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## BENCHMARKING OF THE CIRCULAR ECONOMY IN THE WORLD

*Circular economy is an important support for countries in the world to promote green and low-carbon transformation, and the development of circular economy is not a one-day achievement and requires all-round efforts. Due to the differences in the level of economic and social development of various countries or regions, it is determined that there must be differences in the starting point and path of developing circular economy in different countries or regions. Therefore, it needs a kind of thinking about where and where to start to build the benchmarking management of the world circular economy. Based on the above considerations, this paper discusses the positioning, role and challenges of global circular economy benchmarking management under the current carbon neutral strategic framework from the perspective of international economics. The strategy is briefly analyzed, and relevant countermeasures and suggestions are put forward.*

**Keywords:** circular economy; benchmarking; global development; analytical recommendations

**JEL classification:** F01, F64, Q20.

**Foreword.** The concept of circular economy was first formally proposed by British environmental economists David Pearce and Kerry Turner in 1990 [1]. In 1996, Germany began implementing the Closed Substance Cycle and Waste Management Act. Subsequently, European countries such as France and the United Kingdom followed Germany, and the development of circular economy has gradually become a global consensus [2]. However, as a scientific and brand-new economic development model, circular economy has changed the traditional linear economic model of "excavation-production-disposal", realized the decoupling of economic development from resource extraction and environmental impact, and enabled more Less resource input creates more socio-economic value, which is of great value for achieving global carbon neutrality goals [3].

**Analysis of recent research and publications.** A study by the Allen·MacArthur Foundation in the United Kingdom shows that a circular economy can effectively reduce greenhouse gas emissions in the production and use of products, and proposes that the implementation of a circular economy can reduce the world's key industrial materials such as cement, steel, plastics and aluminum by 2050. 40% of carbon emissions in the production process, reducing carbon emissions of 49% in the global food system. Studies on European countries also show that switching to a circular economy will reduce greenhouse gas emissions by 70% [3].

For example, with the comprehensive transformation of China's economic and social development model and the establishment of the "dual carbon" goal, fundamental changes have taken place in the mode of production and consumption, promoting social and economic transformation and upgrading, and at the same time affecting countries around the world on China's development of circular economy. Knowledge and opinions have formed a certain benchmark and exemplary role.

At the same time, the problem of the combination of benchmarking China's position in the development of a circular economy and China's positioning in global value chains remains unresolved.

**The aim of the article.** This paper discusses how China's positioning and formation in the circular economy, from the international and domestic perspectives, discusses the future positioning, role and challenges of the world's circular economy under the carbon neutral strategic framework, and puts forward relevant countermeasures and suggestions. Our goals are clear: to support the development of the circular economy, especially the development and application of the circular economy in developing countries around the world, to make it more efficient to use the new knowledge and business opportunities in the circular economy, to promote their specialization, investment The possibility of international nationalization and entry into global value chains. Circular economy benchmarks enable this – so let's drive the green transition of the world by exploring circular economy benchmarks.

### Definitions

What is Circular Economy?

The circular economy approach is an alternative to the "make, use, dispose" model, and aims to keep products and materials in the value chain for a longer period and to recover raw materials after the lifetime of the products for their next use.

What is Benchmarking?

Benchmarking is a practice that realizes recognition, discovery, application, and creative development of excellent products, services, designs, equipment, process operations, and management through analysis and comparison, and is used to improve the actual effect of the organization and the process of continuous virtuous circle. system approach.

What is sustainable development?

Sustainable development was formed and developed in the past 20 years with the aggravation of ecological resource crisis and the development of environmental science. This definition includes the principles of fairness, sustainability and commonality of sustainable development. It emphasizes two basic points: First, human beings need to develop. Second, development must be limited, and the survival and development of future generations must not be endangered. In sustainable development, development is the premise and foundation, and the two basic relationships between "man and nature" and "man and man" are the core content of sustainable development, which not only realizes the goal of economic development, but also realizes the goal of human beings. The harmonious development of living natural resources and the environment "enables future generations to live and work in peace and contentment and to develop sustainably.

What are the Sustainable Development Goals?

