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Research on the Development Direction of China's Carbon Audit Under the Background of Low Carbon Economy

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Abstract. In recent years, climate change, global warming, and environmental degradation these issues have intensified. Among them, carbon dioxide is a key factor in climate warming. Controlling carbon emissions by auditing them can make a big difference to the environment. Therefore, most countries have formulated corresponding policies to control carbon emissions and carry out the work of carbon audit. China has vigorously advocated the development of resource and environmental auditing these years. It is expected that carbon will reach its peak in 2030 and achieve its neutrality in 2060. And theoretical research and practical operation of carbon auditing has gradually aroused everyone's attention. Based on this, article will study the theory of carbon audit up to now, combine with the actual operating conditions of various countries, sort out China's carbon emissions, carbon accounting and carbon audit related systems. And the authors propose that the short-term work should increase the construction of carbon audit system, information collection platform construction and government-led operations, etc. And the long-term work should formulate carbon audit standards, cultivate its talent team, build its evaluation system and formation mechanism, etc.

Keywords. Carbon emissions, carbon audit, government-led operations

1. Introduction

In recent years the abnormal climate and the obvious acceleration of global warming led to a series of natural disasters such as flood, droughts, intensification of fires, typhoons, mudslides, agricultural diseases, insect pests, and rising sea levels. Climate warming is the result of the continuous accumulation of the greenhouse effect, and CO_2 is a key factor. Carbon emissions have attracted great attention from the United Nations and other countries in the world. The United Nations adopted the *United Nations Framework Convention on Climate Change* (197 countries joined) in 1992 and signed in 1997 by the United Nations Climate Conference *the Kyoto Protocol* (more than 170 countries joined) with carbon emission legal restrictions. The United Kingdom formally proposed the concept of a "low-carbon economy" and promulgated a low-carbon energy policy in 2003. In 2005 the European Union ETS (EU~ETS) was

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officially launched. The United States introduced low-carbon economy legislation in 2007. In 2008 the United Nations Environment Program chose "low-carbon economy" as the theme of World Environment Day, and the low-carbon economy began to flourish. China started carbon trading pilot projects in 2012 and established carbon trading centers in Beijing, Tianjin and other places, becoming the world's largest carbon trading market. At the end of May 2019, the carbon market pilot quotas had a cumulative transaction of 310 million tons of CO_2, with a cumulative transaction volume of approximately 6.8 billion. However, the temperature in many countries or regions increased by about 6 ℃ compared with 30 years ago in January 2020. At the same time, due to the COVID-19 affecting people's work and travel, CREA found that China's carbon emissions were reduced by about 100 million tons, which was 6% of global carbon emissions in the same period last year in February 2020. A Columbia University study found that New York's CO_2 emissions were reduced by nearly 50% within a week, and the CO_2 content above the city fell by 5%~10% in March. It can be seen that increasing efforts to control carbon emissions can contribute to a substantial improvement in the environment. However, as a new field, carbon auditing has the characteristics of special object, wide range, and strong technology, and is in a state of contention.

This article will analyze the three perspectives of theoretical research, practical operation, and China's carbon emission system construction, and propose the development direction of China's carbon audit.

2. Current Status of Theoretical Research

Carbon audit is the independent verification of corporate carbon accounts, carbon emissions, resource consumption, and carbon information performed by an external audit agency before the start of carbon trading [1, 2], and should audit the legality, fairness and effectiveness of the low-carbon responsibility performance in accordance with the law [3]. It should assess the carbon emission sources in a certain area, including households and individuals [4, 5]. Audit organizations and environmental consulting and assurance companies are the audit subjects [6]. In addition, at a macro level the audit subject is a national audit institution and at a micro level is a corporate internal audit institution or a social audit organization [7].

Low-carbon policy, performance, product and behavior certification should be the content of carbon audit [8], it is also about *Compliance*, *Carbon Neutral* and *Carbon Performance* three parts [9], the rationality of the process for setting carbon reduction targets should also be examined [10].

The carbon audit process includes understanding the environment, planning work, executing business, assessment, summary report, and tracking [11], Piecyk emphasized the process are audit measures, setting of accounting methods, selection of emission elements, data collection, carbon emissions calculation and information disclosure [12]. Mckinnon pointed out that the auditor analyzes the entire supply chain, verifies the amount of greenhouse gas emitted, and fully investigates the potential or potential opportunities for its emissions [13].

