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Thoughts on the Development of Carbon Audit under the Goal of "Double Carbon"

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Abstract

In September 2020, China set the goal of "peak carbon" by 2030 and "carbon neutral" by 2060, namely the "dual carbon" goal. Under the background of China's increasingly strengthening ecological construction and adhering to sustainable development, carbon audit emerged at the historic moment. Based on the dual carbon goal, this paper will discuss the carbon audit from the aspects of overview, current status, existing problems and causes, experience and countermeasures, etc., to clarify the development path, understand the development defects, and put forward reasonable opinions, so as to promote the benign and efficient development of carbon audit, and promote the realization of the dual carbon goal.

Keywords

Carbon Peak; Carbon Neutralization; Carbon Audit; Carbon Emissions.

1. Introduction

In 2020, China's total economic output successfully exceeded the one billion marks, becoming the only major economy in the world to achieve growth, highlighting the vigorous vitality of China's economic development. However, behind the rising economic growth rate, environmental problems such as excessive greenhouse gas emissions and global warming are becoming more and more serious. In order to improve the national independent contribution, China has taken the initiative to put forward the "double carbon" goal, actively respond to climate change and establish a firm determination to take the path of low-carbon development. In this context, China has gradually carried out carbon audit. The implementation of carbon audit can not only bear the responsibility of audit and supervision, but also improve the low-carbon awareness of enterprises, prevent excessive consumption of resources, realize the rational allocation of resources, to promote the implementation of the "double carbon" goal and promote the sustainable development of social economy. However, at present, China has not formed a perfect carbon audit system, and there are also many problems in the process of implementing carbon audit. How to effectively improve the existing problems, promote the development of carbon audit and promote the realization of the "double carbon" goal is a hot spot that we should pay attention to and think about.

2. Definition of Relevant Concepts

2.1. "Double Carbon" Goal

In September 2020, China clearly put forward two stages of carbon emission reduction goals, that is, to achieve "carbon peak" by 2030 and "carbon neutralization" by 2060, which is also known as the "double carbon" goal.

The "double carbon" goal mainly includes three stages: first, to initially form a green development economic system by the mid-1920s, greatly improve the energy utilization efficiency of key industries and reduce the energy consumption rate, to lay the foundation for the realization of the "3060" goal; Second, by the 1930s, the overall green transformation of

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economy and society had achieved remarkable results. The gap between the energy efficiency of key industries and the international energy efficiency level was almost reduced to 0. After reaching the peak, the carbon dioxide emission showed a downward trend as a whole; Third, by the 1960s, a green and low-carbon economic system and a clean, low-carbon, safe and efficient energy system will be fully established, energy efficiency can reach the international advanced level, successfully achieve the goal of carbon neutralization, and promote the further development of ecological civilization.

Realizing carbon peak and carbon neutralization is a major decision made by the Party Central Committee to deal with climate change and bear the responsibility of sustainable development. It is a lasting and firm systematic change in economy and society, which is related to the sustainable development of the Chinese nation and the construction of a community with a shared future for mankind.

2.2. Carbon Audit

2.2.1. Concept

Carbon audit is subordinate to environmental audit. It is the inspection and verification of the government and enterprises on their performance of carbon emission responsibilities by independent third-party audit institutions. It is an audit act of independent supervision and evaluation of carbon emission management activities and their results.

2.2.2. Subject Positioning

At present, the subject of carbon audit has not reached a consistent understanding. IAASB pointed out that "the relevant knowledge of financial statement audit can be well applied to carbon audit; the disclosure requirements of carbon audit report should be similar to traditional audit report", so it believes that certified public accountants should be the subject of carbon audit. At the same time, another voice is that the carbon audit subject should include certified public accountants and environmental experts at the same time. Although certified public accountants have solid financial knowledge, they lack sufficient environmental background. They should cooperate with environmental experts and make up for each other. In China, the main body of carbon audit is the national audit institution.

2.2.3. Object

The object of carbon audit is the carbon emission information report on carbon emission and energy consumption formed in the business activities of enterprises. Similar to financial audit, the preparation of carbon emission information report is the responsibility and obligation of enterprises. Enterprises should be responsible for the authenticity of the report and actively cooperate with the development of carbon audit. At the same time, if enterprises want to enter the carbon emission trading market, they also need to provide their own carbon emission information report.

2.2.4. Target

Carbon audit objectives focus on macro objectives and micro objectives. Among them, the macro objectives mainly include implementing the "double carbon" goal and promoting the development of green and low-carbon economy; Provide real data support and theoretical basis for government decision-making; Promote the construction of ecological civilization and realize sustainable development. The micro goal is to supervise the implementation of corporate social responsibility; Promote enterprises to truly and reliably disclose carbon emission information; Reduce the carbon emissions of enterprises and realize the optimal allocation of resources and sustainable development.