The 2030 Agenda for Sustainable Development, adopted by all UN Member States in 2015, provides a common blueprint for peace and prosperity for people and the planet, now and in the future. At its heart are the 17 Sustainable Development Goals (SDGs), an urgent call for all countries – developed and developing – to act in a global partnership.

What is Socioeconomic?

Socioeconomics are based on cooperative, often non-profit, voluntary rather than paid activities within the community, in the national economy, and internationally.

### **1. A representative benchmarking strategy for the global development of circular economy**

Throughout the world, major developed economies such as the European Union, the United States, Japan, and Singapore, as well as developing economies represented by China, all regard the development of circular economy as an important pillar and key path for driving economic growth and achieving climate goals, and have formulated A series of supporting regulations, directives and related action plans.

1.1. The EU adopted the EU Circular Economy Action Plan in 2015, which included the circular economy as an important strategic category for addressing climate change and stimulating economic growth under the framework of the "Europe 2020 Strategy". In March 2020, the EU further released a new version of the "Circular Economy Action Plan", taking it as an important pillar to support the "European Green New Deal" and proposing to focus on seven key areas such as electronic products and ICT, batteries and automobiles, and plastics. Sustainable product philosophy and policy framework to reduce resource consumption and "carbon footprint" throughout the life cycle, with plans to adopt the Sustainable Products Initiative in 2022. Together with the industrial strategy, the new plan will help the EU to benefit from the development opportunities of the global circular economy, become a new driving force for the EU to drive economic growth, employment and investment, and promote the European economy towards a sustainable, low-carbon, resource-efficient and competitive direction change.

1.2. In 2012, 2016 and 2020, Germany successively passed the first, second and third phases of the "German Resource Efficiency Plan", proposing a full value chain circular development strategy including five links of supply-production-consumption-closed-loop management-overall

measures, and regard resource recycling as an important support path to reduce greenhouse gas emissions and achieve carbon neutrality, formulate a circular development roadmap, and put forward the goal of achieving 100% plastic recycling and recycling by 2025.

1.3. Finland proposes a "resource smart" strategy, which closely links the circular economy with carbon neutrality goals, and formulates specific action plans to reduce the production of raw materials and products in the whole life cycle of extraction, manufacturing, transportation, sales and disposal. of carbon emissions to help it achieve its carbon neutrality goal by 2035.

1.4. Japan has continuously released the Basic Plan for the Promotion of the Formation of a Recycling Society 4 times every 5 years (2003 to 2018), proposing main actions and specific measures to build a recycling society. Starting from the second promotion plan in 2008, it clearly linked the circular economy with low-carbon development, and proposed to strive to build a circular, low-carbon and natural harmony by taking measures to control waste generation and greenhouse gas emissions as much as possible. sustainable society. In 2020, Japan released the "Green Growth Strategy", which clarified the path to achieve its carbon neutrality goal, of which the development of resource recycling-related industries and carbon recycling industries is one of the key supports.

1.5. The United States has proposed the "five zeros" strategy of "zero-carbon electricity, zero-carbon transportation, zero-waste manufacturing, zero-carbon buildings, and zero-emission vehicles", in which "zero-waste manufacturing" is closely related to the circular economy. Developing a circular economy and promoting fundamental changes in resource utilization has become a common choice for all countries to promote economic growth and green and low-carbon transformation.

1.6. In the 1990s, China's resource shortage and environmental pollution problems began to emerge. In order to realize the adjustment of the economic structure and the transformation of the development model, some scholars began to introduce the idea of circular economy into China by learning from the practice of Germany and Japan [4]. After years of development and evolution, my country has formed a circular economy theory, policy and practice with Chinese characteristics [5]. In 2005, the promulgation of a series of documents including "Several Opinions of the State Council on Accelerating the Development of Circular Economy" marked that my country officially embarked on a new road to develop circular economy. In 2008, the Fourth Session of the Standing Committee of the Eleventh National People's Congress of China passed the Law on Promotion of Circular Economy, marking a solid step in the construction of the rule of law in my country's circular economy. In 2013, the State Council issued the "Circular Economy Development Strategy and Short-term Action Plan", and began to implement the "Ten Hundred Thousands" demonstration action of circular economy; Comprehensive conservation and recycling of resources; reduce energy consumption and material consumption, and realize the circular link between production system and living system. Subsequently, 14 ministries and commissions including the National Development and Reform Commission of China jointly issued the Leading Action for Circular Development, implementing ten major special actions during the

