Requirements for enterprise information disclosure on green and low-carbon

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Abstract. As an important bridge for communication between the enterprise and the stakeholders, the corporate information disclosure on green and low-carbon draws more and more attention. This paper has introduced the basic principles for corporate information disclosure on green and low-carbon, and has researched the green and low-carbon related international standards, and information disclosure on green and low-carbon of domestic and foreign enterprises. On that basis, this paper has expounded the main contents of corporate information disclosure on green and low-carbon and disclosure implementation.

1 Introduction

In recent years, climate and green and low-carbon have gradually become the focuses of attention in the world. After making a general survey, we find that main developed countries in the world are carrying out the transformation to green and low-carbon economy in succession. Through the efforts by multiple sides in the international community, United Nations Framework Convention on Climate Change (UNFCCC) was signed in 1992, which has specified the joint responsibilities of different countries for carbon emission reduction. *The Kyoto Protocol* in December 1997 was a milestone for the mankind to protect the earth environment and achieve the sustainable development with all the strength, marking that the governments of different countries consider accepting the limit control with legal binding force or greenhouse gas emission reduction obligation for the first time. On February 16, 2005, *the Kyoto Protocol* officially took effect. This was the first time the greenhouse gas emission was limited by the laws and regulations in the human history. Thus, a series of innovative cooperation mechanisms for decrease of greenhouse gas emission reduction costs have been established, and the green and low-carbon practices are carried out.

According to the report of the 19th National Congress of the Communist Party of China, China should continue to robustly advance the green and low-carbon development, and establish and improve the economic system of green and low-carbon circular development. In order to follow the world trend and achieve the economic transformation, China has set the goal of reducing the carbon emission of GDP per unit by about 40%-45% in 2020 (compared with 2005). “Low-carbon” and “new normal” of economic development are considered, and the laws and regulations on information

disclosure system on carbon emission are positively established and the corresponding platform is set up. In the low-carbon economic development, through establishing the information disclosure system on carbon emission, the government may strictly monitor the corporate carbon emission, continuously and dynamically analyze the corporate carbon emission based on the latest data provided by the enterprise, and regard them as an important basis for the government to set the carbon emission reduction goal in later years. Meanwhile, through the information disclosure system on carbon emission, the enterprise may comprehensively understand its internal carbon emission, adjust the emission reduction structure, seek the business opportunities for sustainable development in the reform, and better shoulder the social responsibility.

As the public environmental protection awareness is enhanced and China enters the World Trade Organization, Chinese enterprises are also faced with the external pressure of information disclosure on green and low-carbon and information demand on green and low-carbon. Based on the previous investigation results, more than 80% of pollutants in the natural environment come from the enterprises currently, so the enterprises bear the compelling obligation for green and low-carbon. The current corporate financial report system of China often lays particular stress on reflecting the traditional economic accountability, but neglects the reflection of environmental accountability. As a result, the demand of information user for corporate green and low-carbon information cannot be met. At present, the necessity for the enterprise to disclose the green and low-carbon information is mainly embodied in the following aspects: firstly, the enterprise should disclose the green and low-carbon information due to the severe resource situation of China; secondly, the enterprise should disclose the green and low-carbon information, so as to correctly

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measure the accounting indicators of national economy and achieve the sustainable development of Chinese economy; thirdly, the enterprise should disclose the green and low-carbon information according to the requirements of national ecological environmental regulators; fourthly, the enterprise should disclose the green and low-carbon information since the corporate overseas competitiveness is strengthened.

2 Principles for corporate information disclosure on green and low-carbon

The corporate information disclosure on green and low-carbon may be subject to the requirements in GB/T 26450[1] and should achieve the following:

Transparent. On the basis of considering the confidentiality requirements, process, procedure, method, data source and assumption and other necessary information of corporate information disclosure on green and low-carbon should be disclosed to all stakeholders.

Appropriate. The method and language adopted in the corporate information disclosure on green and low-carbon should be easily understood by the stakeholders so that the different meanings are minimized and the stakeholders fully participate.

