discussions may have an incentive to free-ride on the export side, as they can enjoy the MFN treatment on import tariff reductions

from participating countries even if they do not participate in the current discussions. Fourth, participating countries that are less competitive in environmental goods may not gain much. Fifth, China's participation had a significant impact on international trade flows.

V. Conclusion

The main findings of this study can be summarized in three ways. First, the international debate on the opening of environmental goods and services markets is taking place in the new context of responding to the climate crisis. Second, the international community has achieved a relatively high level of openness in environmental goods. Third, opening up environmental markets is expected to increase domestic production and exports.

Based on above findings, we propose policy directions in terms of multilateral discussions, regional and bilateral discussions, and domestic responses to the opening of environmental goods and services markets for Korea.

First, at the multilateral negotiating level, it is desirable to contribute to the progress of the TESSD negotiations in WTO. To stimulate the negotiation process and respond to increased demand for advanced climate technology, we need to suggest separating climate-related goods and services from the traditional environmental goods list.

Second, Korea has been actively participating in shaping trade rules for environmental goods and services in regional and bilateral trade

negotiations and discussions, such as IPEFs and FTAs. This trend should continue, and we need to upgrade our FTAs to expand trade and investment in environmental goods and services. The government should also be ready to raise issues or proposals that reflect not only Korea's national interests but also the interests of middle- and developing countries in further discussions on definitions, standards, and other non-tariff measures.

Third, domestic preparations are needed for market opening in the environmental goods and services sector. In particular, it is necessary to fully reflect the opinions of relevant industries when selecting items for market liberalization. The government should also provide support to affected industries in two ways: exporting industries to help them meet the environmental standards of importing countries, and less competitive sectors through trade adjustment assistance. **KIEP**

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