

Accelerating Transitions towards a Circular Economy and Policy Implications for Korea

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I. Introduction

The concept of a circular economy that uses resources efficiently throughout the product lifecycle, thus pursuing sustainability, is gaining global attention. Whereas the existing economic system has a linear structure of production, consumption, and disposal, the circular economy efficiently uses resources throughout the entire cycle from product design to production and consumption, while suppressing waste generation and enhancing reuse and recovery. Recently, major countries, led by the EU, have declared carbon neutrality one after another, and are emphasizing the transition to a circular economy as one of the policy tasks for this purpose.

In this situation, it is necessary to identify response measures for Korea based on the main

issues of the circular economy being promoted at home and abroad. Accordingly, this study analyzes global efforts to transition to a circular economy, and analyzes each country's responses and major issues to the stages of waste generation and management, which decisively distinguish the existing economic system from the circular economy. In addition, this study examines cases of private-sector-led cooperation for supporting developing countries in terms of international cooperation and linking with international trade, and also analyzes the implications of information-based environmental policies in response to the circular economy. Finally, based on the results of these analyses, this study proposes policy measures to prepare for the circular economy.

II. International Community's Efforts for Transition to Circular Economy

1. Definition and Importance of Circular Economy

Although there is no internationally agreed definition of the circular economy, it is accepted as a broad concept that goes beyond the level of recycling products just before disposal to instead consider the entire cycle of products. To summarize common considerations in prior studies and national policies and laws, the circular economy can be defined as an economic system that uses the least amount of resources or energy, minimizes waste discharge, and uses products as long as possible in principal.

Meanwhile, the circular economy is expected to have a positive impact on the environment, economy and society. From an environmental point of view, if the circular economy principle is applied to the industry, it is expected to reduce environmental pollution caused by waste and contribute to reducing greenhouse gases and responding to climate change. From an economic point of view, the circular economy can reduce raw material supply and demand costs, weaken procurement risks, and have a positive impact on economic growth and job creation. From a social point of view, it contributes to the achievement of the UN's Sustainable Development Goals (SDGs) and is expected to have an effect on society as a whole, and it is judged that the contact point with SDG 12 (sustainable consumption and

production) is the greatest.

2. Circular Economic Policy and Multilateral Cooperation in the International Community

According to UNEP's International Resource Panel (IRP), decoupling between the growth of the global economy and the use of natural resources has not yet occurred. Developed countries showed high material productivity and material footprint per capita, which means that the total amount of raw materials collected for final consumption demand is higher than that of other countries, even though they use resources relatively efficiently.

The EU started to emphasize resource efficiency as one of the initiatives for sustainable growth in EUROPE 2020, a long-term growth strategy announced in 2010. And recently, the EU has strengthened the scope of regulations and conditions for product circulation through the adoption of a new Circular Economy Action Plan. In particular, the EU mandates producers to consider the circular economy principle from the product design stage, and induces consumers to purchase products with high energy efficiency and circulation by providing appropriate information. In addition, the EU is analyzing the improvement trend of a total of 10 objective indicators through the Circular Economy Monitoring Framework.

Based on the Basic Act for Promotion of the Formation of a Circular Society (hereinafter referred to as the Basic Act) enacted in 2000, Japan amended its laws on waste treatment

and resource use and introduced regulations to promote the 3R (Reduce, Reuse, Recycle) strategy. In addition, Japan is trying to lead international discussions on policy issues (3Rs, resource efficiency, marine waste, etc.).

The UK has not proposed a national strategy dedicated to the circular economy, but instead pursued it through the Sustainable Development Strategy, the 25 Year Environment Plan, and the Resources and Waste Strategy. Projects carried out by private organizations with a high understanding of the circular economy (such as the Alan MacArthur Foundation) have achieved significant results, and WRAP, a non-profit organization that effectively supports government policies as a leader in public-private cooperation, is a representative example.

Korea is implementing the Framework Act on Resource Circulation enacted in 2016, and the First Basic Plan for Resource Circulation (2018-27) established based on it, and as of 2020 the circular economy is being considered as one of the means to achieve carbon neutrality. The directions of Korea's resource circulation policy, core strategies, and detailed tasks have been established in accordance with the basic plan. In the case of monitoring indicators, unlike in the EU or Japan, indicators focused on secondary materials, technological innovation (patents), and natural resource consumption were not included.

At the multilateral level, the G7 and G20 suggest the policy direction of resource manage-

ment policies for member countries and recommend that their progress be monitored. Multilateral organizations, such as the ISO Technical Committee (ISO/TC323), are discussing the issue of international standardization related to the circular economy, and France, the Netherlands, and Japan are leading the discussion.

