

Original Paper

Research on Carbon Accounting Information Disclosure of BS

Company

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Abstract

With the proposal of China's "dual-carbon" strategic goals and the gradual implementation of energy-saving and emission reduction plans at various levels, the carbon accounting information disclosure of key industries with carbon emissions has received increasing attention from all sectors of society. As the second largest carbon emitter in China after the power industry, the steel industry naturally becomes a focus of attention. This article takes BS Company, which is representative in China's steel industry, as the research object, analyzes the basic situation of carbon accounting information disclosure of BS Company, such as its methods and content, and further analyzes the main problems existing in its carbon accounting information disclosure, so as to provide corresponding suggestions.

Keywords

Low-carbon Economy, Steel enterprises, Information Disclosure of Carbon Accounting Information

1. Introduction

In September 2020, China proposed the strategic goals of striving to achieve carbon peaking by 2030 and carbon neutrality by 2060. Subsequently, specific plans were implemented, and the steel industry became the key entity for low-carbon development. It is well known that the steel industry is one of the important pillar industries of China's national economy, a typical representative of resource and energy-intensive industries, and the second largest source of carbon emissions in China, second only to the power industry. In 2022, the national carbon emissions will reach approximately 11.5 billion tons of carbon dioxide equivalent, and the carbon emissions from the steel industry will be about 2.2 billion

tons of carbon dioxide equivalent, accounting for approximately 19%. At the same time, the carbon emissions from China's steel industry account for more than 60% of the global total carbon emissions from the steel industry. Under the "dual control" of energy consumption and the "dual-carbon" goals of the country, the steel industry also needs to establish its own carbon peaking and carbon neutrality goals. The research on carbon accounting information disclosure in China started relatively late, and a complete carbon accounting information disclosure system has not yet been formed. However, the research on corporate carbon accounting information disclosure can promote the development of China's carbon market, help companies standardize their behavior, respond to challenges, and seize the opportunity for the development of a low-carbon economy. This article takes BS Company, which is representative in the steel industry, as the research object, analyzes the methods and content of carbon accounting information disclosure of BS Company, and further analyzes the main problems existing in its carbon accounting information disclosure, so as to provide corresponding suggestions.

2. Significance of Carbon Accounting Information Disclosure

Carbon accounting information disclosure refers to the company's accounting calculation of carbon emissions and the disclosure of relevant information to the public. In carbon accounting information disclosure, companies are usually required to disclose content including but not limited to: carbon emissions inventory, emissions source data, emission reduction measures, carbon trading situations, carbon tax payments, etc. The information can be disclosed in the form of annual financial reports, sustainable development reports, environmental reports, etc. With the increasing global attention to climate change and environmental issues, carbon accounting information disclosure has become an important part of corporate social responsibility. By disclosing carbon emissions, emission reduction measures, and carbon trading information, companies can demonstrate their efforts and achievements in addressing climate change, and it is also helpful for investors, governments, and the public to make comprehensive evaluations of companies.

2.1 Enhancing Environmental Awareness of Enterprises

Carbon accounting information disclosure requires companies to pay attention to and manage their carbon emissions, which promotes the formation of environmental awareness and thinking within enterprises. While companies focus on their own environmental issues, they also fulfill their social responsibilities and promote carbon emission reduction processes.

2.2 Increasing Transparency and Credibility

By disclosing carbon emissions data and emission reduction plans, companies can better demonstrate their environmental responsibilities and commitments to sustainable development, thereby increasing their credibility. At the same time, this information can also help investors or other stakeholders understand the environmental and social performance of companies, thus enhancing transparency.

2.3 Promoting Low-Carbon Transformation

Carbon accounting information disclosure can help companies establish a sound carbon emissions and

emission reduction monitoring system, formulate scientific emission reduction plans and goals, and promote their low-carbon transformation. Through measures such as upgrading low-carbon technologies and adjusting energy structures, companies can achieve the goal of reducing carbon emissions and saving energy, thereby improving their competitiveness.

Although the requirements and standards for carbon accounting information disclosure are still being improved and implemented in various countries, it can be seen that more and more companies are actively participating in carbon accounting information disclosure because it is of great significance to enhance corporate image and promote sustainable development.

3. Basic Situation of Carbon Accounting Information Disclosure by Company BS

Established in 2000, Company BS is a leading modern comprehensive steel enterprise worldwide, mainly engaged in steel smelting, processing, as well as businesses related to steel such as electricity, coal, ports, warehousing, and transportation. Its representative products include automotive sheets, silicon steel, and carbon steel. In response to the national "dual carbon" target, Company BS has incorporated "carbon neutrality" into its development strategy and is at a leading level in the industry. Therefore, this paper selects Company BS as the research object to analyze its achievements and experiences in carbon accounting information disclosure, as well as the problems it still faces, providing certain reference for the improvement of carbon accounting information disclosure system in the steel industry.

