



Research on Green and Low Carbon Development of China's Convention and Exhibition Industry

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Abstract. As a leading industry in the national economy, the exhibition industry has played a strong role in promoting industry development and economic revitalization, and promoting sustainable development of the exhibition industry. Therefore, it is necessary to improve the carbon footprint accounting mechanism for exhibitions as soon as possible, clarify the responsible parties for exhibition carbon emissions, scientifically determine exhibition carbon emission sources, evaluate the relationship between various emission factors and the size of influencing factors, provide reference for exhibition carbon footprint accounting, and explore various strategies and important paths to reduce exhibition carbon footprint based on the accounting mechanism. Improve policies and regulations, explore tax and financial systems, carry out digital transformation and upgrading of industries, actively introduce the application of high-tech in the exhibition field, Promote the sustainable development of the exhibition industry.

Keywords: Exhibition Industry, Green and Low Carbon.

1 Introduction

According to the International Energy Agency's (IEA) "2023 Carbon Dioxide Emissions" data, global carbon dioxide emissions reached a historic high in 2023. The report states that global energy related carbon dioxide emissions reached a record high of 37.4 billion tons in 2023, an increase of 410 million tons or 1.1% from the previous year. [1]For the convention and exhibition industry, although China's research and exploration in the field of carbon neutrality of convention and exhibition started late, the concept of carbon neutrality of convention and exhibition was gradually introduced into China through a series of international convention and exhibition activities held in China, and was known by countrymen people. Since the first carbon neutrality project of convention and exhibition activities in China was launched in 2010, the development of carbon neutrality of convention and exhibition in China is undergoing a transition period from non-governmental organizations to governments at all levels, and is also constantly exploring and improving the concept and method of green and low-carbon development of the convention and exhibition industry.

Since the proposal of the "dual carbon" target, research on carbon footprint has been continuously conducted by various sectors, and the global demand for exhibition activities continues to increase, resulting in a significant increase in carbon footprint related to exhibition activities, conference activities, and so on. Therefore, it is necessary to better study the carbon footprint of exhibitions and the carbon footprint accounting mechanism, and take effective measures to reduce the carbon footprint of exhibition activities, promoting the achievement of the "dual carbon" goal.

2 Research Background on Green and Low-carbon Development of China's Exhibition Industry

2.1 Overview of the Development of China's Convention and Exhibition Industry

According to the "2024 Annual Report on China's Convention and Exhibition Industry" released by the Asia Pacific Exhibition Research Institute, the overall data of China's convention and exhibition industry in 2023 is good. In 2023, 8505 exhibitions will be held nationwide, a year-on-year increase of 209.5%; The exhibition area was 147.6079 million square meters, an increase of 186.9% year-on-year. By 2023, the number of professional conferences with over 50 attendees will reach 1.72 million, a year-on-year increase of 44.5%; The number of festival activities with over 10000 people was 187000, a year-on-year increase of 125.3%. The exhibition industry, as an important platform and strategic leading industry to support the development of the industry, has played an important role in the development of the national economy.

In 2018, the Chengdu Development and Reform Commission released the first local carbon neutrality guidelines for exhibition activities in China, titled "Chengdu Exhibition Activity Carbon Footprint Accounting and Carbon Neutrality Implementation Guidelines DB5101/T 41-2018"; In 2019, the Ministry of Ecology and Environment issued the "Implementation Guidelines for Carbon Neutrality in Large scale Events (Trial)", which is the first implementation guideline for carbon neutrality actions in large-scale exhibition events in China; The Guiding Opinions of the State Council on Accelerating the Establishment and Improvement of a Green, Low Carbon and Circular Development Economic System (Guofa [2021] No. 4) issued in February 2021 further clarified the direction of green development in China's exhibition industry, guiding the industry to formulate relevant green standards and its own development plans and goals; In June 2021, the Beijing Municipal Administration for Market Regulation released the "Implementation Guidelines for Carbon Neutrality in Large scale Activities in Beijing DB11/T 1862-2021". Subsequently, provinces and cities such as Heilongjiang, Fujian, Hebei, Shandong, Jiangsu, and Guangdong have successively issued local carbon neutrality implementation standards for large-scale activities.