In the carbon audit assessment, Zhang, Jin, et al. discussed the construction of an evaluation index system from driving force, status and response indicators these three aspects, and from emissions, emission reduction and comprehensive evaluation these three perspectives [14]. Luo, Zhang, et al. construct 12 evaluation index systems from

the 3 levels of carbon economic benefits, carbon energy consumption, and carbon ecological environment [15]. Tang establishes an evaluation system including total assets, emission reduction capital investment, and main business income according to DSR (Data preparation) model [16].

Regarding carbon audit supervision, He and Lan believe it should include carbon audit supervision strength, supervision mode, independence, and charging mechanism [17]. Yang proposed to formulate carbon audit industry standards, strengthen carbon audit practitioners review and training, establish a company-level carbon information disclosure platform [18].

3. Foreign Practice Operation Status

Netherlands: The Netherlands Audit Office initiated carbon auditing by examining the objectives, formulation, implementation effects and coordination of relevant policies of carbon emission reduction policies in industries, energy, transportation and other fields from 2000 to 2005 in 2007.

United Kingdom: The British Standards Institute released the carbon emissions assessment specification (PAS2050) for the entire life cycle of products and services in 2008. The British Environmental Audit Committee issued *The 2008-2009 Work Report* which is a review of carbon collection, storage, emissions, trading markets, and carbon emissions in 2009. The government requires that all operating activities, including foreign consulates, be audited and evaluated in five aspects including energy and gas consumption, traffic and transportation. The highlight is the construction of low-carbon communities. First accurately calculate the carbon emissions of each construction and operation link in the community through the information and data. Second comprehensively consider the feasibility and operability of reducing carbon emissions, and finally use clean new environmentally energy to replace the generation of greenhouse gases s material.

Denmark: First put forward the goal of achieving carbon neutrality by 2025 and carry out a series of measures. First, to select buildings as targets for carbon emission monitoring and tracking, and use the information and experience of carbon accounting and auditing to formulate building carbon auditing standards and routine procedures. Second, to formulate low-carbon standards for buildings, the government will set up special funds for renovation and re-auditing until they meet low-carbon standards for projects that do not meet the standards. Finally, the information transmission function of carbon audit is used to spread the awareness of low carbon to all age groups in the society. The most innovative is to train teenagers and children as "climate citizens".

United States: The United States Audit Office issued a report that pointed out that the key to establishing and completing a GHG emission system is its high-quality data in 2009. Therefore, the government first determined that the main source of warm air emissions is CO_2 through analysis, the areas of carbon auditing are defined as vehicles, property and lifestyle. Second tax incentives will be used to encourage, guide and improve people's awareness of low carbon.

4. China's Carbon Audit Development

4.1. China's Carbon Audit Related System Construction

Carbon auditing is a new thing and its development in mainland China is relatively late compared to the United Kingdom, Denmark, and the United States. In line with the national development tasks of energy conservation, emission reduction and low carbon economy, and with low energy consumption, low pollution and low carbon emissions as the growth points of emerging economies, the relevant carbon economy system has been formulated.

The Measures on the Disclosure of Environmental Information in 2007 encouraged enterprises to disclose information related to major pollutants on a voluntary basis, and environmental protection departments to disclose national environmental information to the public. The *Notice on Carrying out the Pilot Work of Carbon Emission Trading* was issued in 2011, and in 2013 "Two Provinces and Five Cities" has launched the pilot carbon emission trading, Shenzhen took the lead in exploring the establishment of a carbon emission trading mechanism including institutional design, data verification, quota allocation, and institution building. In 2014 *Interim Measures for the Administration of Carbon Emissions Trading* has imposed on China's domestic carbon emission rights supervision and management of trading activities and timely release of carbon emissions information to the public. In 2016, the *National Carbon Emission Rights Quota Setting and Allocation Plan* was issued. In 2017 the construction of a national carbon emissions trading market was launched, and the *National Carbon Emission Rights Trading Market Construction Plan (Power Generation Industry)* was issued. In 2020 the ministry of ecology and environment revised the 2014 edition of the *National Carbon Emissions Trading Management Measures*, and issued the *Registration and Settlement Management Measures for Carbon Emissions Rights* and *The National Total Carbon Emissions Trading Quotas from 2019 to 2020 Setting and Allocation Plan (Power Generation Industry).*It clearly announced that 2,267 companies which is an increase of more than 500 over 2017 will be included in quota management for the first time, and achieving full coverage of key emission units in the power generation industry. During the *14th Five-Year Plan* period, China will expand the carbon market coverage to petrochemical industry, chemical raw material and chemical product manufacturing, etc 6 industries with annual comprehensive energy consumption reaching 10,000 tons of standard coal enterprises. Carbon emissions are expected to reach the peak in 2030 and achieved neutrality in 2060.