3.1 Carbon Accounting Information Disclosure Methods

The main carriers of carbon accounting information disclosure by Company BS include annual financial reports, environmental reports, sustainable development reports, and climate action reports. As early as 2003, the company started publishing environmental reports. In order to comprehensively demonstrate its sustainable development planning and social responsibility, the company took the lead in publishing sustainable development reports in 2005, which have continued until now. Upgraded to ESG-based sustainable development reports after 2020, and in June 2022, the company released a climate action report. The carriers of carbon accounting information disclosure by the company in the past five years are shown in Table 1.

Table 1. Carriers of Carbon Accounting Information Disclosure by Company BS

Disclosure Position	2018	2019	2020	2021	2022
Annual Financial Report	√	√	√	√	√
Sustainable Development Report	√	√	√	√	√
Climate Action Report	-	-	-	-	√

Data Source: Company BS's Annual Financial Reports, Sustainable Development Reports, and Climate Action Reports

From the perspective of the carbon accounting information disclosure methods used by Company BS in the past five years, carbon accounting information disclosed in annual financial reports mainly focuses on the company's business plans, notes to financial statements, etc., with relatively brief content and primarily qualitative disclosure. In the sustainable development reports, more information is disclosed, especially after the upgrade to ESG-based sustainable development reports after 2020, in areas such as energy efficiency, carbon emissions, and environmental ecology, adopting a combination of qualitative and quantitative forms. For example, quantitatively disclosing the amount of CO₂ emissions reduction and comparing data before and after. The content of Company BS's sustainable development reports has also become increasingly rich and complete. Figure 1 provides a more intuitive view of the trend in the quantity of carbon accounting information disclosure by the company in the past five years. In June 2022, Company BS released a climate action report in response to carbon neutrality initiatives. The report was compiled based on the Task Force on Climate-related Financial Disclosures (TCFD) framework, and it was the first report of its kind in the Chinese steel industry. The report disclosed carbon accounting information in several areas, including climate change risks and opportunities, carbon neutrality strategies, carbon neutrality actions, greenhouse gas emissions, combining qualitative and quantitative forms. Therefore, it can be seen that the content of carbon accounting information disclosure in sustainable development reports and climate action reports is relatively focused, making it more conducive for users to obtain relevant information. However, there is no dedicated carbon accounting information report.

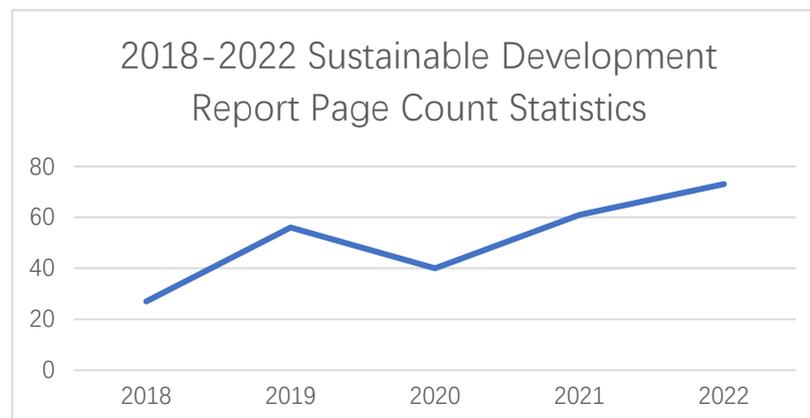


Figure 1. Number of Pages in Company BS's Sustainable Development Reports from 2018 to 2022

Data Source: Company BS's Sustainable Development Reports.

3.2 Carbon Accounting Information Disclosure Content

3.2.1 Carbon-related Risks and Opportunities Disclosure

BS Company started disclosing relevant information on carbon emissions risks in 2018, and from 2020 onwards, the specific impact of these risks on the company has been disclosed. This includes risks

related to carbon pricing mechanisms, carbon tariffs, carbon reduction measures, etc. For example, with the rising carbon prices and limited quotas, the cost of carbon compliance will continue to increase, and the research and development cost of low-carbon metallurgical technology will rise. These risks are mainly described qualitatively, and it was not until 2022 that a corresponding assessment of low-carbon risks was conducted. This assessment quantifies the impact of risks on corporate performance, which is also a progress in carbon accounting information disclosure. The company has disclosed very few opportunities brought by low-carbon reforms in recent years, and it was not until 2022 that opportunities were specifically described. The opportunities are discussed from several aspects such as energy efficiency, low-emission energy sources, and customer demand for green products. However, only the quantified data on cost savings of 300-400 million yuan per year due to energy-saving and emission reduction measures have been disclosed. There is still room for improvement in this part of the disclosure.

