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Development of Circular Economy Is A Fundamental Way to Achieve Agriculture Sustainable Development in China

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Abstract

Modern agriculture rapidly improves productivity, meanwhile it pays heavy prices such as over consumption of resources and energy and damages to the agricultural environment. The eco-environmental deterioration of agricultural development and improper mode of agricultural development make more fragile eco-environment also severely restrict sustainable development of agriculture. Circular economy has become the effective path about the sustainable development of every country as the model according with the sustainable development principle. Eco-agriculture has a long history in our country. The agriculture connects closely with the natural ecosystem, which puts agricultural economic system to the harmonious process of the material circulation in the natural ecosystem. It provides the way of development of circular economy in agriculture. Circular economy is the road to achieve the harmonious development between economy and environment. The recycled usage of agricultural resources must be incredible. The core of circular agriculture is to promote the circular utilization of agricultural resources. Eco-agricultural development makes the agriculture achieve the circular flow between material and energy.

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1. Introduction

Circular economy is a kind of new economy form and economic development model. As the concrete form which reflects sustainable development stratagem, circular economy is becoming main development strategy in more and more regions and countries. China is a country with the largest population and a very

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high proportion of agriculture in its national economy. China's rapid industrialization and urbanization in the last decades has engendered serious problems of depletion of natural resources, degradation of major ecosystems. The agricultural development in many areas has been in the vicious circle condition: seizing resources—producing agricultural production—wasting gas emissions—seizing the resources repeatedly. To ensure China's economic and social sustainable development, transforming production and consumption according to the principles of the circular economy would imply major increases in material use efficiency that should also lead to the reduction of material use and pollution in absolute terms. Therefore, high-tech and green technologies must be used to shift its traditional economic growth, vigorously developing a circular economy and new economy in China.

2. Contents and Principles of Circular Economy

Circular economy, a general term for the activities of reducing, reusing and recycling in production, circulation and consumption, is in denial of natural economy and traditional economy. The traditional economy pattern is a one-way flow of linear economy, namely "resources → Products → waste linear growth, which relies on high-intensity exploitation and consumption of resources and at the same time high-intensity damage to the environment. In contrast to traditional economy, circular economy is characterized with low consumption of materials and resources in the course of production, low pollution level, high efficiency and high circulation rates, enabling resources to be put to full use during production. As a result, the adverse effects of economic activities on nature will be decreased as much as possible. Therefore, circular economy achieves economic development, environment protection and resource saving in one goal. Its peculiar feature is resource saving and recycling, making it an essential choice for China if she wants to change the economic growth pattern from an extensive one to an intensive one.

A system of sustainable cycle of economy should have five features. First, the production and consumption should transform as far as possible from the use of energies causing pollution of the environment to the use of renewable green energies. Second, minimizing the consumption of raw materials and selecting materials able to be recycled. Third, resist over packaging for the purpose of dumping of goods and utilizing packaging materials and containers able to be recycled while predigesting packaging. Fourth, reduce various types of industrial waste which should be recycled as thorough as possible at the same time. Fifth, foster recycling resources industry of post-consumer product the, and making life waste landfill and incineration reduced to a minimum.

Requirements of circular economy are made to build up its industrial system in three dimensions.

1. Dimension of internal circulation to develop eco-industrial and sustainable agriculture;
2. Cycle dimensions between productions to develop ecological industry chain or eco-industrial Park, and the ecological chain can even be expanded to different industries including industry, agriculture and animal husbandry.
3. Dimension of the overall circulation of the society to vigorously develop the green consumer market and resource recycling industry

3. Circular Economy and Sustainable Development of Agriculture

1 The implementation of circular economy is an inevitable option for sustainable agricultural development

◆The implement of agricultural circular economy is the key base of overall national economic and social system to develop circular economy and establish a recycling society .

◆It is an urgent need for sustainable agricultural development to catch up with the trend of circular economy development.

