

# *Study on Carbon Accounting of Power Enterprises in China*

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**Abstract**—With the rapid development of the world economy since the 20th century, environmental problems have become increasingly prominent. Countries have also paid more attention to environmental problems and taken corresponding measures, especially developed countries. Carbon accounting emerged and provided support for environmental protection. At present, in China, power enterprises, mainly thermal power enterprises belong to high carbon enterprises. This paper introduces the establishment of carbon accounting system of power enterprises in China. This paper analyzed the carbon accounting method and implementation process of power enterprises in China and put forward three countermeasures and suggestions for the development of carbon accounting in power enterprises in China.

**Keywords**—carbon accounting; Electric power enterprises; The accounting information

## I. INTRODUCTION

With the rapid economic development in China, environmental problems such as haze weather and global warming are gradually coming into people's sight. The original extensive economic development model no longer ADAPTS to China's national conditions. Promoting pollution control, developing carbon accounting and protecting the ecological environment have become increasingly urgent. On the morning of April 1, 2018, Shanghai pudong new area tax bureau issued the first environmental protection tax bill for bath materials co., LTD, marking the implementation of the environmental protection tax law of the People's Republic of China in the country <sup>[1]</sup>. While China's environmental law system is gradually improved, carbon accounting is still in its infancy, and the disclosure of carbon accounting information by enterprises is still imperfect. The development of carbon accounting is conducive to the understanding of pollution from source, the optimization and upgrading of industrial structure, and the acceleration of the development of low-carbon economy.

Foreign carbon accounting research is relatively mature. Norway was the first country to put forward the concept of carbon accounting <sup>[2]</sup>. In 2008, Stewart Jones and Janek Ratnatunga made a preliminary definition of the concept of carbon accounting <sup>[3]</sup>. In the same year, Kolk, a., d. evy & j. Pinkse pointed out that carbon accounting is mainly composed of asset recognition of carbon sink and liability recognition of carbon source, and proposed that enterprises should establish corresponding accounting system on this basis <sup>[4]</sup>. However,

Francisco Ascuí (2011) points out that there is no consensus on the definition of carbon accounting concept in the accounting academia. The research on carbon accounting theory in China is still in its infancy <sup>[5]</sup>. Wang patriotic (2012) proposed that China's carbon accounting should at least include carbon financial accounting, carbon cost accounting, carbon management accounting and carbon audit, etc <sup>[6]</sup>. Liang liang (2018) pointed out that the accounting, confirmation, measurement and information disclosure of carbon accounting is the top priority <sup>[7]</sup>.

As a typical representative of high carbon enterprises, electric power enterprises should strengthen the disclosure of carbon accounting information to provide a good reference for policymakers. At the same time, improve the energy structure of the company according to the information disclosed, develop the low-carbon economy, and meet the current social needs of energy conservation, emission reduction and low-carbon environmental protection.

## II. CONSTRUCTION OF CARBON ACCOUNTING SYSTEM FOR POWER ENTERPRISES

### A. Connotation of Carbon Accounting in Power Enterprises

Carbon accounting is based on low carbon economy law system, related to the carbon in the process of economic accounting and supervision, to conduct a comprehensive system of economic activity for the government, the public and other stakeholders to provide enterprises information, to promote enterprise performance of the low carbon responsibility, to realize the economic benefit and social benefit win-win economic management activities. Carbon accounting objects are the economic activities related to carbon that accompany the daily economic management of enterprises, including the two interrelated elements of carbon accounting and carbon accounting. Carbon accounting aims to provide timely and reliable carbon accounting information for stakeholders, urge enterprises to fulfill the responsibility of energy conservation and emission reduction, and take into account environmental benefits and internal benefits.

Carbon accounting of power enterprises is a comprehensive and systematic accounting and supervision of carbon emission trading conducted by power enterprises in order to ensure the smooth operation of daily business activities. It aims to ensure that enterprises pay attention to both economic benefits and implementation of low-carbon responsibilities, so as to achieve win-win results of economic

benefits and environmental benefits. Firstly, the carbon accounting objects of power enterprises are mainly carbon emission rights trading in the form of capital. Secondly, carbon accounting of power enterprises does not require enterprises to sacrifice economic benefits to fulfill low-carbon responsibilities, but to enhance corporate reputation through low-carbon responsibilities, focus on long-term interests, and achieve win-win economic and environmental benefits of power enterprises.

#### *B. Carbon Accounting Objectives of Power Enterprises*

The carbon accounting target of electric power enterprises can be divided into two aspects: the overall target and the specific target. The overall goal is to promote the power enterprises to fulfill the relevant low-carbon responsibilities, and at the same time guarantee the economic interests of the enterprises, and realize the win-win of economic benefits and environmental benefits. The setting of specific targets should take into account stakeholders such as the government, environmental organizations, investors, management and the public. The carbon accounting information of enterprises can be fully disclosed, and relevant accounting information of energy conservation and emission reduction can be passed on to stakeholders to help stakeholders make reasonable decisions.