3.2.2 Carbon Emission Data

BS Company's disclosure of carbon emissions data is becoming more detailed, which is related to the construction of the Smart Carbon Data Platform started by the company in 2021. The platform includes three core modules: carbon accounting, carbon assets, and carbon footprint. For example, from 2014 to 2019, the company only disclosed the percentage of carbon emissions per ton of steel, but after 2020, more detailed tables were used to display relevant carbon emission information. However, the calculation method for carbon emissions was not disclosed. From the company's greenhouse gas emissions in the past 5 years (as shown in Table 2), it can be seen that the greenhouse gas emission intensity has shown a slight downward trend. This disclosure method can improve the comparability of carbon accounting information in the same industry.

Table 2. Greenhouse Gas Emissions of BS Company from 2018 to 2022

Indicator	2018	2019	2020	2021	2022
Total greenhouse gas emissions (10,000 tons CO ₂ equivalent)	-	-	8993.7	9080.5	9658.9
Indirect emissions (10,000 tons CO ₂ equivalent)	-	-	8591.7	8698.0	9320.7
Direct emissions (10,000 tons CO ₂ equivalent)	-	-	402.0	382.4	338.2

Note. Greenhouse gases include CO₂, CH₄, N₂O, HFCs, PFCs, SF₆, NF₃ (carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, nitrogen trifluoride).

Source: BS Company Sustainable Development Report

3.2.3 Carbon Emission Reduction Measures and Effects

In conjunction with national and local emission reduction plans, the company has developed the "BS Company Steel Industry Ultra-Low Emission Transformation Plan" and "Carbon Asset Management Measures." In 2013, the local government initiated a pilot carbon emissions trading program, and as one of the first enterprises to join the pilot, BS Company has been disclosing carbon emission management information in its annual financial reports and sustainable development reports since 2013. For example, in 2019, it added the construction of a greenhouse gas monitoring station, and in 2020, it proposed to comprehensively improve the energy-saving and low-carbon technology library. The self-monitoring disclosure rate of carbon emissions reached 100%. In 2021, it disclosed the total investment amount for energy-saving and emission reduction projects. In 2022, it announced the start of construction for the "Million-Ton Hydrogen-based Vertical Furnace" project, which is expected to achieve significant progress in carbon dioxide emission reduction by 2025. The company's R&D expenditure in the past three years was 8.7 billion yuan, 16 billion yuan, and 17.3 billion yuan, with R&D investment ratios of 3.1%, 4.40%, and 4.69%, showing an increasing trend year by year. In addition, the disclosure of government subsidies only includes the total amount, making it difficult to measure the specific level of government support for energy-saving and emission reduction measures. Overall, the content of BS Company's carbon emission management information disclosure is becoming increasingly extensive, indicating the company's strong emphasis on carbon emission management, but it lacks some quantitative data support.

3.2.4 Carbon Trading Information

Since joining the local government's carbon emissions trading pilot program in 2013, BS Company has been disclosing information on the expenditure of purchasing carbon emission quotas and carbon compliance in its annual reports. However, the content is mostly descriptive text and does not disclose the actual amount of carbon emission rights in other current assets in the annual financial statements. No specific explanations have been provided regarding the source of carbon emission quotas, acquisition pathways, reasons for carrying over, etc.

4. Issues with BS Company's Carbon Accounting Information Disclosure

4.1 Non-standard Carbon Accounting Information Disclosure

Firstly, when disclosing carbon accounting information, BS Company uses various carriers, which are scattered throughout the annual financial reports, sustainable development reports, and climate development reports. The disclosure positions are relatively dispersed, and there is a high repetition rate of content across various sections, which inconveniences information users. Secondly, in order to establish a positive corporate image, most of the disclosed content is positive information, while various negative information is avoided, preventing information users from obtaining a comprehensive understanding of carbon accounting-related information. Finally, although the company has recently started using a smart carbon data platform, which has greatly improved the situation of qualitative

descriptions dominating carbon accounting information, the proportion of disclosed quantitative data is still small. There is no publication of calculation standards for carbon emissions, no addition of carbon accounting items in the financial statements, and no independent report on carbon emission activities.