13th Five-Year Plan period. Driven by a series of policies and measures, my country's circular economy construction has achieved remarkable results. While promoting resource conservation and ensuring resource security, it has also produced good carbon emission reduction synergies. According to the calculation of China Circular Economy Association[6], during the "13th Five-Year Plan" period, the comprehensive contribution rate of developing circular economy to my country's carbon emission reduction is about 25%; in 2020, China will reduce CO<sub>2</sub> emissions by about 26% by developing circular economy. 100 million tons, and the output of secondary non-ferrous metals is 14.5 million tons, accounting for 23.5% of the output of ten non-ferrous metals in the country. Aluminum and lead accounted for 32.4%, 20% and 37.2% of the total domestic output. The outline of the "14th Five-Year Plan" released in March 2021 proposed to "fully implement the concept of circular economy and build a multi-level resource efficient recycling system"; "Opinions on Doing a Good Job in Carbon Peaking and Carbon Neutralization", regards "saving priority" as one of the five principles for the implementation of carbon peaking and carbon neutrality goals, puts energy and resources conservation in the first place, and implements a comprehensive conservation strategy [7]; Subsequently, the State Council issued the "Carbon Peaking Action Plan before 2030" [8], which clearly pointed out that it is necessary to "seize the source of resource utilization, vigorously develop the circular economy, comprehensively improve the efficiency of resource utilization, and give full play to the reduction of resource consumption and carbon reduction. "The synergy effect of circular economy", taking the circular economy to help reduce carbon emissions as one of the "Top Ten Actions for Carbon Peaking"; at the same time, the "14th Five-Year Plan for Circular Economy Development" also proposed a future development roadmap for circular economy. Including the implementation of 12 key tasks, five key projects, and six key actions in the three major fields of industry, agriculture and social life. According to relevant forecasts, it is expected that the comprehensive contribution rate of the development of circular economy to my country's carbon emission reduction will reach 30% during the "14th Five-Year Plan" period, and it will reach 35% by 2030 [6].

Facing the current situation, the global response to climate change is unprecedentedly urgent. In order to combat climate change and reduce the total emissions of greenhouse gases, mainly carbon dioxide (CO<sub>2</sub>), 37 countries, including China, formally committed to carbon neutrality by incorporating national laws, submitting agreements or policy declarations, and another 52 countries. countries have made verbal commitments [9]. As the country with the largest total CO<sub>2</sub> emissions in the world, China made a solemn commitment in September 2020 to strive to achieve carbon peaking by 2030 and carbon neutrality by 2060. After the "double carbon" goal was put forward, my country's ecological civilization construction has entered a new stage with carbon reduction as the key strategic direction, and the development of circular economy has been endowed with new missions and requirements.

## **2. Application of benchmarking management from the perspective of circular economy**

### *2.1. Origin of benchmarking application*

Benchmarking was first applied to companies, and originated in the movement of American companies to learn from Japanese companies in the late 1970s. It was Xerox Corporation of the United States that pioneered benchmarking management, which established a model for benchmarking in economic operation and management. After 1976, Xerox, which has always maintained the actual monopoly position in the world copier market, was challenged by competitors from Japan. Therefore, Xerox conducted a comprehensive and centralized analysis and comparison through benchmarking management, and clarified the operation mechanism of Japanese enterprises. When the gap with the main rivals was cleared, the business strategy and tactics were comprehensively adjusted, and the business process was improved. The results were quickly achieved, and the lost market share was regained [10]. As a result, Western enterprises have followed suit and learned from each other, regard benchmarking as the best guidance for enterprises in management, operation and competition, optimize enterprise strategies, improve enterprise management level and market competitiveness, and have achieved remarkable results. Today, benchmarking has been regarded by enterprises in western countries as the most useful management tool to improve business performance and enhance global competitiveness. Its use has grown from initially measuring the performance of manufacturing departments to applying it to different business functions. In addition, benchmarking has also been used for some strategic purposes, even beyond the scope of the original enterprise, and is widely used in non-profit organizations, including in the field of circular economy, through benchmarking, these non-profit organizations and economic Forms look for their own inefficiencies and causes that can be optimized in operation, and learn and reference this set of management best practices.