Credible. The corporate information disclosure on green and low-carbon adopts the recognized and reproducible method and parameter development information and data, and provides the authentic, accurate and substantial information to avoid misleading the stakeholders.

Responsive. During the corporate information disclosure on green and low-carbon process, sufficient attention and timely response should be given to the inquiries of the stakeholders.

Complete. The corporate information disclosure on green and low-carbon should be comprehensive and sufficient, but should not have any omission or deficiency of key information.

Consistent. The corporate information disclosure on green and low-carbon should be consistent so that the users can understand the development changes of corporate green and low-carbon information. The disclosure in different periods should adopt the consistent format, language and indicator. Besides, any change should be explained.

3 International standards related with green and low-carbon

The Technical Committee for Greenhouse Gas Management and Relevant Activity of Environmental Management of ISO is responsible for the carbon emission standards. At present, 6 international standards, 1 technical specification and 1 technical report (refer to Table 1) have been released [2].

The U.S. Environmental Non-governmental Organization World Resources Institute and the Non-governmental Organization World Business Council for Sustainable Development which is set in Geneva and is

composed of 170 international companies have jointly established GHG Protocol Initiative, which has organized the formulation and release of the *Corporate Accounting and Reporting Standard of GHG Protocol* (refer to Table 2).

Table 1. Greenhouse Gas Standards Released by ISO

No.	Standard No.	English Name of Standard
1	ISO14064-1-2006	Greenhouse gases - Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals
2	ISO14064-2-2006	Greenhouse gases - Part 2: Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements
3	ISO14064-3-2006	Greenhouse gases - Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions
4	ISO14065-2007	Greenhouse gases - Requirements for greenhouse gas validation and verification bodies for use in accreditation or other forms of recognition
5	ISO14066-2011	Greenhouse gases - Competence requirements for greenhouse gas validation teams and verification teams
6	ISO/TS14067-2013	Greenhouse gases - Carbon footprint of products - Requirements and guidelines for quantification and communication
7	ISO/TR14069-2013	Greenhouse gases - Quantification and reporting of greenhouse gas emissions for organizations - Guidance for the application of ISO 14064-1
8	ISO 14063-2006	Environmental management - Environmental communication - Guidelines and examples

Table 2. Corporate Accounting and Reporting Standard of GHG Protocol

No.	English Name of Standard
1	A Corporate Accounting and Reporting Standard
2	The GHG Protocol for Project Accounting
3	Product Life Cycle Accounting and Reporting Standard
4	Corporate Value Chain (Scope 3) Accounting and Reporting Standard

The Circular (Development and Reform office on Climate [2013] No. 2526) printed and distributed by the National Development and Reform Commission in 2013 on the accounting methods and reporting guidelines (trial) for corporate greenhouse gas emission in 10 industries in the first batch involves power generation, power grid, steel and iron, chemical production, electrolytic

aluminum production, magnesium smelting, sheet glass production, cement production, ceramic production and civil aviation.

In April 2014, the Technical Committee for National Carbon Emission Management Standardization (SAC/TC548) was established, which is mainly responsible for the carbon emission management terms, statistics and monitoring, compilation method for regional carbon emission list, corporate and project carbon emission accounting and reporting, low-carbon product, carbon capture and carbon storage and other low-carbon technologies and equipment, and formulation and revision of national standards in the carbon neutralization and carbon sink and other fields. It is geared to the Technical Committee for Carbon Dioxide Capture, Transportation and Geological Storage(ISO/TC265) and the Technical Committee for Greenhouse Gas Management and Relevant Activity (ISO/TC207/SC7) of Environmental Management Technical Committee of ISO.

4 International and domestic information disclosure on green and low-carbon

4.1 International information disclosure on green and low-carbon

With the constant emergence of environmental problems, such as atmospheric pollution, water pollution and land desertification, different countries start to pay close attention to the environmental pollution problems of the enterprise, and regard the corporate information disclosure on green and low-carbon as the main basis for evaluating the enterprise's performance of social responsibility.