4.2 Lack of Unified Standards for Carbon Accounting Information Generation

As carbon accounting information disclosure is not mandatory, requirements and standards for carbon accounting information disclosure are still being continuously improved and implemented in various countries. Although China has stipulated that heavily polluting enterprises must publicly disclose relevant carbon emission information, there is currently no unified standard for generating carbon accounting information. BS Company is one of the early adopters of carbon accounting information disclosure among enterprises. However, the company adopts multiple information generation standards, such as primarily relying on the Global Reporting Initiative (GRI) Standards and the "CASS-CSR5.0 Guidelines for Chinese Enterprise Social Responsibility Reports," as well as referencing the "Shanghai Stock Exchange Listing Company Environmental Information Disclosure Guidelines" and United Nations Sustainable Development Goals (SDGs), among others. Among the 31 listed steel companies in China, more than 12 different standards are used as references. This makes it difficult for information users and regulatory authorities to obtain high-quality carbon accounting information with the same standard.

4.3 Challenges in Auditing and Attesting Carbon Accounting Information

First, BS Company only recently started validating and issuing validation statements for its sustainability reports. Although this step puts them ahead of many other companies, the limitations of the validation report have been stated in the report itself. It is mentioned that the financial data extracted from independently audited financial reports has not been cross-checked with the source data as part of the validation process. The validation only involves interviews and document reviews with relevant department heads and some employees, without involving external stakeholders. As mentioned earlier, BS Company's disclosure of carbon accounting information is mainly qualitative, lacking quantitative data, and there is also a lack of comparability between companies, which makes it difficult for certified public accountants to audit and verify carbon accounting information. Secondly, the regulations on carbon emission data validation standards in China are not yet perfect, for example, there are no specific carbon accounting information auditing standards, nor are there dedicated regulatory agencies established. Lastly, there is a lack of professional talent. Currently, carbon accounting information disclosure is just starting, and the cultivation of auditing and verification talent will lag behind, and it will also take time to apply it in practice.

4.4 The Regulatory System for Carbon Accounting Information Disclosure Needs Improvement

Compared to other companies, BS Company has a strong initiative in disclosing carbon accounting information, and the quality of carbon information has been improving year by year. However, there are still various problems in the disclosure of information mentioned earlier, let alone smaller steel companies. Many companies choose to conceal information that is unfavorable to the company and

only disclose information that is beneficial to the company in order to achieve short-term profits and maintain the company's image, resulting in incomplete or untrue information disclosure. The quality of carbon accounting information directly affects the achievement of the company's and the country's "dual carbon" goals. One important reason for these phenomena is that China's regulatory system for carbon accounting information disclosure is not yet perfect. Firstly, regulatory agencies overly rely on government departments, and other regulatory bodies are absent. On the one hand, the regulatory power of government departments is limited, and on the other hand, the supervisory perspective of a single entity is relatively narrow. Secondly, companies have not established a self-regulatory system for carbon accounting information disclosure. Although companies have integrated the "carbon neutrality" goals into their development strategies and actively provide carbon accounting information, due to factors such as personnel capabilities and management concepts, internal supervision focuses more on internal control and financial information, rather than carbon accounting information. Thirdly, stakeholder groups such as customers and suppliers pay insufficient attention to carbon accounting information of companies. They are more interested in the company's performance and profitability than environmental protection and carbon emissions reduction. Lastly, for the general public, their awareness and participation in supervising carbon accounting information disclosure still need to be improved, which is related to the overall environmental awareness and participation of the public.

5. Suggestions for Improving the Disclosure of Carbon Accounting Information by Steel Companies

5.1 Improving the System for Disclosing Carbon Accounting Information

Currently, China has many laws and regulations on environmental protection, energy, and carbon emissions, but the provisions regarding the disclosure of carbon accounting information are relatively vague and insufficient to guide the specific practical work of enterprises. In 2020, the Ministry of Finance issued the "Interim Provisions on Accounting Treatment of Carbon Emissions Trading", which provides regulations on the principles of handling carbon emissions trading, account setting, accounting treatment, presentation of financial statements, and disclosure of changes in carbon emission quotas. In 2021, the "Outline of the 14th Five-Year Plan for Accounting Reform and Development" was released, which explicitly proposes to establish a sustainable reporting system for Chinese enterprises. Based on this, China needs to urgently improve the system for disclosing carbon accounting information, provide unified and clear regulations on the basis, method, content, supervision, and legal responsibilities of disclosing carbon accounting information, and provide operational standards for enterprises' disclosure of carbon accounting information. We believe that a well-developed and practical system for disclosing carbon accounting information can effectively regulate corporate disclosure behavior. Incentives and penalties such as low-carbon subsidies, tax incentives, fines, etc., can increase the initiative of enterprises to disclose carbon accounting information. Strengthening the supervision of relevant departments can ensure that the carbon accounting information disclosed by enterprises is true and

reliable.

