Carbon Management System Study for Group Companies

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Abstract. Scientific research has clearly shown that climate change is the main cause of global warming, which poses a serious threat to the Earth's ecosystems and societies. Extreme weather events, sea level rise and other climate-related issues have attracted global attention. Through agreements, such as the Paris Agreement, the international community has committed itself to taking action to reduce greenhouse gas emissions and limit the magnitude of global warming. These agreements impose emission reduction targets and obligations on individual countries and organizations. These factors have led Group companies to focus increasingly on carbon management in an effort to reduce their carbon footprint, comply with regulatory requirements, improve sustainability, and meet investor and consumer expectations, while addressing challenges such as climate change and global warming. Carbon management in group companies is not only important for the companies themselves, but also has a positive impact on the global environment and society.

Keywords: Group company, Carbon management, Carbon emission

1. Introduction

First of all, carbon management can help enterprises realize energy saving and emission reduction. With the continuous strengthening of the national policy on environmental protection, enterprises must take into account the rational utilization of resources and the reduction of energy consumption in order to achieve sustainable development. Through the introduction of carbon management, enterprises can take various forms of energy-saving measures, thus reducing wasted energy and realizing the effective use of resources. Secondly, carbon management helps enterprises reduce operating costs.[1] When implementing a carbon management plan, an enterprise can optimize its supply chain, improve productivity, and apply new technologies to reduce carbon emissions and lower operating costs at the same time. In addition, carbon management can help companies build a good brand image. As the public becomes more aware of environmental issues, more and more consumers prefer to support companies that are concerned with environmental issues.[2] By implementing a carbon management program, companies can actively participate in environmental protection and

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show their concern and commitment to social responsibility, thus injecting more social value into the company.[3]Finally, carbon management also helps enterprises to develop markets. With the accelerating trend of globalization, more and more countries and regions are restricting and controlling carbon emissions.[4] Therefore, products and services with lower carbon emissions will be more easily accepted and recognized by other countries and regions, thus gaining broader development opportunities in the international market. In summary, carbon management has become an indispensable part of enterprises, which can help them realize sustainable development and create greater value.[5]

2. Characteristics of carbon management in group companies

Group companies have some specific characteristics when it comes to carbon management, which may differ from independent single enterprises.

Diverse businesses and subsidiaries: Group companies typically have diverse businesses and subsidiaries, which may include businesses in different industries, sectors, and geographic locations. Therefore, carbon management needs to consider the carbon footprint of multiple business areas and different subsidiaries, which can be more complex.[6]

Sharing Best practices: Group companies can share best practices on carbon management across their subsidiaries. This helps to promote successful carbon management methods throughout the organization and achieve greater benefits.[7]

Common goals and strategies: Group companies usually need to develop centralized carbon management goals and strategies to ensure that all subsidiaries are working in a common direction in reducing carbon emissions. This requires the support and coordination of senior leadership.

Investment and financing: Group companies can finance carbon reduction projects more easily, as they usually have more resources and better access to financing. This allows them to drive sustainability projects across multiple subsidiaries.[8]

Regulatory compliance: Group companies may need to deal with carbon emissions regulation in different countries and regions. This may require the establishment of dedicated compliance teams to ensure compliance with the law in a variety of regulatory environments.

For carbon management, it is necessary to calculate carbon emissions first, at present, carbon emissions calculation methods include emission factor method (also known as emission factor method), measurement method and mass balance method.[9] The emission factor method is the first C02 emission accounting method highlighted in the guidelines published by the International Panel on Climate Change (IPCC) in 2006. The specific calculation formula is:

$$CO_2 = \sum_{i=1}^{8} CO_{2,i} = \sum_{i=1}^{8} E_i \times NCV_i \times CEF_i \times COF_i \times 44/22 \quad (1)$$

Where CO2 represents the estimated carbon emissions, the unit is 10,000 tons; i = 1,2, ⋯8 represents energy type, and E represents energy consumption; NCV indicates the low average heating value. CEF stands for carbon emission coefficient; COF stands for carbon oxidation rate.[10]