### *2.2. Circular economy benchmarking management process*

In the process of economic operation, benchmarking is mainly carried out through the implementation steps of each actual economic operation in the process. In specific implementation, it can be roughly divided into 10 steps. Each link of these steps is the final closed loop of mutual influence and advancement (as shown in Table 1).

### *2.3. The ideal circular economy benchmark performance*

2.3.1. From the perspective of product life cycle, in the product design stage, green design technologies are widely used, such as reduction design, recyclable design, etc.; in the manufacturing stage, clean production is widely used; in the distribution stage, highly developed Green logistics, including highly developed venous channels; in the consumption stage, circular consumption has become the mainstream consumption method; in the disposal stage, waste is basically eliminated, resources are recycled to the maximum extent, and the waste that cannot be recycled is carried out. the most appropriate disposal.

2.3.2. From the perspective of the awareness and behavior of each subject in the circular economy system, whether the country, the government, the enterprise or the public, all have strong awareness of resources and environment, strong environmental ethics, and clear division of labor and roles Positioning, and have the behavior of consciously fulfilling environmental obligations.

Table 1

List of 10 steps in the circular economy benchmarking process

Sequence of steps	Step point	illustrate
Step 1	Identify the topic of benchmarking	This topic can be a matter of greatest concern or the most critical determinant of competitiveness at the firm, industry and country level, requiring accurate identification.
Step 2	Determining what and what to benchmark	This object should be a few representative objects with the best performance and highest efficiency in the same organization, industry and department. The content of benchmarking should be the operating procedures, management practices or key elements that determine the main performance performance of the benchmarking object within the scope of the benchmarking theme.
Step 3	Form a working group and determine a work plan	
Step 4	Data collection and investigation	
Step 5	Analyze comparisons, identify gaps, and identify best practices.	On the basis of classifying and sorting out the data obtained from the survey, and conducting necessary further investigations, conduct a comparative study among the survey objects and between the survey data and the actual situation of their own enterprises and industries (departments), and identify each Investigate differences in respondents, identify the causes and processes of gaps, and identify best practices
Step 6	Identify the direction for improvement and formulate an implementation plan.	
Step 7	Communication and improvement plan	Using various channels, the proposed plan and the goals and prospects to be achieved are repeatedly exchanged and communicated with all members (social residents), soliciting opinions, seeking the understanding and support of all members, and revising and improving the plan according to the members' suggestions.
Step 8	Implementation and Supervision	Put the plan into practice and continuously compare the implementation with best practices, monitor deviations and take effective corrective actions in an effort to achieve best practice levels and strive to exceed benchmarks.
Step 9	Lessons Learned	After the completion of the first benchmarking activity, it is necessary to make a reasonable judgment on the implementation effect, summarize the experience in time, and conduct further analysis on the new situation and new findings.
Step 10	Benchmarking process again	In response to new changes in the environment or new management needs, continuous benchmarking activities are carried out to ensure the "tracking" of the development of green circular economy practices.

2.3.3. From the perspective of institutional guarantee, at the macro level, a mature circular economy system should have a complete institutional guarantee system, including an environmental ethics system, a circular economy legal system and related policy systems. At the micro level, each organization should have a sound organizational management system.