5.2 Strengthening Theoretical Research on the Disclosure of Carbon Accounting Information

China's research on carbon accounting theory started relatively late. Therefore, government departments, steel industry associations, certified public accountant associations, etc., should encourage scholars to continuously research carbon accounting-related topics. By forming research teams, holding academic seminars, and collaborating with enterprises, China's theoretical research on carbon accounting can quickly reach a new level and form a carbon accounting theory that is in line with China's economic development. For example, the generation standards of carbon accounting information, the recognition and measurement of carbon accounting elements, the preparation of carbon balance sheets and carbon income statements, and the preparation of carbon accounting reports, etc. In particular, exploring carbon accounting information disclosure theories that are suitable for China's national conditions is of great significance in promoting the timely and accurate acquisition of relevant information by users of carbon accounting information in China.

5.3 Enhancing the Auditing and Verification Capabilities of Carbon Accounting Information

Auditing and certification by professional institutions are crucial for improving the quality of carbon accounting information disclosure. Therefore, the government should establish a professional carbon accounting information certification agency or allow independent auditing firms to conduct carbon accounting information audits. Independent auditing firms play an important role in ensuring the quality of accounting information disclosure and may also become the main force in carbon accounting information audits. Therefore, it is urgent to enhance the auditing capabilities of independent auditing firms for carbon accounting information. Firstly, talent cultivation can be started by establishing carbon accounting-related majors in universities to train professionals who can be integrated into enterprises and auditing certification institutions. Secondly, the content of the Certified Public Accountant (CPA) qualification examination should include topics related to carbon accounting information audits. Finally, in practice, the assistance of experts in enterprise carbon emission assessment should be sought. When accounting firms conduct auditing and certification business, special carbon accounting information auditors should be appointed. In addition, the national audit department can carry out special audits of carbon accounting information for listed steel companies to comprehensively ensure the authenticity of carbon accounting information disclosure in China.

5.4 Constructing a Multi-party Participating Regulatory System for Carbon Accounting Information

China's carbon accounting information disclosure started relatively late but has developed rapidly, and corresponding regulatory work needs continuous improvement. It cannot solely rely on the single regulation of government departments but requires the collaboration of companies themselves, stakeholders, industry associations, and the general public. Firstly, government departments should continuously enrich their professional talent team and optimize internal workflow under the existing regular inspections and special review models. The annual carbon accounting information disclosure of companies can also be incorporated into the credit management system to impose disciplinary actions

on the behavior of disclosing untrue or incomplete carbon accounting information. Active publicity work should also be carried out to enhance the public's awareness and participation in environmental protection. Secondly, companies should establish internal audit and supervision mechanisms for carbon accounting information, which can establish separate audit departments or establish specialized groups within the internal audit department to solidly accomplish self-supervision of carbon accounting information disclosure. Thirdly, the power of independent verification institutions should be fully utilized, especially when their own capabilities are not strong enough. Qualified independent verification has significant significance, such as improving the quality of carbon accounting information disclosure, promoting the orderly development of carbon trading markets, and ensuring the steady progress of carbon emissions reduction work. Lastly, all parties should make full use of advanced methods such as big data and artificial intelligence to gradually improve the platform for sharing and publicizing carbon accounting information. Only when all parties actively participate in the regulatory work can the quality of carbon accounting information disclosure truly be improved.

6. Conclusion

The steel industry is the largest emitter of carbon dioxide among manufacturing industries in China. Therefore, it has become the focus of low-carbon development. The disclosure of carbon accounting information plays an important role in achieving carbon peak and carbon neutrality goals for the steel industry. Although China started relatively late in the research on carbon accounting information disclosure and has not yet formed a complete carbon accounting information disclosure system, research on enterprise carbon accounting information disclosure can promote the development of the carbon market in China, help enterprises regulate their behavior, respond to challenges, and seize the development opportunities of a low-carbon economy. For steel companies, improving the disclosure of carbon accounting information not only benefits them in fulfilling their social responsibilities, improving economic efficiency, and enhancing market competitiveness but also aligns with national and regional policy demands. It can achieve a virtuous cycle and lay a solid foundation for the sustainable development of enterprises.

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