According to the data disclosed by the China Carbon Emission Trading Network, the social responsibility report from 2017 to 2019 and the annual financial report of the enterprise, the CO2 emissions are calculated and their carbon quota is calculated. The carbon dioxide emission data table was obtained by collating relevant data, as shown in Table 1

Table 1 Carbon dioxide emission data of enterprises from 2017 to 1019

Year	Carbon dioxide emissions (10,000 tons)	Year-on-year growth rate (%)
2017	14706.2	.
2018	16434.8	11.75%
2019	16793.1	2.18%

By calculating the carbon dioxide emissions, the carbon quota obtained from the government is further calculated, and the basic carbon quota of the company is calculated according to the carbon emission intensity base of the company's products and the annual output of the company. The formula is as follows:

$$\text{Enterprise annual basic quota} = \sum (\text{historical strength base} \times \text{annual product quantity}) \quad (2)$$

Among them, the annual output needs to be verified by a third-party inspection institution or approved by the management department of the enterprise's annual product output. The formula for calculating emissions per unit of production is as follows:

$$\text{Carbon emissions per unit output} = \text{annual carbon dioxide emissions} \div \text{annual product output} \quad (3)$$

The carbon quota balance is calculated as follows:

$$\text{Carbon quota balance} = \text{annual base quota} - \text{carbon dioxide emissions} \quad (4)$$

3. Group company carbon management system established

The Carbon Management System is designed to help group companies understand, monitor, assess and reduce their carbon emissions in order to achieve sustainable operations and development.[11] By establishing a carbon management system, the company can manage carbon emissions more systematically, develop appropriate strategies and measures, and enhance communication and transparency with all parties. The process is shown in Figure 1.

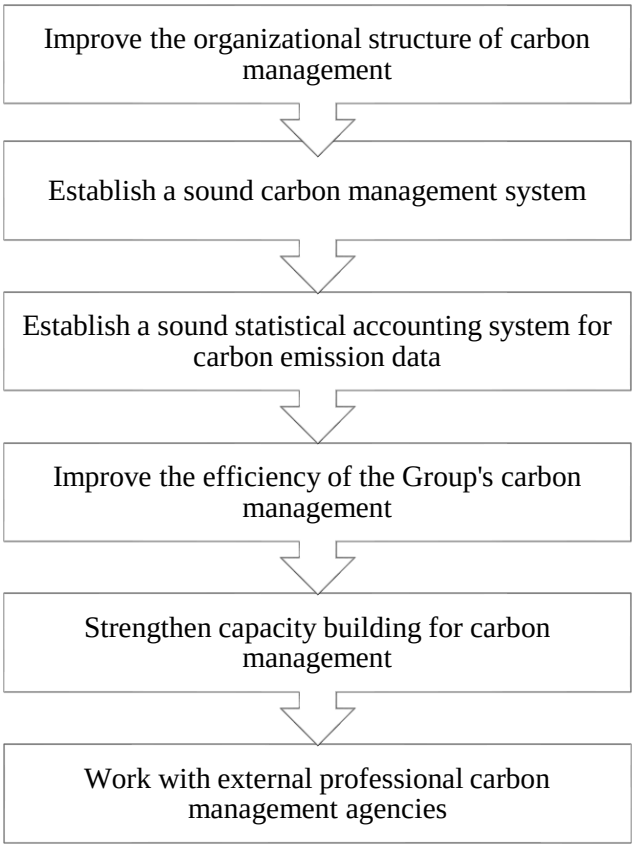

Figure 1. Flowchart of establishing the carbon management system 1 Process of establishing the carbon management system.

1.Improve the organizational structure of carbon management, and enhance the overall coordination ability of carbon emission and carbon asset management of the Group company

In order to better unify and coordinate the management of group carbon management, according to the current management structure of large domestic groups, the carbon emission and carbon asset management of group companies can adopt the management principle of "unified planning, unified guidance and unified management", and implement the three-level management mode of "group companies, regional companies and grass-roots enterprises". Group enterprises can start from the top-level design and build the organizational structure, division of labor, coordination mechanism and target assessment system of the group's carbon management business according to the characteristics of carbon management and carbon trading. [12]

Each regional company shall identify a centralized management department for carbon management, which shall be responsible for implementing the relevant policies and requirements of greenhouse gas emission reduction of the State and the group company, carry out the statistics, summary and reporting of carbon emission data of grassroots enterprises in

the region, and timely report to the Group company the carbon emission data submission and carbon trading activities organized by relevant local departments. Organize the grass-roots enterprises in the region to complete the annual work targets assigned by the group company.