**3. Challenges facing the development of circular economy benchmarks**

The basic task facing the development of circular economy is to realize the leap from the current linear economic system to the future circular economic system, from the current system state of extensive utilization of resources to an ideal system state. Due to the fact that the current circular economy practice has not been carried out globally for a long time, the development of circular economy is still being explored, and no organization has formed a complete system, and the effects produced by the practice plans of different organizations may not represent the ultimate circular economy. Moreover, it is unknown whether this practical plan is truly the best. The development of circular economy is a new and continuously updated field, and there is a broad space for creativity. As far as the current development status of various countries is concerned, even developed countries, there is still a considerable distance from the ideal state of

circular economy. To achieve global green and sustainable development is a new task for countries to enter a new stage of development and to build rich and beautiful homes. To promote the innovative development of circular economy and support the realization of green development goals, it faces new challenges in innovative technologies, industrial support and policy guarantees. challenge.

*3.1. Energy utilization triggers new demands for circular economy in safeguarding important resources*

Comprehensive utilization of energy is one of the key paths to achieve green development. With the large-scale development of global solar energy, wind energy, hydrogen energy and other renewable energy, clean energy industry and new energy vehicles and other industries, the demand for a large number of wind turbines, photovoltaic power generation equipment, new energy vehicles, and energy storage equipment will increase. As a result, the consumption of some key mineral resources and basic raw materials continues to grow. Studies have shown that the mineral resources required by onshore wind power plants are 8 times that of gas-fired power plants with the same installed capacity, and the mineral resources used by an electric vehicle are 5 times that of traditional vehicles [12]. At present, some developing countries' chromium, cobalt, lithium, copper, nickel and other important minerals closely related to the new energy industry are increasingly

dependent on resources, and their recycling and reuse are not ideal. The security situation of strategic resources and key mineral resources is grim. Relevant strategic resources and key raw materials have become the material basis for the transformation of some developing countries' medium and long-term energy systems, and the circular economy urgently needs to play an important supporting role in the safe supply of these key resources. How to break through and improve the recycling technology in the process of mining, use, recovery and reuse of these key mineral resources, how to coordinate the international and domestic markets and two resources, improve the construction of a green industrial chain and supply chain, and develop product design and These will be new and important challenges in the future development of circular economy.

*3.2. The need for global carbon emission reduction forces the circular economy industrial system to urgently need to be upgraded*

Under the new pattern of carbon-neutral transformation, the development of circular economy technology and industries in various countries should be guided by low-carbon goals. At present, the development of circular economy in some traditional fields around the world has the phenomenon of low quality, non-recycling economy and low-carbon recycling. For example, in the renewable resource recycling industry, 70% are small and medium-sized enterprises. In addition, there are many types of industries and large differences. Some industries have high energy consumption, and even belong to high energy consumption and high carbon manufacturing industries. At the same time, there is a lack of comprehensive assessment of the economic cost benefit, resource environment benefit, and energy carbon emission benefit of the whole life cycle of recycling technology. Some companies lack guidance in technology selection. There are still some backward technologies and production capacity in the circular economy industry, which affects the High-quality development of the industry. The clean and low-carbon level of my country's traditional recycling technology and the scale and standardization of the industry still need to be further improved. In addition, with the adjustment of energy structure and industrial structure, innovation and breakthroughs based on new technologies, new formats and new models in the fields of new energy and fossil resource materialization, it is also necessary to strengthen the guidance and support for the development of corresponding industries.

*3.3. Circular economy carbon emission reduction accounting evaluation standard system needs to be established and improved*

Incorporating the circular economy into the carbon emission reduction management system and market system, and accurately accounting for the carbon emission reduction of circular economy activities are the basis and key. Circular economy activities often involve various aspects, with a long time span and a wide spatial scope, and its carbon emission accounting is extremely complex. At present, in terms of quantitative analysis of the coupling relationship between circular economy activities and carbon emission reduction at the regional, park, industry, and enterprise levels, there are insufficient basic data support, lack of methods and tools, inconsistent standards, and imperfect statistical evaluation mechanisms that need to be solved urgently. The problem. The existence

of these problems, on the one hand, will directly affect the assessment and evaluation at the management level of governments at all levels in various countries and the formulation of relevant policies; The global carbon market trading system, especially under the international carbon border adjustment mechanism, may also affect the competitiveness of various countries' products in the international trading system.