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2.2.5. Range

Combined with the object of carbon audit, carbon audit focuses on the information of enterprise carbon emission and energy consumption, so the audit scope covers the economic businesses and related activities related to enterprise carbon dioxide emission and energy consumption.

3. Research Status and Achievements of Carbon Audit

3.1. Research Status of Carbon Audit

The current research mainly focuses on the transformation of green industry under the "double carbon" goal and the construction of carbon audit evaluation system. Among them, the majority of scholars have studied the "double carbon" goal, and the research contents are diverse. Gan Qiaoqiao et al. (2022) studied the industrial structure adjustment of Xinjiang under the "double carbon" background from the perspective of production inducing effect and production dependence; Zhang Xiliang et al. (2022) conducted in-depth research on energy economy transformation and relevant policies under the goal of carbon neutrality based on the four models of c-gem, repo, cpreg and CBEM. In addition, in the research on the construction of carbon audit evaluation system, Du Yonghong (2022) advocated the construction of scientific and reasonable ESG audit evaluation index system, the establishment of ESG collaborative audit mechanism and the promotion of the implementation of the "double carbon" goal.

Throughout the literature, there are few studies that directly link the "double carbon" goal with carbon audit. Luo Ping (2021) used the case analysis method to study the problems faced and existing in the process of carbon audit by taking the carbon emission of a company as an example, and put forward corresponding improvement measures.

3.2. Achievements of Carbon Audit

3.2.1. The Awareness of Low-carbon Responsibility is Gradually Strengthened

With the new concept of green development gradually rooted in the hearts of the people and the gradual development of carbon audit, the people gradually understand their low-carbon responsibilities, and some enterprises also actively practice low-carbon development. Hangzhou Ganghua Gas Co., Ltd. is a Sino foreign joint venture specializing in urban pipeline gas business, with the franchise of pipeline gas in a large area. In 2008, China gas became one of the first "carbon audit · green institutions" to actively promote the implementation of carbon audit. In 2009, China Gas extended low-carbon audit to joint ventures in the mainland, helping all regions and industrial parks in the country to transition to zero carbon. In 2021, Ganghua gas company changed its name to "Ganghua Smart Energy Co., Ltd." to carry out zero carbon scenario construction and operation business and help achieve the national dual carbon goal.

3.2.2. The Scope of Carbon Audit has been Expanded

China was the first to carry out carbon audit in Hong Kong. In July 2008, the Hong Kong government launched the first guidelines on building carbon audit; In 2009, Sichuan Zhongxi certified public accountants completed the first carbon emission audit report in mainland China. Since then, carbon audit has been popularized in various regions of China, and many energy and construction enterprises actively cooperate with carbon audit. As the only three-star green building design logo and operation logo in Macao, Meishi MGM has taken carbon audit as a major way to understand and improve the business results of enterprises.

According to Tianyan survey, at present, 629 carbon audit companies in China have carried out carbon audit business, which has greatly promoted the promotion and development of carbon audit.

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3.2.3. The Carbon Emission Trading Market has Initially Taken Shape

Since 2011, the pilot of carbon emission trading has been carried out in seven provinces and cities including Beijing, Shanghai, Guangzhou and Shenzhen. The establishment of carbon emission trading market is conducive to quantifying the environmental protection responsibilities undertaken by enterprises, allocating environmental resources with the help of market forces, solving environmental problems and providing the demand for carbon emission information disclosure, which provides a good development opportunity for China's carbon audit. According to the information provided by the Ministry of ecological environment, the first performance cycle of the national carbon emission trading market will be successfully completed in 2021.

3.2.4. Carbon Financial Markets have been Established One after Another

Nowadays, China has established Beijing Environment Exchange, Shanghai Environment Exchange, Shenzhen Environment Exchange and Tianjin emission right exchange, which are mainly engaged in carbon emission right trading based on CDM projects. The carbon finance market makes use of financial means and methods to trade or circulate relevant carbon financial products and their derivatives on the market-oriented platform, actively promote enterprises to implement their responsibilities and obligations of carbon emission reduction, and provide a strong guarantee for the implementation of carbon audit in China.

3.2.5. Significant Reduction in Carbon Emissions

In 2020, China's carbon dioxide emissions per unit of GDP will be nearly 19% lower than that in 2015 and 48% ~ 49% lower than that in 2005. The situation of rapid growth of carbon dioxide emissions has basically changed; In 2021, the CPC Central Committee and the State Council issued the opinions on deepening the battle of pollution prevention and control, which also put forward the goal of reducing carbon dioxide emissions per unit of GDP by nearly 20% compared with 2020 by 2025. These data show that China has achieved remarkable results in low-carbon emission reduction, and carbon audit plays an important role in supervision and evaluation in promoting the realization of this effect.