◆ From the perspective of sustainable development, the model of development of sustainable agricultural development centered in circular economy is the solution feasible for rural problems

◆ Problems of environmental pollution, ecological damage and resource depletion in the modern conventional agriculture need to be settled by the use of circular economy principles and methods .

2 More advantages of agricultural to develop circular economy

◆ Closely linked with the natural environment, agriculture is accessible more easily to the material recycling process of natural ecosystems to establish recycling model of economy development

◆ Agriculture is closer to the consumption of human beings who are at the top of the food chain web, As a part of nature, agriculture is involved in the whole system of the circulation of materials and energy conversion, which offers more directly the path of realization for the coordination of relationship between human and nature and the promotion of sustainable development of mankind required by the circular economy.

◆ Characteristics of agricultural industries have more advantages to develop circular economy. Industrial system of agriculture is a coupling body in which farming forestry, fisheries, animal husbandry, processing of agricultural products, agricultural trade and service, and consumption of agricultural products are interdependent and synergistic closely. The natural connection among agriculture sectors and the integrated features of agricultural structure are the basis for agro-ecological industry chain established and strengthened by circular economy, and it is also integrated features of the agricultural structure that determine the need to pursue the coordinated development of agricultural industries.

4. Basic Contents of Agricultural Circular Economy

The basic principles: Follow the 3R principles (reduce, reuse, recycle) and the principle of the primacy of waste reduction. Reducing is to reduce input volume of exiguous or non-renewable resources and materials and production volume of wastes throughout the life cycle of agro-products in the process of agro-productions for the purpose of achieving fixed targets of production and consumption. Reuse refers to resources or products to be used multiple times in the first place. For example, wash water for livestock and poultry can be used for irrigation, not only achieving the effect of watering and fertilizing also avoiding the discharge of sewage which pollutes water environment. Recycling refers to products after the completion of its function to become re-available resources rather than useless garbage. The principle of the primacy of waste reduction requires avoiding waste in the production as a priority objective of economic activity.

In addition, the agro- circular economy should uphold the principles of measure adjusted to local conditions, biological coexistence and mutual benefit, overall coordination, maximum green cover, minimum soil loss, utilization and protection of land resources, reasonable flow and the best allocation of resources, rationalization of economic structure, Eco-industry link, two wins of both social and economic benefits and ecological environmental benefits and comprehensive management. Clean production and pollution prevention and control in the whole process are in the implementation to have pollution minimized.

Mutually exchange and benefit of material Levels within agricultural industry and minimize waste of discharge, such as a lot of the typical three-dimensional models from planting and breeding industries. Exchange waste between levels of agricultural industries so that wastes are able to be used as resources ,like breeding fish in the rice field which provides for fish a better living environment. Fish eat weeds and insects and its waste manures field, which reduces the use of chemical fertilizers and pesticides in rice, controls source of pollution in agriculture, Protect the ecological environment and increase economic efficiency levels of material and energy cycles of agro-products during and after the process of consumption, such as crop straw for livestock, grain for human consumption, meat for human

consumption, and waste for fertilizing field.

Composed of eco-farming, eco-forestry, fisheries ecology, ecological animal husbandry, the processing of ecological agricultural products and agricultural trade and services, Agricultural ecological industry chain (system) is a network in which all sectors are interdependent, synergistic and in close contact through the waste exchange, recycling between the consumption of agricultural products. The various industrial sectors in this chain are essentially interdependent and mutually dependent relations and organisms formed by a certain percentage of volume. For instance, in the systems of sugarcane farming, processing, alcohol brewing, paper making, thermoelectricity, integrated environmental treatment, construction of eco-industries (sugar) chain will form a more complete and closed ecological industrial network to coordinate with each system and digest the products and waste exchange with its resources in the best allocation and efficient use of waste and a minimum reduction of environmental pollution through the revitalized, optimization, upgrade, expansion and other steps.

Agricultural technology systems supporting development of circular economy should be included: 1. concept of cleaner production of agriculture and ecological technology system; 2. life cycle theory and environmental assessment techniques 3. concept of agricultural ecological management and technique system of ecological management 4. principles of agricultural industry ecosystem and technique system; 5, laws and regulations of agricultural circular economy and implementation of preferential policy and security system.