*3.4. The circular economy benchmarking management system and governance system are not yet perfect*

At present, countries lack top-level design and overall planning for the development of circular economy and green development, the existing circular economy legislation, environmental reform measures and related policies lack synergy [13], and a circular economy governance system for achieving benchmarking and effective management goals has not yet been established. For example, countries have not yet constructed specific paths and development strategies to achieve effective benchmarks based on circular economy. There are significant stepped regional imbalances in the development level of regional circular economy, and there are uneven development levels of circular economy. It is urgent to establish a roadmap and action plan covering multi-level levels and coordinating the development of circular economy. Compared with developed countries such as Germany and Japan, these countries have not formed a perfect legal and regulatory system to promote the development of circular economy.

*3.5. The circular industry and technological innovation system need to support the realization of the benchmark goal of circular economy*

In recent years, although the circular economy industry and technological innovation system in various countries have achieved great development, there are still many problems in the practice process, and it is difficult to support countries to achieve the goal of green development of circular economy. For example, the circular economy industry is small in scale and the level of industrial development is low. The production and consumption norms that run through the entire industry chain have not yet been formed; the circular economy network covering all regions, industries and fields is not smooth enough; the production system, circulation system, and consumption system have not yet been formed; innovation capacity still needs to be improved, and the green and low-carbon recycling The mechanism innovation, model innovation and product innovation of the industry have not paid enough attention to. Subversive and strategic technological innovations such as intelligent and refined dismantling of wastes such as power batteries, in-depth sorting of rare metals, waste-to-energy, and plastic waste paper fueling[14] are relatively slow.

*3.6. Differences in governance concepts among countries have affected the all-round popularization and implementation of the concept of circular economy development*

At present, governments in various countries have not yet formed a circular economy governance system led by the government, with enterprises as the main body, and social organizations and the public participating together. Social forces are not very motivated to participate in circular economy and carbon neutrality. Therefore, the public's green and low-carbon lifestyle has not yet been formed, and the "abandoned" consumption behavior of

buying quickly and throwing away is widespread. In addition to the large use of disposable products, the rapid replacement of electronic products such as mobile phones has also caused a lot of waste of resources [15], aggravating the generation of solid waste. The public still lacks enthusiasm for behaviors such as resource conservation and garbage classification: the implementation of policies such as the "plastic restriction order" and green travel are not as effective as expected; many communities have problems such as lax garbage classification, dirty delivery sites, and mixed collection and transportation of garbage. In addition, the environmental protection information disclosure of enterprises in various countries is still at a low level, which cannot meet the information sharing needs of building a circular economy. For example, China has not yet built a national-level information sharing platform, resulting in insufficient sharing of corporate environmental protection information, and it is difficult for social organizations and the public to participate in the supervision of corporate emission reduction behavior and government environmental protection governance. Scientific research groups and environmental protection organizations lack the ability and resources to publicize and organize, and fail to guide the public to participate in environmental governance [16].

#### **Conclusions and further Countermeasures and suggestions for building a circular economy system for global benchmarking**

To sum up, the "3R" principle of circular economy is of great value to the realization of the world's circular economy benchmark. At present, the concept of circular economy has been widely practiced and applied. Currently, developed economies such as the European Union have taken the development of circular economy as an important path to address climate change and achieve carbon neutrality [16]. After years of development, countries around the world have achieved certain remarkable achievements in the application of circular economy, and both industrial development and technological innovation have been quite effective. In the context of achieving green development and carbon neutrality goals, all countries in the world must focus on solving the many problems and challenges that still exist in their own circular economy development, from building a circular economy governance system, establishing a circular industry and technological innovation system, and building a green, low-carbon and circular society. Steadily promote the circular economy mechanism, policy, benchmarking management model, technology and product innovation oriented towards green development and carbon neutrality goals, and provide support and guarantee for the realization of green development and carbon neutrality goals.

#### *4.1. Build a circular economy governance system for carbon neutrality*

4.1.1. In developing the circular economy, the primary task of each country is to clarify the connotation and relationship between circular economy and carbon neutrality, clarify the path for circular economy to achieve carbon neutrality, and strengthen the overall planning and coordination of circular economy and carbon neutrality. Top-level design to build a circular economy governance system oriented towards carbon neutrality.