4. Problems and Main Causes of Carbon Audit

4.1. Main Existing Problems of Carbon Audit

4.1.1. The Lack of Audit Information Makes it Difficult to Implement

The audit shall be based on the relevant data provided by the auditee. At present, a major problem faced by China's carbon audit is the lack of sufficient audit information. China does not force enterprises to make carbon disclosure. In order to understand carbon audit, enterprises lack trust in auditors, resulting in poor cooperation with auditors or providing untrue carbon information, interfering with the acquisition of audit information and the progress of audit work. At the same time, due to the consideration of business interests, public opinion and information workload, most enterprises will not choose to actively disclose carbon information, so as to avoid serious burden and adverse impact on the development of enterprises. Therefore, carbon auditors lack sufficient audit information when conducting carbon audit, which makes it difficult to implement.

4.1.2. Audit Standards and Institutional Differentiation

China has developed carbon audit for a short time. In recent years, although a variety of regulations and guidelines have been formulated and promulgated to make up for the shortcomings of carbon audit standards, there has not been a unified regulation and standard of carbon audit standards in China. The existing measures for the supervision, monitoring and information disclosure of pollution sources of national key monitoring enterprises (for Trial Implementation) and the guidelines for environmental disclosure of listed companies and other

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relevant provisions do not clearly specify the audit standards and audit system of carbon audit. Most of the promotion enterprises choose their own evaluation system and indicators, which increases the complexity of the audit work and reduces the comparability of the quality results of carbon audit.

4.1.3. Poor Audit Methods and Processes

Based on the particularity and complexity of the carbon audit object, the audit subject should build a targeted audit method and process system. At present, the development of carbon special fund audit in China is relatively perfect, but there is a lack of sufficient talent reserve and testing technology in carbon energy conservation and emission reduction audit, so that its audit method is still a conventional audit method, and the audit method is not fully applicable to carbon audit. At the same time, auditors lack the learning of carbon audit related technologies, the audit process tends to be formalized, and there is a phenomenon of emphasizing conclusions over processes.

4.1.4. Poor Quality of Audit Report

Carbon audit is mostly carried out in accordance with the three steps of preliminary preparation, process implementation and report issuance of the verification guide. When the audit subject conducts carbon audit, the two steps of preliminary preparation and process implementation need to be determined in combination with the specific business and types of the enterprise. The acquisition of audit focus and the monitoring of audit content mostly occur in the implementation of the process. Therefore, the first two stages have strong flexibility and high requirements for auditors, but based on the standardization of audit report, some audit subjects focus on the writing of the audit report and ignore or despise the importance of the audit implementation process, thus questioning the reliability, authenticity and relevance of the report.

4.1.5. High Audit Cost

While pursuing quality, audit also pays attention to efficiency and strictly implements the principle of cost-effectiveness. At present, carbon audit is still in the rising stage in China. Based on the problems of fuzzy standards, lack of technology, complexity and importance of audit, the cost of carbon audit is high. Firstly, the attention of carbon audit has not reached the peak, and few scholars have carried out research on carbon audit methods and technologies, and have not found low-cost audit methods; Secondly, the market price of carbon audit detector is high, and the capital burden of audit subject is large; Finally, in order to enhance the professionalism of carbon audit and the lack of compound talents in finance and environment, the audit subject needs to strengthen the training of environmental professional knowledge for relevant auditors, and the training fee is another important expense.

4.1.6. Inadequate Application of Audit Results

The significance of audit can not only supervise, verify and evaluate the economic activities of enterprises, but also provide guiding opinions for the development of enterprises. However, the application of carbon audit results in China is not ideal at present. At present, the application of carbon audit results in China is mainly reflected in the rational use of financial funds and the implementation effect of energy conservation and emission reduction projects. On the premise of implementing mandatory measures, the audit results in the carbon audit report issued to enterprises are often ignored by enterprises, and in the later development process, they will not pay attention to and improve the carbon emission problems existing in the current enterprise development process.

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4.2. Causes of Problems in Carbon Audit

4.2.1. Weak Awareness of Information Disclosure

At present, China has not formed a clear definition of carbon audit, and the audit standardization and compulsion are poor. Moreover, the audit report lacks the part that explains the impact of carbon emissions on the environment, which makes enterprises have a weak awareness of carbon information disclosure. "Non initiative, insufficient and non-standard" is the main problem existing in the process of information disclosure.