2. Establish and improve the carbon management system and consolidate the carbon management system mechanism of the Group

To study and formulate the standard process of carbon emission and carbon asset management of the Group, guide the carbon emission control, carbon asset management and trading of various departments of the company: to carry out the construction of carbon emission control system and standard system, and greatly improve the standardization and process level of carbon emission management of the Group; To formulate general rules for carbon emission control and management and statistical accounting systems; Complete the formulation of carbon emission control assessment and evaluation methods, and complete the formulation of carbon asset management systems. Study the relevant policies and technical details of the carbon trading mechanism, and formulate internal normative documents, work manuals and other management systems. Through the establishment and improvement of the Group's carbon management system at all levels, carbon management can be carried out more effectively, preparing for the national carbon market in advance, and consolidating the Group's system and mechanism to adapt to the new normal of carbon tube control in the future.[13]

3. Establish a complete statistical accounting system for carbon emission data to establish a reference basis for the Group's long-term assessment of carbon emission situation and judgment of quota surplus and shortage in the future

Together, large groups should establish a complete monitoring system, determine organizational boundaries and emission boundaries, correctly identify emission sources and rationally select emission factors, and report carbon emission data according to a unified standard on the basis of fully assessing their own carbon emission status. Through the establishment of a regular carbon emission data statistics, accounting and reporting system, the Group can further discover the space for carbon emission control, which will help the Group to establish carbon emission control goals, and then promote the overall energy conservation and consumption reduction work, which will help improve the Group's comprehensive competitive strength.[14]

4. Improve the efficiency of the Group's carbon management, and promote the development of carbon management information tools

Due to the large number of emission control enterprises included in the national carbon market by large groups, the carbon quota management, carbon emission accounting, carbon quota trading, annual compliance, low-carbon solutions and carbon information disclosure of each unit will generate a large amount of information and data flow.

5. Strengthen carbon management capacity building, and comprehensively improve the business concept and business level of carbon management

The Group needs to make appropriate reserves of manpower, knowledge and skills in advance, comprehensively improve the Group's understanding of the national carbon market, and strengthen personnel training on carbon emission and carbon trading. The Group can systematically develop special training plans to improve carbon management capabilities,

carry out special training on low-carbon strategy and carbon market policy interpretation, carbon emission data statistical reporting.

6. Cooperate with external professional carbon management agencies to maintain and increase the value of the Group's overall carbon assets through active carbon asset management

In the operation phase of the national carbon market, the Group and its subsidiaries will gradually face the normal tasks of carbon emission quota application, management, trading and asset appreciation, and the operation and management of carbon assets will also become an important part of the daily operation and development of enterprises.[15]

4. Group company carbon management case

General Electric Company has implemented carbon asset management program on a global scale to reduce the company's carbon emissions. The company has developed corresponding emission reduction measures by establishing a carbon inventory system to link the company's carbon emissions with the company's production capacity.

Daimler is committed to reducing the carbon footprint of its products. The company has implemented a global carbon asset management program that tracks carbon emissions in its supply chain through a carbon inventory system, as well as in all processes, from manufacturing to transportation. The company has also adopted a life cycle assessment approach to assess the carbon footprint of its entire product life cycle.

5. Carbon management recommendations for group companies

For the Group's carbon management, the Group should set clear carbon reduction targets, implement energy efficiency measures, promote clean energy use, adopt carbon capture and storage technologies, optimize transport and logistics, strengthen carbon emissions monitoring and reporting, and promote employee engagement and awareness.

6. Conclusion

The results of the Group's carbon management research show that enterprises are paying more and more attention to the management and reduction of carbon emissions while pursuing sustainable development. By implementing a carbon management strategy, companies can achieve significant economic, environmental and social benefits in a number of ways. In the practice of carbon management, enterprises need to comprehensively consider the production process, supply chain, energy utilization and carbon emission disclosure, so as to establish a comprehensive carbon management system.

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