In Japan, the corporate information disclosure report on green and low-carbon adopts the voluntary disclosure model, and it is dominated by government guidance and supplemented by law. The corporate environmental report of most companies in Japan has passed the third party examination. Although the third party examination is not institutionalized, its development is rapid and the examination organizations are diversified (accounting firm, consulting firm, and environmental research institute, etc.). In addition, Japan has set the "Environmental Report Award", and encourages the enterprises to positively disclose the green and low-carbon information, and promotes the enterprises to develop the environmental quality report and implement the environmental activity plan.

The UK had the atmospheric and water pollution records during the industrial revolution period. In the 1990s, the environmental protection law was passed, and "BPEO" and "BATNEEC" concepts were introduced. According to the summary of information disclosure on green and low-carbon released by the British Environment Agency, most companies have discussed the environmental issues in the annual report, and the

proportion of companies that disclose information increases year by year.

The USA started to disclose the green and low-carbon information in the initial stage of 1970s. The USA founded the Environmental Protection Agency in 1970. The USA has formulated a series of laws on information disclosure on green and low-carbon. At the same time, the U.S. Securities and Exchange Commission requires that the listed company should disclose the green and low-carbon information according to the environmental law. The listed company carried out the disclosure in such three aspects as environmental policy, environmental cost and environmental liability primarily. It was dominated by quantitative and supplemented by qualitative description. In addition, the U.S. Environmental Protection Agency and the U.S. Securities and Exchange Commission make concerted efforts. The U.S. Securities and Exchange Commission attaches great importance to the list of enterprises with potential environmental threats provided by the Environmental Protection Agency, and supervises whether the environmental protection responsibilities of these companies are performed, and whether the environmental risks brought by the enterprises is reduced. If the Securities and Exchange Commission thinks that information disclosed in the corporate financial report is not accurate enough or the disclosure is not sufficient enough, it is entitled to require the enterprises to revise the financial report or explain the cause for information disclosure defects in the report notes. Meanwhile, the list of enterprises with environmental problems is submitted to the U.S. Environmental Protection Agency, for the purpose of corresponding management and supervision.

The developed countries have advantages in the information disclosure on green and low-carbon. For example, in Japan, in addition to the governmental supervision, the corporate green and low-carbon information is disclosed through the third party examination. In the USA, the U.S. Securities and Exchange Commission and the Environmental Protection Agency cooperate, and the functions are clear. In the meantime, the enterprises are required to quantitatively describe the green and low-carbon information so that the information disclosure on green and low-carbon is more specific. The UK is one of the countries which carry out the information disclosure on green and low-carbon at the earliest, and has gradually established the comprehensive and complete system.

In 2000, Carbon Disclosure Project (CDP), an international cooperation project initiated by the professional investors, collected the carbon information of global enterprises by questionnaire distribution. A report is released each year, for the purpose of building a channel for enhancing the trust between the enterprise and stakeholder through revealing the costs, risks and opportunities brought by the climate change to the enterprise and transaction information.

Global Reporting Initiative (GRI) was jointly established by United Nations Environment Programme and the U.S. Environmental Protection Organization CERES in Boston at the end of 1990s. Initially, GRI is a

“Global Reporting Initiative” action. Afterwards, this initiative action is constantly supported and expanded, and it has developed into an independent organization. Through more than ten years’ efforts, GRI, an experimental new governance and cooperation platform, starts to “stand out conspicuously”. It gradually becomes the leader in the world’s sustainable development information (including environment, society and governance information) disclosure field. At present, the most commonly used sustainable development report guideline G4 in the world is formulated after the stakeholders in GRI network participate and reach a consensus.

4.2 Domestic information disclosure on green and low-carbon

In recent years, the environmental protection has drawn the unprecedented attention from the Chinese government and people. In this backdrop, China has made huge progress in the environmental protection legislation and the revision of information disclosure system on green and low-carbon. There are increasingly strict requirements for the enterprises whose pollutant discharge fails to meet the regulations or the heavy pollution enterprises. Therefore, at the system level, the gap between China and foreign developed countries gradually narrows. However, there is still a large gap in the execution.