In terms of finance, the *Guidelines on Social Responsibility of Listed Companies on the Shenzhen Stock Exchange* was issued in 2006, the *Corporate Internal Control Guidelines No. 4: Social Responsibility* was issued in 2010, *Guidelines for the Implementation of Social Responsibility of Central Enterprises* was published in 2015, and Environmental *Guidelines for Disclosure of Information on Social and Corporate Governance* was issued in 2018, these regulations don't mandate that companies disclose their pollutant discharge information. The *Interim Provisions on the Accounting Treatment of Carbon Emission Trading Rights* made special provisions on the accounting of carbon emissions trading rights in 2019.

In terms of audit supervision, the National Audit Office clearly proposed to construct a resource and environment audit mode with Chinese characteristics in the *Development Plan of Auditing Work from 2008 to 2012*. In 2010 The Chinese Institute

of Certified Public Accountants pointed out that CPA should contribute to carbon emissions. In 2011 the *Guidance on Energy Conservation Project Authentication* was issued by CICPA emphasized the signing of the certification business letter and preparation of the certification report. In 2012 CICPA published *CPA Business Guidance Catalog* classifies carbon audits as other assurance services. It should strive to promote the construction of ecological civilization, resource and environmental auditing is one of the key points during the *Thirteenth Five-Year Plan* period.

4.2. Practical Operating Conditions

Hong Kong is the first region in China to implement carbon audit, and the mainland is in the exploratory stage. By analyzing overall greenhouse gas emissions, 13% comes from energy (power generation) and 79% comes from buildings. Therefore, the government launched the *Guidelines for Accounting and Reporting of GHG Emissions and Reductions in Hong Kong Buildings* in 2008 and established a green carbon audit organization to encourage governments, enterprises, social organizations and schools to voluntarily conduct "GHG emission audits", and the effect is remarkable. In 2010, 44 new large-scale buildings were added to the carbon audit activities, and more organizations joined to further improve the implementation of carbon audits in Hong Kong. The carbon audit verification business in the mainland is mainly carried out by third-party certification agencies. From the pilot operation, the implementation methods in various regions are not uniform.

5. The Development Direction of China's Carbon Audit

5.1. Short-Term Development Priorities

First, with the construction of the carbon emissions trading market to promote the development of carbon auditing, it's necessary to introduce a special carbon information disclosure system and carbon audit-related regulations to regulate. Second, to build a nationwide carbon information disclosure platform to make use of audit data collection and information analysis relevant functions, to verify the implementation effects of carbon emissions trading pilots since 2013 and to understand the implementation status, including the effects of energy saving and energy reduction, the level of low-carbon economic development, etc. Third, the feasibility of the implementation effect of pilot provinces and cities to reach the carbon peak by 2030 and achieve carbon neutrality by 2060 should be reasonably evaluated. Fourth, carbon auditing should be launched as soon as possible, focusing on its analytical function and helping to identify the feasibility and operability of existing policies. Finally, the implementation of carbon audit needs the direct promotion of the government, and learn from the publicity methods of the United States from the community and Denmark from the youth to extensively promote the concept of low-carbon economic development and cultural construction.