2.2 A Review of Research on Green and Low-carbon Exhibition Issues

Although issues related to carbon footprint, carbon neutrality, and carbon emissions have attracted great attention from the country. Internationally, there are discussions on the issue of exhibition carbon footprint by Japan's Yusuke Kitamura, India's Periyasamy Aravind Gandhi, and the United States' Wortzel Joshua R., while only a few scholars in China have explored it, such as Liu Zhi and Wang Jin.

Internationally, Nunberg Sarah et al. (2016) explored how to combine disassembly indicator design with lifecycle based tools and investigated the environmental benefits of disassembly design. They suggested combining disassembly design with lifecycle based principles to quantify environmental benefits and address the issue of improving products in terms of recyclability; [2] According to a study by Yusuke Kitamura et al. (2020) in Japan, the total CFP is 804.8 t-CO₂eq, with transportation (Transp, 56.0%) contributing the most, followed by planning and preparation (13.2%) and accommodation (Acc, 12.0%), souvenirs, shopping, entertainment, and sightseeing (SE, 10.1%), and food and beverage (FB, 7.9%). [3] Wortzel Joshua R. et al. (2021) conducted a cross-sectional study on the carbon footprint estimation of attendees at the annual meeting of the American Psychiatric Association (APA);[4] Gandhi Aravind et al. (2023) studied the carbon emissions and carbon neutrality prospects of virtual and physical conference modes. [5]

In China, Wang Xian (2011) analyzed the reference significance for the development of energy conservation and emission reduction; [6] Pei Chao (2021) believes that the "dual carbon" economy, as a new economic model centered around the "dual carbon" goal, has begun to become a new direction for the development of various industries in society; [7] Wang Jin (2022) analyzed in detail the definition of responsible parties, confirmation of carbon emission sources, and screening and judgment process of carbon footprint projects in the carbon footprint accounting system for exhibition activities; [8] Tang Xue (2022) identified and analyzed the carbon footprint of the Hangzhou 2022 Asian Games based on the full lifecycle assessment method. [9]

3 Research on Issues Related to Exhibition Carbon Footprint

3.1 Determination of the Responsible Party for Carbon Emissions in Exhibitions

The responsible party for carbon emissions in exhibition activities refers to who is responsible for the carbon emissions generated by each link and project of the exhibition activities. Due to the large number of participants involved in exhibition activities, it is important to clarify the appropriate responsible party. The exploration and implementation of carbon emissions from exhibition activities started relatively late. Currently, there is no unified standard for distinguishing the responsible parties for emissions both domestically and internationally. Some international sports event organizers that have explored carbon neutrality earlier determine the responsible parties based on their own characteristics. For example, the International Olympic Committee (IOC) determines the responsible party for emissions based on whether the carbon

emission project is funded by the host, and the International Federation of Football (FIFA) also uses a similar method to determine the responsible party. In addition, for organizers of exhibition activities in other fields, there has been no in-depth exploration and research on who will bear the corresponding carbon emission responsibility, and confirmation is only based on conventional logic. We can refer to the judgment methods of the International Olympic Committee and FIFA. China's exhibition activities can also adopt the principle of "whoever invests is responsible".

3.2 Determination of Carbon Emission Sources for Exhibitions

After confirming the responsible party, determine the carbon emission source based on the carbon emission projects undertaken by the responsible party. The International Organization for Standardization (ISO) divides the classification boundaries of carbon emission projects into three categories based on "direct" and "indirect" emissions in the international standard for greenhouse gas emissions, ISO 14064, namely Scope 1, 2, and 3. Based on the characteristics of the exhibition industry, Scope 1 is defined as the carbon emissions directly generated by fossil fuels from machines, equipment, and vehicles during exhibition activities; Scope 2 is defined as the indirect carbon emissions generated by the net purchase of energy in exhibition activities, such as power supply, heating, cooling, etc; Scope 3 is defined as the indirect carbon emissions generated by other projects related to the upstream and downstream of exhibition activities, such as travel, procurement, garbage disposal, etc. All carbon emission projects related to exhibition activities can be classified one by one according to this method.

3.3 Accounting Method for Carbon Emissions in Exhibitions

To achieve carbon emission reduction, it is necessary to first know the carbon emissions. Given that China currently does not have direct monitoring data on carbon emissions, accounting for carbon emissions has become the basis for studying carbon emission issues. It is found that the current accounting methods for carbon emissions can be mainly classified into two categories, namely material balance algorithm and emission coefficient method.