The problems are as follows: first, the enthusiasm of actively disclosing carbon information is low. Second, the carbon information disclosed for enterprises lacks a unified reference standard, resulting in uneven and different specifications of the disclosed information, which reduces the comparability and readability of the information. Third, the quality of enterprise information disclosure remains to be studied. In order to create a good corporate image, most of the information is only disclosed, but the effectiveness is concealed. There is also the possibility of carbon information fraud, resulting in doubts about the quality of information disclosure.

4.2.2. Lack of Institutional System to Regulate

With the continuous improvement of China's attention to the ecological environment, China has promulgated policies such as the guidelines for environmental information disclosure of listed companies (Exposure Draft) and the measures for self-monitoring and information disclosure of national key monitoring enterprises since 2010, but has not issued laws and regulations specifically for carbon audit to clearly specify carbon audit matters, and has not established a perfect carbon audit index system, The audit standards and audit indicators established by enterprises are differentiated, which affects the audit efficiency and audit quality.

4.2.3. Carbon Audit Data Accounting is Difficult

The audit object of carbon audit is different from the relevant notes to the financial statements of traditional audit, and its object is the carbon emission of enterprises. Different from tangible assets, carbon emissions can be directly counted on the spot, which needs to be measured with the help of professional measuring instruments. After recording the measurement results, data accounting is also required. In the process of data accounting, it is also vulnerable to the influence of uncertain factors, which promotes the systematic deviation of accounting results. Therefore, the high-quality completion of carbon audit puts forward higher requirements for audit methods, processes and personnel. The traditional observation, inspection and other audit procedures are not enough to deal with complex carbon audit.

4.2.4. Lack of Auditors

The development of the new era has increased the social demand for compound talents. As a branch of environmental and energy audit, the professional knowledge of carbon audit is no longer limited to the basic financial part. In China, there are two extremes of carbon audit talents: first, talents with complete financial system lack the understanding of low-carbon knowledge and cannot take effective audit procedures and methods to measure carbon emissions; Second, talents with engineering or environmental knowledge reserves can calmly measure the carbon emissions of enterprises through mathematics, statistics and other methods, but they lack sufficient understanding and learning of audit. Due to the existence of this problem, some auditors only pay attention to the final audit report, the monitoring process unfamiliar to themselves is completely carried out by external personnel, and there is a lack of inspection of the monitoring results, resulting in the poor quality of the audit report.

4.2.5. Poor Awareness of Science and Technology and Innovation in the Audit Process

In the information age, paying attention to science and technology and innovation is a powerful tool to improve work efficiency. At present, the development of carbon audit in China is still in

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the rising stage, and there is a lack of too much research and Discussion on its methods and technologies. As a result, in the process of carbon audit for enterprises, most of them are completely based on traditional audit ideas, and no innovative ideas are put forward on the current situation of carbon audit. In addition, it did not actively pay attention to the research and development of low-cost detectors in order to make full use of science and technology and reduce the cost of audit.

4.2.6. Late Supervision is not Timely

Carbon audit has not formed a perfect system in China, which makes the audit work end after the issuance of the audit report. The follow-up feedback of the report results and the implementation of the recommendations are not supervised by a third party, which makes the carbon audit only stay at the level of monitoring the carbon emission of the enterprise, and fails to achieve the purpose of helping the enterprise understand the responsibilities and obligations of implementing the "double carbon" goal, Enterprises have not taken substantive measures to solve environmental problems and achieve sustainable development.

5. Foreign Experience and Improvement Measures of Carbon Audit

5.1. Foreign Experience for Reference

Carbon audit developed earlier in foreign countries. After long-term development, many countries have gradually formed their own carbon audit system. China can learn from the development achievements of foreign carbon audit to provide rich experience for the development of domestic carbon audit.

Table 1. Advantages of foreign carbon audit

Country	Advantage
U.S.A	Grasp the key points of audit
Denmark	Complete legal system
Japan	Pay attention to scientific and technological investment

5.1.1. United States: Grasp the Key Points of Carbon Audit and Pay Attention to Talent Training

So far, the United States has formed a relatively perfect carbon audit system. During the carbon audit, the United States identified carbon dioxide as the main emission source of greenhouse gases and set a distinction between direct emission sources and indirect emission sources. After a series of assessment and comparison, it is confirmed that it focuses on cars, real estate and lifestyle. At the same time, focusing on the audit focus, the United States sets audit standards for the industry, and makes statistics and publication of relevant data, which makes the overall carbon audit highly targeted. In addition, the United States attaches importance to the cultivation of talents and stipulates that auditor can conduct audit work only after obtaining relevant qualification certificates.