5.2. Long-Term Development Priorities

First, formulate specific guidelines on carbon audit, and national (government) audit, social audit and internal audit are responsible for different levels of carbon audit business at the same time. Second, extensively develop carbon audit evaluation system construction and evaluation standard formulation the research on the formation of the rating mechanism will eventually form a nationwide basically unified and operable evaluation system. Third, cultivate a composite audit team with the ability to collect and analyze big data, and have carbon information expertise. Fourth, continue to explore carbon audit models and innovate carbon audit technology. Fifth, continue to operate and feedback to develop carbon information disclosure and carbon audit from a mandatory operation system into an independent operation mechanism. Finally, related cultures such as carbon information, carbon audit, and low-carbon economy are gradually taking shape. The gradual formation of related cultures such as carbon information, carbon audit, and low-carbon economy.

6. Conclusion

Carbon audit can ensure the authenticity and fairness of carbon trading and help control carbon emissions to improve environmental quality. And China has now become the world's largest carbon trading market. So it's important to develop carbon auditing. However, there are numerous result of carbon audit at present and various countries are still researching and exploring it. This article summarizes the theoretical research on the meaning, content, process, evaluation and supervision of carbon audit, starting from the practical application level of development of carbon audit in other countries, comparative some studies have found that the development of carbon audit in mainland China have obviously results in registration and transaction settlement of carbon emission rights, the setting and distribution of the total amount of carbon emission trading quotas in the power generation industry, the accounting treatment of carbon emission trading rights, and resource and environmental auditing, etc. At the same time, based on the goal of "carbon will reach its peak in 2030 and achieve its neutrality in 2060", this article believes that in the short term, the government should strengthen to construct the carbon audit system, build the information collection platform and the government-led operation, etc and in the long term should formulate carbon audit standards, cultivate specialized talents, build an evaluation system, and form a carbon audit mechanism, etc.

References

[1] Ratnatunga J 2008 An inconvenient truth about accounting *American* Accounting *Association Annual Meeting*.
[2] He Y 2015 Analysis of the theoretical structure of carbon auditing *Enterprise Herald* (15) 16-17.
[3] Qian C, Su N, et al. 2011 Thoughts on the main body of carbon audit in China *Audit* Wide *Angle* (6) 76-78.
[4] Wang A 2012 Foreign carbon audit and its enlightenment to China *Audit Research* (5) 36-40.
[5] Moloney S 2010 Transitioning to low carbon communities from behavior change to systemic change *Energy Policy* (38) 7614-7623.
[6] Green W and Tarlor S 2013 Factors that influence perceptions of greenhouse gas assurance provider

quality *International Journal of Auditing* **17** (3) 288-307.
[7] He X and Liu B 2010 A preliminary study on the theoretical structure of carbon auditing *Friends of Accounting* (10) 25-26.
[8] Yuan H 2011 Application analysis of low-carbon audit in the development of China's low-carbon economy *Enterprise Herald* (8) 48-57.
[9] Zhang W and Wu Z 2012 Discussion on the development model of low-carbon audit in China's "two-type" society *Finance and Accounting Monthly* (20) 59-60.
[10] Yang Y 2013 International comparison and experience reference of carbon audit application *Modern Enterprise* (06) 66-67.
[11] Lovell A C 2003 *Developing A Carbon Audit Framework to Support Corporate Level Carbon Reduction Strategies* (University of East Anglia).
[12] Piecyk M 2006 Carbon auditing of companies, supply chains and products *Green Logistics: Improving the Environmental Sustainability of Logistics* 49-67.
[13] McKinnon A C 2010 Product-level carbon auditing of supply chains: Environmental imperative or wasteful distraction? *International Journal of Physical Distribution & Logistics Management* (40) 42-60.
[14] Zhang Y, Jin M, et al. 2017 Construction of a model-based carbon audit evaluation index system *Finance and Accounting Monthly* (21) 82-88.
[15] Luo X, Zhang Y and Wang Y 2018 Construction of a corporate carbon performance evaluation index system based on the "3E" triangle model *Finance and Accounting Newsletter* (29) 61-64.
[16] Tang J 2013 Construction of corporate carbon audit evaluation index system *Finance and Accounting Monthly* (11) 82-85.
[17] He L and Lan L 2016 Research on my country's corporate carbon auditing market *Chinese Certified Public Accountant* (10) 67-72.
[18] Yang M 2019 The design of the external supervision system of China's carbon audit *Economic Aspects* (6) 182.