Since the construction of information disclosure on green and low-carbon in China is still at its infancy, no perfect environmental accounting standard has been established, and no strongly operable environmental accounting system exists either. Even if relevant laws and regulations on information disclosure on green and low-carbon have been promulgated, there are still problems during the execution. In the guidelines for information disclosure on green and low-carbon of listed company, how to disclose the green and low-carbon information contents is not stipulated in detail. Consequently, the environmental accounting information disclosure of Chinese enterprise lacks reliability and relevancy. With the implementation of the Evaluation Report on Environmental Responsibility Information Disclosure of Listed Company of China, the construction of information disclosure on green and low-carbon in China enters the development stage. Compared with the previous disclosure level, it has improved to some extent. However, compared with the western developed countries, there is a huge gap. Relevant departments, including China Securities Regulatory Commission and environmental protection bureau, should establish and improve the information disclosure system on green and low-carbon so that there are laws to abide by and the system guarantee is provided for the information disclosure on green and low-carbon.

Considering the particularity of environmental issues, the green and low-carbon information is often disclosed in different forms. Generally, the green and low-carbon information has two disclosure ways, namely, monetary form and non-monetary form. At present, the disclosure

of green and low-carbon information by the Chinese listed companies is dominated by monetary information, which is centralized in resource tax, pollutant discharge fee, greening fee and environmental protection construction. Besides, these contents are mainly presented in the report notes, but they are rarely presented in the detail subject of the report. The non-monetary information is the indicator which is difficult to quantize in the environment related certification and policy making. However, the enterprise should still choose two forms or their combination based on its specific circumstances, and more comprehensively disclose the green and low-carbon information.

In the information disclosure on green and low-carbon, most enterprises only describe their overall environmental protection policies. A few enterprises explain in detail how to carry out the information disclosure on environmental protection. Regarding the contents of monetary measurement (for example, greening fee and environmental protection subsidy), only name and amount are shown in the detail subject, but no specific explanations are made. The possible environmental issues in the future are rarely explained. This reduces the effectiveness for the financial report to evaluate the corporate environmental liability and environmental performance to some extent and is unfavorable for the improvement of information disclosure on green and low-carbon. Meanwhile, in the information disclosure on green and low-carbon, most companies mainly adopt the qualitative method and use the text descriptions. Since the text descriptions are controlled by human, subjective factors may be mingled, affecting the objectivity of information disclosure on green and low-carbon. Due to a lack of data support, the information disclosure on green and low-carbon is unconvincing. Because the green and low-carbon information mainly reflects the historical financial information, it is difficult to reflect the impacts of environmental issues on the current corporate operation and future corporate development. As a result, the decisions made by the external information users have no time effectiveness, their judgment is affected, and it is difficult to make effective decisions.

5 Contents of corporate information disclosure on green and low-carbon

5.1 Content elements of corporate information disclosure on green and low-carbon

The content elements of corporate information disclosure on green and low-carbon should include: (1) Corporate profile; (2) Organization; (3) Strategy, guideline and development goal; (4) Conformity to laws, regulations and standards; (5) Production and operation related green and low-carbon information; (6) Risks and opportunities.

5.2 Corporate profile

The corporate profile should include: (1) Basic situation about the enterprise, including basic information and location; (2) Organization and implementation of corporate information disclosure on green and low-carbon, including implementation process and implementation team; (3) Standards or codes for corporate information disclosure on green and low-carbon, and adoption of relevant domestic and foreign initiatives, declarations and conventions about information disclosure on green and low-carbon; (4) Historical information disclosure on green and low-carbon, for example, whether it is the initial disclosure, information disclosed in the last year and approach; (5) Contact way, including contact person, contact number and mailbox.

5.3 Organization

5.3.1 Responsibilities of top management

The enterprise should disclose the responsibilities of top management for green and low-carbon related issues, including the following contents: (1) Process and frequency for the top management and/or organization under the top management (for example, audit, risk or other committees) to know the green and low-carbon related issues; (2) Whether the top management and/or organization under the top management has/have considered the green and low-carbon related issues in the examination and guidance on strategy, important action plan, risk management policy, annual budget and business plan and formulation of corporate performance goal, and monitoring of implementation and execution; (3) How does the top management supervise and monitor the achievement of green and low-carbon goals.