The material balance algorithm is based on the principle of conservation of mass in the input-output process, and quantitatively analyzes the proportion and transformation of materials in the production process. The carbon emission data obtained by this method is relatively accurate, but it requires a comprehensive analysis of the inputs and outputs in the production process, which is labor-intensive and the process is complex. The emission coefficient method is a method of calculating the total carbon emissions by converting various energy sources consumed in the production process into standard coal. Due to the general lack of comprehensive data support for exhibition projects, and the availability of emission formulas for different activities in the exhibition industry such as electricity, heat, transportation, accommodation, catering, and waste, such as DB11/T 1785-2020 (CO₂ emission accounting and reporting requirements for the service industry), the use of emission coefficient method in carbon

emission accounting for exhibitions is more in line with the actual situation of the exhibition industry.

3.4 Research on the Influencing Factors of Carbon Emissions in Exhibitions

Compared with other industries, exhibitions have their own industry characteristics. Every exhibition, festival event, conference forum, sports event, social event, etc. has a complete closed loop consisting of various stages such as initiation, planning, preparation, execution, and closure. This closed loop is defined as the life cycle of the event. For organizers of exhibition activities, the full lifecycle boundary of exhibition activities includes three stages, namely pre event, event execution, and post event. Using the definition of the full lifecycle to identify and determine the carbon footprint of each stage of the exhibition activity, the purpose is to systematically and comprehensively sort out the entire exhibition activity and improve the accuracy of its total carbon footprint in accounting. Therefore, the Life Cycle Assessment (LCA) method can be used to systematically identify, determine, and evaluate the carbon footprint items in the three stages of the exhibition activity lifecycle, in order to explore the influencing factors and accounting formulas of exhibition carbon footprint emissions, and provide reference for exploring emission reduction paths. introduction

4 Exploration of Green and Low Carbon Development and Carbon Emission Reduction Path in China's Convention and Exhibition Industry

Exhibition activities, especially large-scale events, have significant hidden carbon emissions such as electricity, transportation, accommodation and catering, and conference supplies, as well as emissions from waste disposal. Carbon neutrality is an inevitable path for large-scale events. Although the exhibition industry is not one of the eight key emission industries included in China's carbon emissions trading market in the first stage, each industry has an inescapable responsibility in the context of dual carbon. The exhibition industry is no exception. We can explore the green and low-carbon development and carbon reduction path of China's exhibition industry from the perspectives of policy and legal path, tax and financial path, industrial optimization path, and technological development path.

Firstly, in terms of policies and regulations, it is necessary to refine and improve as soon as possible and actively promote the implementation of carbon neutrality rules and regulations for large-scale events, clarify the carbon emission responsibility subjects for various activities and links in the exhibition industry, clarify the carbon footprint accounting projects, carbon offset methods, carbon neutrality time requirements, and carbon credit project types for exhibitions, especially the application of carbon sequestration forest methods under the forest carbon sink project in China's voluntary greenhouse gas emission reduction trading mechanism in the exhibition industry; Secondly, in terms of taxation and finance, we will follow up on the carbon tax systems of various countries and explore the role of carbon taxes on exhibition projects

in driving the upgrading of the exhibition industry and promoting green development through emission reduction; Again, in terms of industrial optimization, clarify the carbon dependence and degree of each link in the exhibition industry chain, actively explore industrial optimization paths in exhibition construction, logistics transportation, venue construction and management, project operation, digital transformation and upgrading, etc; Finally, in terms of technological development, we will actively introduce the application of high-tech in the field of exhibitions, develop digital exhibitions and smart exhibitions, and use big data, cloud computing, the Internet of Things, and other technologies to assist in the progress of exhibition technology and green and low-carbon transformation. We will implement specific "digitalization", "integration", and "greening" measures to support green exhibitions and promote the sustainable development of the exhibition industry.

5 Conclusion

It is necessary to improve the exhibition carbon footprint accounting mechanism as soon as possible, clarify the responsible subjects of exhibition carbon emissions, scientifically determine the exhibition carbon emission sources, provide reference for the accounting of the carbon footprint of exhibitions, and explore various strategies and important paths to reduce the carbon footprint of exhibitions based on the accounting mechanism. Improve policies and regulations, explore tax and financial systems, carry out industrial optimization in digital transformation and upgrading, actively introduce the application of high-tech in the exhibition field, and promote the sustainable development of the exhibition industry.

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