5. Models for the Sustainable Development of Agricultural Circular Economy

Based on ecological agriculture, a model of progressive development of recycling economy is developed for the purpose of pollution-free agricultural products and green food. Chinese ecological agriculture is to use modern science and techniques, traditional farming techniques, principles of ecology and ecological economics and systems of engineering methods to implement comprehensive planning, rational organization of agricultural production so as to comprehensively manage Low-yield areas and enhance ecological functions of high-yield areas according to local conditions and advantages of local resources, achieving high quality, efficient and sustainable development of agriculture and a virtuous cycle of both ecological and economic systems as well as effective unit of economy, ecology, and society.

Develop a leap circular model of economy in the light of organic agriculture for the purpose of developing organic food (products) and organic industry as a means. Organic industry refers to ecological industry chain of organic agriculture (organic farming, organic forestry, animal husbandry, organic fisheries), processing industry of organic agricultural products, organic agricultural trade and services, organic consumption. No using genetic engineering and chemically synthesized substances like chemical fertilizers and pesticides in the process of agricultural production, Organic agriculture follows ecological principles and ecological economic law to build up and restore a healthy ecological circular system of agriculture. Organic agricultural products are required to be produced and processed in accordance with corresponding international standards of production and through the certification of the organization of organic agricultural products. Development of organic agriculture and organic industry is the need to protect the environment, conserve scarce resources, develop the rural economy and improve people's quality of life and protect human health; an effective way to accelerate agricultural restructuring and industrial upgrading and effectively control source of pollution and promote sustainable agricultural development; an important measure to build an ecological province, develop economy of eco-efficiency environmental protection, construct new economic growth point, shift advantages of ecological resource into economic advantages, achieve leap development and break the international "green barrier", It's more thorough of organic agriculture in environmental protection and agricultural pollution control, with its concepts consistent with circular economy, so a leap development of circular economy can be

achieved. Therefore, we should strive to implement the application leap development model of recycling economy to promote organic agriculture as the basis, develop organic food (products) for the purpose and develop organic industry as a means.

Since the 60s of 20th century, people have been reflecting the limitation of traditional methods of industrial production, which is large consumption of natural resources, mass production of consumer goods and a large number of the formation of waste , Establishing the mode of production cycle Is to make it into a mode of cycle of production " resources → products →waste →renewable resources → recycled products" in which a variety of waste material in production and life can enter the reproduction areas. This is the "deep cycle" mode of production of new industrialization that is more advanced and deeper than the original one. For example, high-tech productions like nanometer and bio-engineering belong to the deep part production of the new industrialization. The fundamental features of the new industrial production are deeper in production level than that of the original industrial production. The resources (including raw materials and energy), therefore, are more broad, which is a fundamental solution to the lack of resources in industrial production. Deep cycle has three levels of economic structure, namely the technology system of circular production, the organization system of circular production and the system of social circular economy. Cycle production technology system is the most basic part of the establishment of circular economy, which is fundamentally a technique applying variety of waste material to reproduction, including decomposition, synthesis and manufacture.

6. Measures to Construct Circular Economy

Promoting the recycling economy needs to improve the community awareness of environmental protection and resource conservation, for which publicity and education should be greatly strengthened to advocate concept of ecological values and green consumption in the whole society, like choosing less packaging or recyclable items, rather than a one-time items to minimize waste generation. For consumer guide, Government should play an exemplary role, preferentially procuring enterprise products through eco-design or through the environment label, through cleaner production audit or through the ISO14000 certification.

Establish the overall plan for construction of circular economy, and implement the strategy of circular economy by stage and bring a new industrial circular economy into the process of modernization. In some areas a cycle of production systems should be immediately established. With the basic realization of new industrial technology and industrial development as well as stability of social resources stocks, a new cycle of industrialization and economy should be unswervingly built up. Requirements of 50% or more rate of the deep circular of resources should be reached in the new of industrial recycling economy.

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