5.1.2. Denmark: The Legal Support System is Complete and the Government Actively Promotes it

Denmark is the first country to propose to achieve carbon neutrality by 2025. In the process of promoting the realization of this goal, the Danish government adopts the method of combining carbon accounting and carbon audit, regularly monitors carbon emissions and pays attention to follow-up tracking. At the same time, based on a lot of empirical experience, the government has promulgated regulations on building carbon audit and defined low-carbon standards. For buildings that fail to meet the standards, the government sets up a special fund to help them carry out transformation and re audit. In the whole process, a good system of empirical problem

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finding and policy problem solving is formed, and carbon audit is actively promoted to demonstrate the determination to achieve the goal of carbon neutralization on schedule.

5.1.3. Japan: Focus on Science and Technology to Help Carbon Audit

Japan's development in environmental audit is still late compared with western countries, but its attitude of focusing on science and technology to help the development of carbon audit is worth learning from. By strengthening the R & D and application of environmental audit software and carbon audit software, Japan provides technical support for audit institutions to carry out audit work, reduces the workload and workload of auditors to a certain extent, achieves the purpose of reducing audit costs, and promotes the improvement of carbon audit efficiency and effect.

5.2. Improve China's Carbon Audit Measures

In order to promote the development of carbon audit and help the realization of the "double carbon" goal, China should clarify the main responsibility, build the cooperation mechanism of various main bodies, grasp the development defects and put forward targeted suggestions.

5.2.1. Enterprise Level: Clarify the "Double Carbon" Goal and Improve the Awareness of Information Disclosure

As the main body of market economy, enterprises should pay attention to the realization of social and ecological benefits while creating economic benefits. Therefore, enterprises should clarify the goal of "double carbon" in the early stage of audit, deepen low-carbon awareness, understand the necessity and importance of implementing carbon audit, correct the attitude of information disclosure in the process of audit implementation, and change "non initiative, insufficient and non-standard" into "active disclosure, full disclosure and standardized disclosure", so as to avoid concealment, fraud and neglect, and put an end to non cooperation, non-attention and non implementation. After the audit, we should also make full use of the audit results, standardize enterprise behavior, and take the initiative to assume the responsibility and obligation to achieve carbon peak and carbon neutralization, and realize the sustainable development of social economy.

5.2.2. Social Level: Pay Attention to the Cultivation of Comprehensive Talents and Strengthen the Follow-up Supervision and Tracking of Audit

The completion of high-quality carbon audit requires comprehensive talents with financial and environmental knowledge. All social subjects should strengthen the training of financial personnel on environmental ecology, energy dynamics, mathematics, statistics and other knowledge, and pay attention to the reserve of compound talents. Enterprises can set up training courses or professional groups to make financial personnel and environmental personnel familiar with each other's professional fields and improve work cooperation. The school can offer relevant elective courses to facilitate the improvement and all-round development of students' comprehensive ability.

In addition, the society should also implement the follow-up supervision and tracking of audit. Set up a special group or institution to form a tracking mechanism to be responsible for the follow-up supervision of enterprises that have conducted carbon audit in previous years, to promote the application of audit results and promote the effectiveness of carbon audit. At the same time, big data, blockchain and other technologies are used to improve audit efficiency and speed up the informatization process.

5.2.3. National Level: Improve Carbon Audit Regulations and Build a Carbon Audit System

As the highest maker of the system, the state should actively formulate relevant systems according to the empirical feedback of the society to ensure the implementation of the objectives. Our government should establish the determination to achieve the "double carbon"

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goal, receive social feedback in time, have insight into the development problems and puzzles of carbon audit, provide legal guarantee and support for carbon audit in combination with China's "double carbon" development goal, ensure the orderly progress of its work, endow audit authority, enhance audit authority, clarify audit standards, clarify audit priorities, and then build a carbon audit system in line with China's national conditions.

6. Epilogue

To sum up, in order to achieve the goal of carbon peak and carbon neutralization, due to the weak awareness of information disclosure, imperfect system, lack of auditors, untimely supervision and other reasons, China's carbon audit is faced with many problems, such as difficult audit, differentiated audit standards, questionable audit report quality, high audit cost, insufficient application of audit results and so on. In the follow-up development process, enterprises need to clarify their social responsibility, Enhance the awareness of information disclosure; Society should pay attention to talent training, strengthen the follow-up supervision of audit, and promote the application of science and technology; The state needs to provide a solid legal basis for the development of carbon audit and build a perfect carbon audit system. Make unremitting efforts to achieve the "double carbon" goal through multi-party cooperation.

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