

The Research of Low-Carbon Economy Assessment

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Abstract. Recently, greenhouse effect caused by greenhouse gas emissions is becoming an increasingly heated topic. Developing a low-carbon economy is becoming a trend both abroad and at home. China is a main carbon emission country as well as the largest developing country. It is important to take prompt actions in this green campaign. This paper builds a low-carbon economy index system based on the reaches of low-carbon economy, which can be served as the theoretical support for developing a low-carbon society in our country.

Introduction

Currently, the emission of greenhouse gases (mainly carbon dioxide) has caused greenhouse effect, which arouses wide attention of the global society. Especially with the agreement of the "Bali roadmap" and the deepening of international action of dealing with global climate change, low-carbon economy has become one of the focuses in the global society. As a main carbon emission country and the largest developing country, China should try to explore a road of low-carbon development, so as to reach the balance and harmony between social economic development and environmental protection. Therefore, our country needs to develop low-carbon economy, both to ensure the economic development, and to protect the environment, thus achieving a win-win situation of economic development and environmental protection.

Theoretical Basis of Building Low-carbon Economy Index System

The production, use and consumption of energy in a region can clearly reflect the current situation of local low carbon economic development. In general, the larger proportion of clean energy in energy structure, the better use of carbon in fossil energy, the more perfect of disposal mechanism of carbon waste, the better development of low carbon economy. Therefore, the carbon conversion through the process of production and living can be simplified into the model shown in figure 1. Thus, in order to achieve a low-carbon economy, we can mainly control the following four aspects.

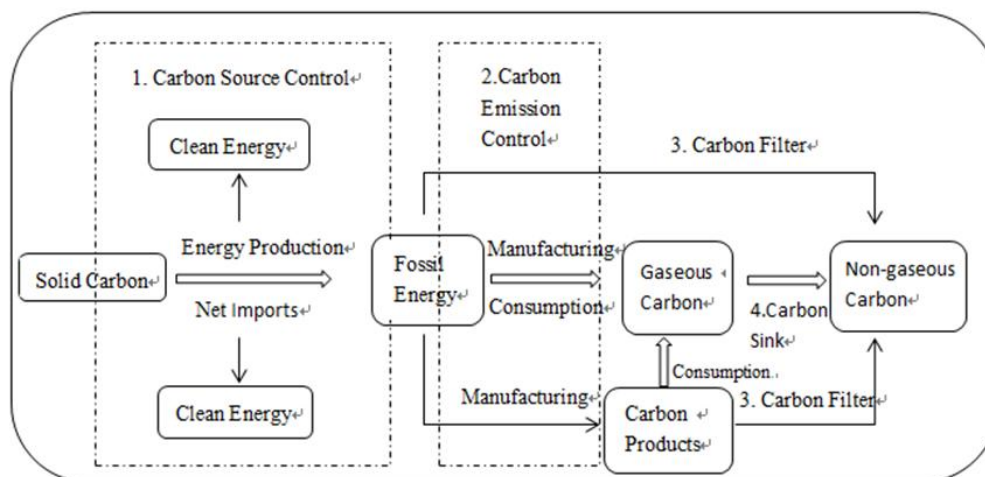


Fig. 1 Model of Carbon Cycle

Carbon Source Control Point

Carbon source control belongs to pre-control. Based on the basis of the previous carbon cycle model, the measurement index of low-carbon economy can be considered from the following several aspects: (1) energy structure. The root cause of excessive carbon emission is the use of fossil energy in energy structure, and what low-carbon economy advocates is a kind of economic development mode mainly aims to reduce energy consumption, pollution, emissions and carbon content in energy using. (2) energy cooperation and import and export trade. Low-carbon economy is becoming a trend of world development. The prosperity of carbon emission permits and its derivatives' trading as well as the extensive cooperation and development of energy technology mean that low-carbon economy development shows a good momentum and huge development potential in the future.

Carbon Emission Control Point

Now, under the situation that fossil energy is still the predominance in energy structure, carbon emissions can be used as a measure index of regional economic development level. Adopting the low-carbon economy development pattern will be obligations for countries and regions with large carbon emissions. Therefore, carbon emissions indexes can be used to well clarify different areas' shared responsibilities of energy saving and emission reduction, and is an important mandatory target in low-carbon economy development.

Carbon Filter Control Point

The development model of low-carbon economy can optimize energy structure, reduce energy use, increase the efficiency of energy utilization, create low carbon products and change people's concept of production, living and consumption. Index found out on the basis of carbon filter control point can comprehensively reflect different regions' potential of reducing energy consumption, emission and pollution under the condition of not sacrificing economic benefit and efficiency.

Carbon Sink Control Point

Photosynthetic needs to absorb carbon dioxide from the air and carbon sink makes use of this process to eliminate and reduce greenhouse gases in the air and restore the eco-balance. Things like enlarging the area of afforestation and increasing urban green rate all belong to carbon sink control. Commonly used indexes include forest coverage rate, city green coverage rate, etc.