### III. CARBON ACCOUNTING AND IMPLEMENTATION IN ELECTRIC POWER ENTERPRISES

#### *A. Carbon Accounting Objectives*

"Accounting is a continuous, systematic and comprehensive reflection of the economic activities or financial revenues and expenditures of each enterprise and unit by filling out vouchers, registering books and preparing statements in the form of currency," ge said.<sup>[8]</sup> as a branch of accounting, carbon accounting is the accounting of carbon emission enterprises, with currency as the main measurement unit and physical unit as the auxiliary unit. Through special accounting methods, the carbon activities are verified, measured, recorded, reported and disclosed, providing high-quality intergrade information.

The primary research goal of carbon accounting of power enterprises is to form a complete and applicable carbon accounting standard, realize the refined accounting of carbon accounting of power enterprises, improve the quality of carbon accounting information, so that carbon accounting information can better serve the development of green power. Firstly, electric power enterprises should build a complete set of cross-level accounting standards applicable to the industry, which is both in line with the actual industry and has good practical significance. Secondly, it should realize the fine accounting of carbon accounting of power enterprises, and form diversified and effective carbon accounting information. Finally, the fundamental goal of carbon accounting in power enterprises is to improve the quality of carbon accounting information and enhance the comparability between different enterprises in this industry.

#### *B. Elements of Carbon Accounting*

**Confirmation:** the confirmation of carbon accounting in power industry is mainly the confirmation of carbon emission rights. As a special economic resource, carbon emission right is expected to bring economic benefits to enterprises, and its cost or value can be measured reliably, meeting the requirements of asset recognition. According to wang yan and li yapei, carbon emission rights should be measured at fair value, because they can be traded and bought in the carbon emission market, and the carbon emission rights should be recognized as trading financial assets<sup>[9]</sup>. He hongfeng and liu guichun argue that the carbon assets used in the production and operation of enterprises should be recognized as intangible assets. If it is to gain economic benefits for trading, it should be classified as financial assets<sup>[10]</sup>. Peng zhang believes that carbon assets should be included in the financial statements; In the subsequent measurement, the final value of the carbon asset is calculated by referring to the purchase price of the carbon trading market and it is included in the financial statement<sup>[11]</sup>. This paper argues that it is a better choice for power industry to recognize carbon emission rights as inventory. Enterprises hold carbon emission rights for licensing emissions rather than for trading purposes, and China's carbon trading market is not yet sound, and the monetization trend of carbon emission rights is not obvious.

**Measurement:** the measurement attribute of carbon emission rights mainly focuses on the selection of historical cost measurement and fair value measurement. Historical cost refers to the measurement of cash or cash equivalents paid when assets are purchased<sup>[12]</sup>. Fair value refers to the price set voluntarily by both parties in a fair transaction. This paper mainly tends to use historical cost to measure carbon emission rights.

**Record:** the acquisition of carbon emission rights can be roughly divided into two methods: free acquisition and auction acquisition. According to the recognition and measurement principles of carbon accounting in the power industry, the carbon emission rights treatment by carbon accounting of power enterprises shall be divided into three stages, namely, initial acquisition, mid-term use and final delivery, in chronological order.

**Report:** in order to ensure the integrity of their carbon emissions trading report, can do it on the basis of traditional report a separate report, with the method of combination of number and amount, listed the distribution and enterprise purchase carbon emissions quota, and according to the daily discharge and enterprise management department to use clear list the carbon emissions generated in daily business activities, in order to get the final balance or overruns of carbon emissions quotas, and reflect its whereabouts, according to different situations to make carbon trading giant situation and their influence can reflect more clearly.

#### IV. COUNTERMEASURES AND SUGGESTIONS FOR THE DEVELOPMENT OF CARBON ACCOUNTING IN POWER ENTERPRISES

##### *A. Improve the Information System of Power Enterprises*

Power industry is an information intensive industry, and the effective collection, processing and transmission of information including accounting information becomes the key to improve the management efficiency of power enterprises. Therefore, all major power enterprises should set up a rigorous informatization system, which can not only guarantee the energy saving and emission reduction of enterprises, but also control the carbon-related costs, so as to comprehensively maximize the economic and social benefits.

##### *B. Improve the Internal Governance System of Power Enterprises*

At the present stage, carbon accounting behaviors of power enterprises, including carbon information disclosure, are mostly voluntary behaviors. Sound internal governance system and effective internal supervision are the basis for improving the quality of carbon accounting information. Therefore, improving the internal governance system of power enterprises is one of the important preconditions for the effective implementation of carbon accounting. By improving the independent director system, electric power enterprises can enhance the status of independent directors and enhance their supervision on the fulfillment of corporate social responsibility.

##### *C. Deepen the Knowledge Structure of Accounting Practitioners in Power Enterprises*

Carbon accounting has a broad academic foundation, and the knowledge of financial accounting alone may not meet the needs of carbon accounting promotion. If carbon accounting can be implemented smoothly in power enterprises, it is necessary to deepen the implementation structure of accounting practitioners in power enterprises, change

traditional concepts and perspectives, and adapt to the implementation needs of carbon accounting in power enterprises.

#### V. SUMMARY

The development of carbon accounting practice in China's power companies is still in its infancy. Compared with the long-standing financial accounting system, the establishment of carbon accounting system still has a long way to go. The establishment of a carbon accounting system requires the efforts of the government, enterprises, and scholars, and we can see the bright future of carbon accounting.

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