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Abstract: This paper first describes the current domestic and foreign related carbon emissions accounting methods, to discuss the fundamental principle of the accounting methods, and the analysis of the characteristics of different kinds of accounting methods; Secondly to port ship the shore power technology at home and abroad research literature on greenhouse gas measurement and analysis; At last, according to the situation of our country's port, the Countermeasures of greenhouse gas emission reduction in our country are analyzed and related suggestions are put forward.

Introduction

With the economic rapid development and international trade volume growing, the ship has become a water transport essential tool, but the ship caused by greenhouse gases and the problem of environmental pollution has become worse. Previous vessel port period generally use built-in auxiliary engine power to supply electricity on the ship. Auxiliary power (mainly rely on marine diesel generator) in working process will be a lot of gaseous pollutants emissions, these air pollutants will have a serious impact on the surrounding environment. Marine shore power technology during the ship in port to is suspend the use of auxiliary power and shore power connection ways of power supply so as to meet the requirements of ship power[1]. For example, the port of Los Angeles took the ship to shore power technology, during which effectively reduces the carbon dioxide (CO₂), nitrogen oxides (NOₓ), sulfur oxides (SOₓ) and gaseous pollutants emissions[2]. For Port side and the ship, ship berthing using shore power technology can reduce about 30% of the fuel cost [3], social and environmental benefit and economic benefit is obvious.

Our shipping trade volume increased gradually, at the same time, greenhouse gas emissions are also increasing. In our country with a large number of ports, and environmental pollution problems to more serious. How to manage and control greenhouse gas emissions, how to build “green port” that becomes our country urgent important topic. This domestic and foreign experts have carried out the research on greenhouse emissions gas, the content of the research is mainly to the calculation of carbon emissions carbon reduction technology and greenhouse gas research emissions port ship shore power technology measure research, also the research results appear constantly.

Greenhouse Gas Emissions estimates Research status

Greenhouse Gas Emissions Estimates Research Status Abroad

Since the international proposed to develop low-carbon model, experts and scholars from various countries have participated in this research. At present, the research methods of carbon emission accounting are divided into four categories:
IPCC list method: In 1996, the United Nations Intergovernmental Panel on climate change (IPCC) between the revised version of <National Greenhouse Gas Inventory Guidelines> provides a greenhouse gas emissions accounting methods, this calculation method for <UN Climate Change Convention> provides support[4].

Field measurement method: This is after collecting and discharging gas, and the gas velocity and flow rate, the concentration of each parameter were measured, and then calculate the gas emissions can be obtained. Requirement is the collected gas samples have a representative, so the measurement is usually from the environmental monitoring station to collect the required data[5].

Material balance algorithm: This calculation method is to the law of conservation of mass based, that is in units of time into the material quality of a system is equal to the system by the output material quality. So the material balance method is according to the production process of raw material and products between the quantitative relationship between the conversion, the utilization of raw materials to take quantitative analysis [6].

Model factor decomposition method: This is the domestic and foreign research scholars explore the impact of carbon emissions by more method, this method can be more convenient to study how to effectively reduce CO₂ emissions, and carry on the quantitative analysis of the various factors effect on CO₂ emissions, based on proposed CO₂ emissions and impacts due to the interaction between biotin. Both at home and abroad, many scholars to study and construct all kinds of model [7].

For carbon emissions measurement, evaluation, influence factors and so on, a lot of work on research scholar, such as Weber[8] and Lenten[9] were constructed different evaluation models, quantitative analysis of Germany, the Netherlands, Australia and other countries of the greenhouse gas emissions. Shyamal[10] on Influencing Factors of carbon emissions in India were studied, and sums up the four factors: 1. GDP change; 2. the influence of industrial structure; 3. the impact of energy intensity; 4. the energy emissions impact.