Principles of Setting Low-carbon Economy Evaluation Index System

Evaluation index system is composed of several interrelated statistical indexes. According to the evaluation index, we can analyse and clarify the interdependence and mutual restriction relationship between each research object from different levels, thus reflecting the whole situation of the research object from different angles. Therefore, scientific and reasonable evaluation is not only the prerequisite and guarantee for the accurate evaluation of research objects, but also an important channel to help guide the correct development direction. Low-carbon environmental protection evaluation index system emphasizes the mutual coordination and sustainable development of economic development, technological innovation, social progress and environmental optimization. When establishing the concrete evaluation index, we should follow the following principles:

1. Scientific Principle

As the fundamental factor of evaluation index system, scientificity meets the requirements of objective law of low-carbon economy development and environmental protection. Understanding and acquiring low-carbon environmental protection accurately and systematically can not only reflect the essential characteristics of low-carbon environmental protection, but also emphasize the

feasible goal of low-carbon environmental protection, which ultimately serve for making the right development decision.

2. Systemic Principle

Social and economic development environment is a multi-level and complex system, which consisted of several interconnected subsystems, including economic subsystem, environment subsystem, social subsystem, resources subsystem, etc. Every subsystem is not independent.

3. Feasibility Principle

The purpose of building evaluation index is to effectively evaluate items concerning low-carbon economy, thus fully reflecting the current situation of low-carbon economy development. Therefore, the selection of indexes must be based on physical situation and try to select some typical and practical indexes.

4. Stability and Dynamic Principle

In order to make comparison and evaluation easily and accurately grasp the development present situation and predict future trends, selected indexes should be stable within a certain period. As economic development, environmental change and technological advancements are dynamic rather than static; the indexes should make necessary adjustments based on the development of society, economy and technology.

5. Political Principle

Environmental protection is a global issue and no country can keep out of it. Therefore, making evaluations should not only synthesize domestic situations, but also take international situation into consideration. Thus, national policies and relevant international conventions should be served as instructions when designing low-carbon environmental protection evaluation indexes.

Design of Low-carbon Environmental Protection Evaluation Indexes

Low-carbon environmental protection is a multi-level and complex system composed of two parts: low-carbon economy development and environment protection, including economy, science and technology, resources, society and environment, etc. Comprehensively reflect the current situation of low-carbon environmental protection and its evaluation demands analysis from different angles and levels by using various indexes. Based on the theoretical analysis above, this part constructs an index framework which includes first grade indexes, second grade indexes and third grade indexes, and set up several in each level indexes to achieve comprehensive evaluation of low-carbon environmental protection (see table 1).

Tab. 1 Low-carbon Environmental Protection Evaluation Indexes

First Grade Index	Second Grade Index	Third Grade Index	Unit	Index Property
Level of Low-Carbon Environmental Protection	Economic Development Index E1	Per Capital GDP (E11)	10,000 yuan/person	Target Type
		GDP Growth (E12)	Hundred million	Target Type
		Fixed-Asset Investment (E13)	%	Target Type
	Low-carbon (Technology) Development Index E2	Energy Consumption Elasticity Coefficient(E21)	%	Restrained Type
		Energy Conversion Efficiency of Processing (E22)	Tons of standard coal/ 10,000 yuan	Target Type
		Energy Consumption Per RMB 10,000 of GDP (E23)	Tons/ 10,000 yuan	Restrained Type
		Carbon Emission Intensity (E24)	%	Restrained Type
		Proportion of Clean Energy (E25)	%	Target Type
		Proportion of Tertiary Industry in GDP (E26)	%	Target Type
		Social Development Index E3	Growth Rate of Population (E31)	%
	Final Consumption Rate (E32)		%	Target Type
	Urban Rubbish Disposal Rate (E33)		Yuan	Target Type
	Per Capita Health Expenditure (E34)		%	Target Type

		Engel Coefficient (E35)	%	Restrained Type
Environment Index E4		Greenery Coverage Rate (E41)	Millions of standard cubic meters	Target Type
		Industrial Waste Gas Emissions (E42)	%	Restrained Type
		Proportion of Environmental Pollution Control Investment in GDP (E43)	Yes/No	Target Type
Politics Index E5		Low-carbon Development Planning (E51)	Yes/No	Target Type
		Environmental Protection policies (E52)	Yes/No	Target Type
		Detection, Statistics And Regulatory System of Carbon Emissions (E53)	Yes/No	Target Type
		Incentive Policies And Methods of Low-Carbon Development (E54)	Yes/No	Target Type
		Carbon Emissions Permits Trading (E55)	Yes/No	Target Type

Conclusion

At present, the low-carbon economy has become a common concern and research hot spot issue. But there is a lack of research on low-carbon economy at home, especially on low-carbon economy evaluation index system and methods. Based on the theoretical basis of low-carbon economy and setting principles of index design, this paper constructs a low-carbon economy index system, so as to provide theory support for the construction of low-carbon society in our country.

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