4.1.2. It is recommended that countries strengthen the overall coordination, supervision and management of

circular economy work at the national level, and promote close cooperation between government departments in various countries to realize the close connection between circular economy and carbon neutrality.

4.1.3. It is recommended that countries formulate circular economy development plans for key regions, key industries, and key enterprises for green development by classification, clarify the stage goals, implementation routes and action plans of relevant entities for green, low-carbon and circular development, and provide circular economy-related industries and enterprises. Set specific carbon emission reduction targets to ensure the coordinated advancement of circular economy development and carbon neutrality actions. Guide the internal government to flexibly use fiscal and taxation policies and industrial policies to support the development of circular economy industries, efficient use of energy and recycling of resources.

4.1.4. It is recommended that countries, in order to achieve the goal of green economic development, revise and improve the existing laws and regulations on circular economy in a timely manner, and accelerate the formulation of relevant laws and regulations such as the "Resource Comprehensive Utilization Law" and the "Climate Change Law", and further Improve the circular economy legal system that adapts to green development.

4.1.5. It is recommended that countries, on the basis of the obtained work experience in circular economy industrial parks, "urban minerals" demonstration bases, and "waste-free cities" construction pilots, further refine the "3R" principles in key areas, key industries, Key enterprises explore and carry out the promotion of circular economy development oriented to green development, innovate systems and mechanisms, and strive to form a batch of replicable and popularized green and low-carbon circular economy development experiences and models.

#### *4.2. Build an effective benchmarking recycling industry and technological innovation system*

Suggesting and calling on governments to further improve the industrial system and technological innovation system is the key to the development of circular economy and the realization of green development goals. We should actively build a green and low-carbon recycling industry system and technological innovation system, improve resource utilization efficiency, and provide strong support for the realization of global low-carbon environmental protection goals.

4.2.1. Countries should actively build production, circulation and consumption systems for green, low-carbon and circular development. Provide more support to relevant circular economy industries and enterprises, coordinate the promotion of green production and transformation of the entire industrial chain of relevant industries and enterprises, promote product ecological design, realize green and low-carbon products throughout the life cycle, and improve the greenness of industrial chains, value chains, and supply chains. Low carbon cycle level.

4.2.2. Construct a development model for circular agriculture, further extend and improve the use cycle of agricultural products in various countries, and improve the level of resource utilization of agricultural and forestry wastes to promote the development of circular agriculture. By improving food storage methods, strengthening the construction of logistics cold chain infrastructure, improving the food logistics distribution system, and

filling the shortcomings of food processing and packaging infrastructure to optimize food storage, transportation and processing [13].

4.2.3. On the basis of expanding domestic demand, countries should strengthen the circulation and circulation of products in their own countries, and provide raw material support and market support for the development of resource recovery enterprises. Countries should actively improve the recycling and utilization system of waste and used materials, strengthen the recycling and utilization of renewable resources such as waste paper, waste plastics, waste tires, scrap metal, and waste glass, improve the level of recycling and utilization of renewable resources and key mineral resources, and support recycling of recycled metals and recycled water. Development of the recycling industry.

4.2.4. All countries should actively carry out the implementation of green and low-carbon recycling technology innovation and technological breakthroughs. Incorporate circular economy and carbon-neutral strategic technologies into national key R&D plans and major national science and technology projects, strengthen the construction of green and low-carbon recycling technology laboratories, and set up relevant scientific research projects to promote the efficient use of rare resources such as key metals, and new types of waste such as power batteries. Research and development and application of circular low-carbon technologies including recycling and dismantling, and regenerative agriculture.

4.2.5. Governments of various countries should encourage the deep integration of enterprises, universities and scientific research institutions. Collaboratively cultivate management talents and innovative talents in the field of circular economy and carbon neutrality, build green and low-carbon recycling technology innovation project incubators and collaborative innovation and entrepreneurship platforms, and promote international green and low-carbon recycling technology transfer and innovation achievements transformation.