Greenhouse Gas Emissions Estimates Research Status in China

Ying Han[11] with the IPCC listing method to measure carbon emissions in iron and steel industry in China, that conclusion is: the most effective emission reduction path is to optimize the energy consumption structure. Jian-Xei Sun[12] and others in the IPCC listing method of our country on the basis of calculated the annual carbon emissions in the past. Xue-Na Wang[13] and others analyzed about the interactive mechanism between the factors affecting carbon emissions, to use the method of system modeling and simulation, Simulation of carbon system and measure of carbon emissions. Zhong-Hai Ma[14], based on correlation analysis theory, coefficient of energy emissions do detailed budget, then on carbon emissions. Guo-Quan Xu[15] constructed the basic formula of carbon emissions, and use this formula to measure the carbon emissions in China.

Guo-Quan Xu[16] and others after the construction of basic formula of carbon emissions, and build the factor decomposition model of China's per capita carbon emissions, to China from 1995 to2004, this decade to quantitative analysis, the conclusion is obtained that the factors of carbon emissions per capita in China include: energy structure, energy efficiency and the development of the economy.

Port Shore Power Technology Greenhouse Gas Measurement Research Status of the Ship

Current Situation of Research on Greenhouse Gas Calculation of Offshore Technology in Foreign Countries

The International Maritime Organization (IMO) is a global shipping greenhouse gas emission reduction advocates, in 1997 the International Convention for the prevention of pollution from ships (MARPOL) of the conference of the States parties, the international maritime organization will be on all the ships of the survey, understand the general situation of the greenhouse gases (CO₂), estimates the global marine transport emissions of greenhouse gas emissions, and to develop greenhouse gas (CO₂) emission reduction measures [17].
International port guidance document of the greenhouse gas emissions[18] as shown:

GHG protocol: The greenhouse gas protocol is frequently used on the international carbon emission calculation tool, because the greenhouse gas protocol more comprehensive greenhouse gas accounting standard and computing framework. In the actual port on carbon emissions estimates, usually by greenhouse gas protocol standards into the bank’s estimates.

Air quality and greenhouse gas tools: This tool system in the port application research, you can get the air, climate change and the relationship between the port, the port for carbon emissions related recommendation.

Carbon footprint guidance document: The purpose of the carbon footprint guidance document is to provide technical guidance for the carbon footprint of the port.

Corbett and Koehle[19]: using “bottom-up” modeling method of 2001 global diesel ship greenhouse gas emissions for the power were calculated, respectively, obtained the 912 * 106 tons and 813* 106 tons of greenhouse gas emissions.

The European Union is an active advocate of the global shipping industry greenhouse gas emission reduction, in 2013 the IMO convention proposed to began to plan the implementation of the European Union Shipping carbon emission reduction strategies, their ideas are to establish a stable monitoring, verification and reporting system[20].

Kågeson[21] established a global carbon emissions trading system, this is in total control and emissions trading principles based, on marine transportation shipping industry and the creation of the system; Stochniol[22] established shipping carbon emission reduction system, the total control and carbon tax system is in the system evolution to. The carbon tax system is a dynamic system, it is mainly oriented international marine transport ship adopt mandatory measures to collect carbon to discharge duty, urge the shipping business to implement energy-saving emission reduction work; Baron R[23] construct economic entity of voluntary commitment system, which is according to the international maritime traffic transport industry, the establishment of the emissions trading system can be carried out.

Current Situation of Domestic Research on the Measurement and Calculation of Greenhouse Gas by the Technology of Ship Shore

Xue Zhang[24] in published <Ship Air Pollutants Evaluation Method Research> thesis analysis the manual calculation method, load calculation method and fuel consumption calculation method, calculated the ship's greenhouse gas emissions and the three evaluation methods advantages and disadvantages, and nitrogen oxides, sulfur oxides, carbon monoxide as the ship air pollutants the most important evaluation factors, based on design and create the evaluation model of ship air pollutants; Zun-Hua Zhang[25] in published <Port System Energy-Saving Emission Reduction Evaluation Method Research> we will port system as the research study objects, constructed the evaluation index system of energy saving and emission reduction in port and shipping system, and the evaluation index system for evaluation of the port and waterway system energy conservation and emissions reduction to give a reference basis; Man-Ping Xu[26] and others in published <A Simplified Method for the Detection of Nox Emissions from Ships> this article are given in the NOx emissions to simplify the calculation of testing and NOx emissions.