III. Circular Economy and Waste Treatment

1. Waste Generation and Treatment

This study compared the generation and treatment of municipal waste by country using OECD data. As of 2018, the United States generated the most urban waste among OECD member countries with 265 million tons annually, followed by Germany (50.26 million tons), Japan (42.71 million tons), France (35.88 million tons), and Turkey (34.53 million tons), in that order. As of 2018, OECD member countries with high waste recovery rates include Switzerland (100.0%), Sweden (99.3%), Finland (99.2%), Denmark (98.9%), and Germany (98.2%). And countries below the OECD average (55.4%) include the United States (46.8%), Spain (46.4%), Canada (28.7%), Israel (23.8%), and Greece (21.6%).

Meanwhile, the import and export of waste has increasingly become an issue of attention from the international community, with China implementing a waste import ban in 2017, and the adoption of an amendment to the Basel

Convention to ban the illegal import and export of hazardous wastes in 2019. Global waste plastic imports decreased from about \$6.6 billion in 2016 to about \$2.2 billion in 2020. And unlike in 2016, where 56% of total imports were concentrated in China, in 2020, imports were distributed to the United States, the Netherlands, Malaysia, and Vietnam. During the same period, plastic waste exports also decreased from US\$5.2 billion to US\$2.3 billion, and the United States, Germany, Japan, the Netherlands, and Belgium formed the top group in terms of export value.

2. Waste Management and Recycling Promotion Policy

The EU proposed the priorities of waste management (prevention - preparation for reuse - recycling - other recovery - disposal) through the revision of the Waste Framework Directive in 2018. In the same year, the Plastic Strategy was announced, suggesting a plan to convert all plastic packaging materials to recycled plastics by 2030. From 2021 onwards, a so-called plastic tax was introduced, which levies 0.8 euros per kg on non-recyclable packaging plastic waste.

In 2021, China presented quantitative goals, such as increasing resource productivity by 20% and achieving a 60% recycling rate for solid wastes compared to 2020 levels, through the 14th Five-Year Circular Economy Development Plan. The plan also includes three major tasks (building resource recycling industry system and improving resource efficiency,

building waste resource circulation system, and developing circular economy in agriculture) and 11 major projects (urban waste, re-manufacturing, waste electronic products and waste batteries, eco-friendly packaging materials, etc.). However, although China is changing its policy direction to recycling waste and resources, in reality, it remains highly reliant on incineration for waste treatment and it is evaluated that the establishment of a statistical system related to waste and resource circulation will be insufficient.

In the US, a large proportion of waste is disposed through landfill, and rather than recycling domestically, it has taken the method of exporting to other countries such as China. However, in line with the international community's policies for waste reduction and circular economy, more and more state governments are introducing packaging material-related regulations or expanding producer responsibility systems.

Korea operates a resource circulation system that includes the waste charge system (for producers or importers), producer responsible recycling system, technology review for recycling resources recognition, recycling environmental assessment, and waste disposal charge system (for recycling companies). Korea's approach is to reduce the generation of waste itself and increase the actual recycling rate through its Comprehensive Waste Management Measures (2018), Resource Circulation Policy Transformation Promotion Plan (2020), and Measures to Remove Plastic from

Household Waste (2020).

3. Major Issues

While the existing linear economy focused on post-processing after the generation of waste, the transition to a circular economy requires a focus on preventing waste, such as by designing products that consider reuse or reparability, or expanding the scope of the producer responsibility system. The government needs to support the private sector to develop and certify new materials and resource-efficient production technologies, and to provide institutional incentives for producers to reduce waste and reduce the content of hazardous substances. It is necessary to improve the system and physical infrastructure to increase the recycling rate of generated waste and to enable landfill and incineration processes that do not adversely affect the environment.

Recently, measures to restrict or ban the import of specific waste items have been put in place, mainly in major waste-importing countries. But additional measures are needed to monitor illegal waste imports and exports and to improve the waste treatment capacity of developing countries.

It is necessary to improve national, regional, and global statistics and monitoring systems on waste generation and treatment. In particular, it is necessary to increase the reliability of data related to developing countries and to accumulate data based on unified international standards, not only for waste management but also to improve resource efficiency.

IV. International Cooperation Cases for Circular Economy

1. Support and Cooperation for Developing Countries

The waste management and disposal sector accounted for the largest share of the global circular economy ODA support from 2016 to 2019 (four years). It was found that the proportion of support for the remaining three fields, such as bio-thermal power generation, responsible business practices, and waste thermal power generation, was relatively small. The top donor countries and institutions for ODA in waste management and disposal support were the EU, Germany, International Development Association, and Japan. In the field of biofuel power generation, Germany had the largest amount of support, and most of the support for waste power generation was provided by Canada.