#### 4.3. *Create a green, low-carbon and circular society for carbon neutrality*

Accelerating the promotion of green, low-carbon and circular development requires the formation of a multi-governance system with government-led, enterprises as the main body, social organizations and the public participating in the governments of various countries. By activating the vitality of the whole society to build together, we will implement the key tasks of circular economy and carbon-neutral development.

4.3.1. Countries should attach importance to the media's guiding role of public opinion and create a good social atmosphere for the development of circular economy. Consolidate the concept of circular economy, disseminate and popularize the "3R" concept and knowledge of green and low-carbon circular economy; cultivate green and low-carbon awareness, encourage the public to reduce the use of plastic and other disposable products, cultivate sustainable eating habits, enhance awareness of garbage classification, and choose green travel methods, buy green products, and promote the public to accelerate the transition to a green and low-carbon lifestyle in terms of clothing, food, housing, and transportation.

4.3.2. Countries should build a shared circular transportation system nationwide [13]. With the support

of information technology, we will build an urban transportation network linked by intelligent public transportation, comprehensively improve the operating efficiency of the public transportation system, support the development of shared bicycle companies, further meet the diverse travel needs of residents, and reduce urban travel carbon emissions.

4.3.3. Countries should regulate the development of their second-hand market. Create an "online + offline" second-hand circulation platform, and build a complete international "Internet + second-hand" model. Improve the operation and management mode of green and low-carbon recycling in residential communities, build a centralized and standardized "flea market" in the area, promote the transaction and circulation of idle items among households, and improve the level of product reuse.

4.3.4. Countries should strengthen the construction of green, low-carbon and recycling communities. Promote green and low-carbon cycle community pilots, improve the operation and management model of community green and low-carbon cycle, and carry out community cycle and low-carbon development model innovation and institutional innovation.

4.3.5. Countries should combine big data and other new-generation information technologies to build a green-oriented circular economy industry environmental protection information sharing and supervision platform. Realize the sharing and interaction of environmental information among governments, enterprises, social organizations and the public. Fully protect the public's right to know, participate and supervise on green, circular and low-carbon development and key tasks, mobilize the enthusiasm and initiative of social organizations and the public to participate in the supervision of green, low-carbon and circular governance, and create a collaborative effort between the government, enterprises, social organizations and the public. A green, low-carbon and circular society jointly built.

#### 4.4. *Strengthening international cooperation in the field of circular economy*

At present, the development of circular economy has become the mainstream international consensus. In order to achieve the 2030 Sustainable Development Goals and the Paris Agreement on Climate Change, major developed countries such as the European Union, Japan, and some developing countries in Latin America have taken policy measures to actively develop circular economy. The European Commission promulgated a new round of circular economy action plan in early 2020. As the core system of the EU Green New Deal, it aims to create a cleaner and more competitive green Europe and support the EU to achieve climate neutrality and other green development strategic goals. From the current international consensus, strengthening international cooperation in the field of circular economy is an important strategic development path to achieve the 2030 Sustainable Development Goals and the Paris Agreement on Climate Change.

4.4.1. Actively carry out bilateral and multilateral cooperation to enhance my country's circular economy development level and international influence. With the goal of jointly addressing global climate change, the circular economy will promote carbon reduction as a key area of international cooperation, strengthen policy dialogue,

technical cooperation and talent exchanges between different countries, promote technology integration and mutual recognition of standards, and jointly improve the international carbon management system. Actively promote the implementation of specific action plans under the framework of cooperation between countries and regions. For example, the Sino-US Joint Statement on Addressing the Climate Crisis, the Sino-EU Memorandum of Understanding on Circular Economy Cooperation, etc.

4.4.2. Strengthen third-party market cooperation. Explore key projects and projects that incorporate circular

economy into the joint green Belt and Road Initiative and South-South cooperation plans to address climate change, share successful experiences accumulated by countries in developing circular economy, and promote related production capacity export, technology export and model export. Select key regions and countries to build cooperation platforms in areas such as reducing plastic pollution, marine protection, developing circular agriculture, and addressing climate change, and build green supply chains and circular industrial chains.

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