5.3.2 Internal organization and system

The enterprise should disclose the green and low-carbon related internal organization and system, including the following contents: (1) Whether the enterprise has assigned the green and low-carbon related responsibilities to the management post or management department; (2) Process for the management post or management department to know the green and low-carbon related issues; (3) How does the management post or management department monitor the green and low-carbon related issues (through specific post and/or management organization); (4) Descriptions about green and low-carbon related internal system of the enterprise, for example, assessment and reward and punishment mechanism, establishment of environmental management system and energy management system and the like; (5) Abilities and experience of relevant responsible and implementation personnel, including working experiences and knowledge background.

5.4 Strategy, guideline and development goal

5.4.1 Strategy and guideline

The enterprise should disclose the mid-term and long-term strategy and guideline which have major impacts on the green and low-carbon issues.

5.4.2 Impacts of relevant external changes on strategy and guideline

The enterprise should disclose how do relevant external changes identified leave impacts on the strategy and guideline, for example, impacts on product and service, impacts on supply chain and/or value chain, and impacts on research and development investment.

Relevant external changes include changes of green and low-carbon related natural environmental, policy, law, regulation and market environment.

5.4.3 Development goal

The enterprise should disclose the key green and low-carbon development goals, including: (1) Time limit of goal; (2) Base year corresponding to the goal; (3) Annual and mid-term and long-term green and low-carbon development goals; (4) Indicators used in the assessment on goal achievement, and its monitoring or assessment method. The enterprise may disclose the indicators in relevant historical periods so that the stakeholders conduct the trend analysis.

5.5 Conformity to laws, regulations and standards

The enterprise should disclose its conformity to the laws and regulations, including: (1) Green and low-carbon related laws, regulations and requirements which should be met, for example, whether the indicator of total emission volume stipulated by the State is met; (2) Unlawful act and relevant punishment records; (3) Relevant petition letter, lawsuit case and the like; (4) Corresponding time limit of the abovementioned circumstances.

The enterprise should disclose its conformity to relevant standards, including conformity to the compulsory energy consumption, water consumption, land consumption, pollutant discharge, environmental quality and other relevant standards.

5.6 Production and operation related green and low-carbon Information

5.6.1 General provisions

The enterprise should disclose relevant information about environmental impact of production and operation activity, including climate change, resource consumption, pollutant discharge, cyclic utilization and the like. The enterprise should describe the scope of relevant production and operation activity in the disclosure, which may cover the facility, equipment and place owned and managed by the enterprise and involved in its investment. If it is required to disclose relevant

information about environmental impact for multiple scopes, the enterprise should carry out the disclosure according to different scopes. The enterprise may apportion the carbon emission of facility, equipment and place involved in its investment according to the proportion of owner's equity and other ways. If the disclosure is carried out in this way, the enterprise should describe in detail the apportionment reason and way, including calculation method. The time range of carbon emission information in the production and operation activity disclosed by the enterprise should be consistent with that of financial information about production and operation (such as financial report and audit report) disclosed by the enterprise.

5.6.2 Climate change

Relevant information about climate change in the production and operation activity of the enterprise should include: (1) Carbon emission, such as total volume of carbon emission of the enterprise and emission volume of product or output value per unit; the determination of carbon emission should meet the requirements of GB/T 32150[3], GB/T 32151[4] and other standards; (2) Carbon emission reduction and investment, emission reduction of investment per unit, trading amount of carbon emission, improvement activity of climate change, adopted emission reduction technology and process and the like; the determination of project emission reduction should meet the requirements of GB/T 33760[5] and other standards; (3) Development change of carbon emission, for example, decrease of total emission volume year by year.