The EU includes an external cooperation strategy as part of the detailed policy of the New Circular Economy Action Plan, and one of the key areas is a support program for the transition of developing countries, such as African countries, to the circular economy. Representative examples of the EU's circular economy support for developing countries include the Switch to Green initiative for developing countries in Africa, Asia, and the Mediterranean region and the EU-Africa circular economy partnership.

Major UN agencies such as UNEP and

UNIDO are also promoting a number of support projects for green economy and circular economy transition. Major support projects include the Partnership for Action on Green Economy (PAGE) in which five UN organizations, including UNEP and UNDP, participate as cooperative organizations, UNIDO's Chemical Leasing and Mercury Program, and UNEP's Special Program.

2. Relation with Circular Economy and International Trade Policy

The Extended Producer Responsibility (EPR) system is a policy that extends the responsibility of producers to the recycling stage, resulting in problems related to information costs and high compliance costs that can distort international trade. In order to minimize the trade distortion effect, it is important to ensure transparency in policy operation, such as providing sufficient information to importers and conducting mutual consultations in the process of establishing and implementing the EPR system.

The green government procurement system means giving priority to products and services that have little negative impact on the environment throughout the product life cycle in the area of government procurement. In this case, it is pointed out that various standards required in the process of green government procurement may act as factors hindering trade revitalization. In order to prevent the green government procurement system from functioning as a trade barrier, it is important to operate the

system in a continuity with the existing procurement policy, establish a one-stop inquiry and consultation channel, and operate a system learning and sharing platform.

The introduction and proliferation of circular economy-related labeling can act as a barrier to market access in a way that increases the compliance costs of multinational producers. In addition, as the global value chain deepens, various standard systems and related regulations that exist in each country can also act as actual trade barriers for the product. In order to minimize the negative impact of labeling on international trade, it is necessary to promote a cooperative policy to build reliable information on labeling in different countries and promote the introduction of labeling with high interoperability. In the transition to a resource-efficient circular economy, mutual recognition of related standards and harmonization of each standard system are necessary. This will be possible not only through dialogue channels of multilateral organizations such as the WTO and OECD, but also through bilateral or regional cooperation channels such as regional trade agreements.

3. Private Circular Economy Cooperation

The Alan MacArthur Foundation is a charitable organization established for the purpose of expanding the international community's interest in the circular economy, promoting corporate participation, and supporting related research. Currently, the foundation is leading the

New Plastics Economy Global Commitment (NPEGC) to solve plastic waste and pollution problems.

The Platform for Accelerating the Circular Economy (PACE) is a representative public-private cooperation platform that aims to develop agendas related to accelerating the transition to the circular economy and promote related projects. PACE is currently carrying out various cooperative projects to discover circular economy action agendas in major fields such as food, electronic products, textiles, and plastics.

The Sustainable Packaging Alliance is an association of major distribution, manufacturing, packaging and recycling companies in North America established to improve the sustainability of packaging systems. Currently, the Alliance is promoting cooperative projects such as providing information on sustainable packaging, supporting education and innovation programs, supporting collaboration among members, supporting software development related to environmental impact assessment, and introducing standards and labeling.

The Alliance to Eliminate Plastic Waste is a non-profit organization that engages plastic and consumer goods manufacturers, chemical companies and waste management companies around the world to end plastic waste. The alliance is currently supporting projects in each region to build sustainable waste management systems, reduce plastic use, and promote reuse and recycling.

V. Information-based Environmental Policy Mechanism and Circular Economy

1. Circular Economy and Labeling System

The circular economy considers the entire product cycle, in which products are produced by producers, traded in the market, consumed by consumers, and then discarded. In order to achieve the policy goal of the circular economy, it is necessary to make an effort to reflect the goal of the circular economy in the process of production activities in which production technology is combined with production factors.

In particular, in order to spread the circular economy approach, the government may consider applying the circular economy labelling system, an information provision environmental policy method, instead of unilateral prescriptive regulation. If circular economy-certified products are evaluated as having higher value by consumers in the market – that is, if consumers are more willing to pay for the circular economy certified product – the market price of circular economy-certified products will be higher. The high market price for circular economy-certified products provides an incentive for producers to engage in production activities that conform to the circular economy, and thus the circular economy can be expected to gradually spread.

2. Economic Concept of Circular Economy Labeling System Operation

The circular economy labelling system can be seen as a policy to resolve market failures caused by information asymmetry by utilizing the market incentive structure. If the government implements the circular economy labelling system and plays the role of information provider in the market, the problem of market failure due to asymmetric information in the market can be solved. Through the circular economy labelling system, certification information on the resource circulation rate of products can be provided to consumers, thereby influencing consumers' choices in the market. If the incentive structure of the market is properly used, producers can voluntarily participate in the circular economy labelling system without any compulsory government regulation.