5.6.3 Resource consumption

Relevant information about resource consumption in the production and operation activity of the enterprise should include: (1) Energy consumption, such as energy consumption of the enterprise and energy consumption of product per unit (process and service volume, etc.) and the like; the determination of energy consumption should meet the requirements of GB/T 2589[6] and other standards; (2) Water resource consumption, total volume of fetched fresh water of the enterprise, fresh water consumption of product per unit, reutilization rate of industrial water, total volume of recycled and reutilized water of the enterprise, and percentage of total volume of recycled and reutilized water in the total fetched water and the like; the determination of fresh water consumption of product per unit should meet the requirements of GB/T 7119[7]; the determination of water consumption and water fetching of product per unit should meet the requirements of GB/T 18820[8], GB/T 26719[9] and the like; the determination of discharge reduction of waste water and recycling rate of waste water should meet the requirements of GB/T 32327[10]. (3) Consumption of other raw materials, including consumption of non-renewable raw materials and renewable raw materials, for example, consumption of packaging materials and the like. (4) Resource saving

and investment, such as energy saving, water saving, material saving, resource saving investment, adopted relevant technology and process for resource saving and the like; the determination of energy saving should meet the requirements of GB/T 13234[11], GB/T 28750[12] and other standards; the calculation of project water saving should meet the requirements of GB/T 34148[13] and other standards. (5) Development change of resource consumption.

5.6.4 Pollutant discharge

Relevant information about pollutant discharge in the production and operation activity of the enterprise should include the discharge information of atmospheric pollutant, water pollutant, solid waste and noise. Relevant information about pollution treatment and development change of pollutant discharge may include: (1) Total volume of waste gas discharge, discharge volume of main pollutant in the waste gas, discharge intensity of atmospheric pollutant (discharge volume of main pollutant of product production per unit or output value per unit) and the like; (2) Total volume of waste water discharge, discharge volume of main pollutant in the waste water, discharge intensity of water pollutant (discharge volume of main pollutant of product production per unit or output value per unit) and the like; (3) Generation volume, treatment volume and recycling volume of solid wastes, safe treatment volume of hazardous wastes and the like; (4) Noise source and effects and the like; (5) Pollution treatment investment and adopted relevant technologies, process and other information.

5.6.5 Cyclic utilization

Relevant information about cyclic utilization in the production and operation activity of the enterprise should include product recycling rate, renewable resource utilization volume (rate), remanufacturing rate, circular economic index and the like. The determination of product recycling rate should meet the requirements of GB/T 20862[14], the determination of remanufacturing rate should meet the requirements of GB/T 28620[15], and the determination of circular economic index should meet the requirements of GB/T 34345[16].

5.7 Risks and opportunities

The enterprise should disclose the possible risks and opportunities for the production and operation activity due to the green and low-carbon related external changes.

The possible risks due to the external changes include: increase of costs and expenses; reduction of productivity; supply chain management difficulties; decrease of market size or share; compliance difficulty; weakening of corporate and brand influence.

The possible opportunities due to the external changes include: decrease of costs and expenses; improvement of productivity; establishment of green

supply chain; provision of new market opportunity; improvement of corporate compliance capacity; obtaining of policy support; promotion of corporate and brand influence.

6 Implementation of disclosure

Subject to the requirements of GB/T 26450, GB/T 32150 and other standards and codes, the enterprise should formulate the work guideline and work plan for the enterprise information disclosure on green and low-carbon, compile the information disclosure report on green and low-carbon, and properly release the information disclosure report on green and low-carbon periodically.

A third party organization may be entrusted to conduct or review the corporate information disclosure. Whether the third party carries out the disclosure or review should be described in the disclosure report. In order to improve the public trust, the enterprise may disclose its green and low-carbon information report on the third party disclosure platform.

7 Conclusions

The corporate information disclosure on green and low-carbon is one of the most important measures for solving the global climate issue and environmental issue. At the same time, the establishment of corporate information disclosure on green and low-carbon system is favorable for meeting the requirements of the government, enterprise, the public and other stakeholders for greenhouse gas emission and energy consumption information. The corporate information disclosure on green and low-carbon is not only the embodiment of corporate social responsibility, but also a key connotation for building the corporate culture and brand. However, the research on information disclosure on green and low-carbon is not yet comprehensive or systematic. How to enrich its theoretical core connotation and effectively carry out the carbon management is still a task to be further researched in the future[17].

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