3. Research Cases for Circular Economy Labeling System Effect Analysis

Kotchen (2013) argued that the eco-friendly labelling system can solve market failures by alleviating the asymmetric information problem in the market, and that the eco-friendly labelling system can solve the free-rider problem while acting as a private mechanism to supply public goods.

Andreoni (1990) argued that consumers supply public goods not only through incentives to improve social welfare, but also through the satisfaction of donation itself. If this is applied to the circular economy labelling system, it

means that consumers may be willing to pay for the public good characteristic of products which have a high resource circulation rate in the process of disposal after consumption.

VI. Policy Recommendations

Based on the research results of the previous chapter, the following policy implications can be derived for the Korean government and the private sector to prepare for the spread of the circular economy.

First, it is necessary to break away from existing waste management-focused policies to fully consider the entire life cycle of a product. In particular, more efforts should be made at the production and consumption stages to reduce the use of resources and minimize the generation of waste itself. In the production stage, beginning from the design process, the possibility of generating waste must be reduced and considerations made to put the used materials or parts into production later. At the consumption stage, there is a need to encourage consumers to purchase recyclable products, use them for a long time, and dispose of waste in a sustainable way. This requires providing consumers with sufficient information about the product and guaranteeing the “right to repair” so that the products can be used as long as possible. More use should be made of platforms related to the sharing economy, such as mobile applications where consumers can share or rent products they do not need. Above all, it should be kept in mind that the transition to a circular economy is a mid-

to long-term goal. Educational opportunities should be continuously provided from an early age so that people can realize the necessity of a circular economy and learn how to practice this in their daily life.

Second, it is necessary to take a leading role in discussions on the circular economy related to international trade, focusing on the international standards for a circular economy. Since various circular economy policies can affect international trade, it is necessary to fully consider these factors in the design and operation of circular economy-related policies. In particular, standards are closely related to various environmental policies such as the labeling system and the green government procurement system. In addition, each country is focusing on the development of domestic circular economy standards, and it is highly likely that these standards will act as technical trade barriers in the future. Therefore, through multilateral channels such as IOS/TC323, it is necessary to identify trends in international standards-related discussions and actively develop international standards proposals. In addition, it is necessary to adjust the domestic standard system in line with these international standards and actively utilize the framework of bilateral or regional cooperation such as FTAs.

Third, Korea needs to develop international cooperation on tackling circular economy challenges, instead of focusing on domestic measures. Cooperation with the European Union, which is leading global responses, could

serve as a good benchmark for Korea to establish bilateral and multilateral cooperation. Multilateral agreements and initiatives proposed by the European Union could be developed into global standards, such as the Global Agreement on Plastic Pollution and Global alliance on Circular Economy and Resource Efficiency. Korea also could develop further cooperation with developing countries based on the examples of the European Union and consider expanding cooperation with ASEAN member states and South Asian countries. Cooperation with Asian countries could enhance the competitiveness of companies and capabilities to tackle issues related to the circular economy for both Korea and Asian countries as well.

Fourth, the government should prepare various measures to support the private sector to take the leading role in transition to a circular economy and strengthen competitiveness in the global market. It is necessary to expand R&D infrastructure and financial support for basic research, demonstration, and commercialization of materials using resource-efficient or recycled materials. In addition, the government can also catalyze development of technologies to improve the production process or reduce the use of resources that can have a negative impact on the environment. For small and medium-sized enterprises (SMEs) with limited resources to implement transition to a circular economy, financial, technical and capacity-building support are needed. In the area of current green public pro-

curement, the criteria for mandatory purchase could be expanded to include products certified for using circular resources and to promote reuse of purchased products and product sharing systems. In addition, since circular economy policies and regulations can make a significant cross-border impact on international trade and business activities, it is necessary to proactively monitor policy changes and trends in major trade partners and provide timely assistance for the private sector.

Finally, design, implementation and monitoring of circular economy-related policies should be based on reliable, accurate and comprehensive data and statistics. Considering the different data standards and statistical system among OECD members, selected major economies and Korea, the harmonization of standards and criteria of data collection, such as waste treatment methods and recycling rate calculation, could be the first step to come up with effective measures to improve circular resource management. Therefore, domestic and international efforts are required to discuss internationally agreed statistical standards that can measure overall resource efficiency as well as waste generation and treatment. For this to happen, Korea needs a more sophisticated statistical system to capture and measure resource use and efficiency and material flows in each industry sector and the economy as a whole. Furthermore, it is necessary to develop indicators that can objectively evaluate various aspects of the circular economy and precisely monitor the performance of relevant policies. **KIEP**