Currently in constructing low carbon international port, “green port” has achieved good results, however, there are few domestic researches on the measurement of greenhouse gas by the ship shore power technology. Domestic scholars mainly through the analysis of foreign port low carbon development experience and comparison of the status of China's port construction, using qualitative methods, research on how to construct low carbon port puts forward relevant strategies, but for the port there is little research that is the actual measurement of greenhouse gas emissions.
Port Greenhouse Gas Emission Reduction Countermeasures

As the port industry to the concept of energy conservation and emissions reduction promotion, at present port management departments of all countries to strengthen the vessel pollution control, and special activities work in port environmental protection and energy saving, among them to promote the use of shore power technology is the main content of the ship. At present the domestic each big port has been carried out beneficial exploration, and has achieved initial success, the technology also the main port in China has been popularized and applied. Berthing of ships using shore power technology not only can reduce greenhouse gas emissions, but also bring economic benefits and social benefits to the Port side and the ship. Port using shore power technology of energy saving and emission reduction effect is remarkable, but technology is not very perfect and for port reduction, there are still many unsolved problems in the research on the Countermeasures of greenhouse gas emission.

Determine the Scope of the Greenhouse Gas Emissions Accounting

Port of greenhouse gas emissions accounting scope mainly from the port ships using shore power, fuel consumption of greenhouse gases produced and using shore power after the burning of fossil fuels produces greenhouse gases. Greenhouse gas emissions accounting content includes: 1. establish greenhouse gas emissions baseline; 2. the project boundary determination and data analysis; 3. establish greenhouse gas (CO₂) emission index system method system; 4. establish the guiding document, easy to practical application.

Construction of the Accounting System of the Greenhouse Gas Emission in the Port

Through literature research, on-the-spot investigation and the expert opinions, to establish a set of scientific and feasible to obtain the key parameters of the survey method, get performance index, pollution emission coefficient, the key parameters. Combined with existing data, set up port greenhouse gas emissions accounting system, proposes the effective control methods and techniques of ship emissions.

The Development Strategy and Suggestion of our Country's Port

At present, there are three sources of greenhouse gas emissions from domestic ports: 1. a ship docked at the port fuel consumption; 2. port power consumption; 3. port fuel consumption. How to control and reduce the three emission source, is the important content of building a “green port”. research on the present situation of the port of our country, the international ocean shipping organization should first understand the status of the ship's emissions of greenhouse gases, research work on greenhouse gas emissions index, and the collected data are summarized, establish database of ship emissions of greenhouse gases, create problems timely submitted to the relevant research structure.

Followed by scientific and reasonable arrangement of work, improve the berth efficiency. To ships in the harbor of greenhouse gas emissions, so the construction of green and low carbon port priority is reasonable arrangements for the time of operation, according to “the shore discharging first” the principle of “shipment priority” to distribution job instructions, increase trailers in reprint rate, improve efficiency, reduce the ship Dock in port during the period of greenhouse gas emissions. To solve this problem from two aspects: 1, shortening the ship in port waiting time, the scientific deployment method of port cargo, the ship docked position and operation sequence of reasonable arrangement, shortening the ship Dock in port stopping time; 2. High ship energy use efficiency, the main method is the use of shore power technology, loading and unloading machinery, oil and other means to reduce the emissions of greenhouse gas emissions.

The last is to study all kinds of emission reduction measures, to build a low carbon port development management system, to explore the countermeasures of China's greenhouse gas emissions.
Summary
At present, there is relatively more research on the other shore power technology in domestic and overseas, mostly concentrated to the shore power system technology research and development, in view of the calculation method of greenhouse gas, the corresponding calculation method of greenhouse gas is very few. How to shore power technology as the basis of a set of a berthing of ships using shore power on greenhouse gas emissions measurement methods, which has far-reaching significance. This calculation method can be used for the calculation of greenhouse gas in China's port and offshore projects, monitoring to provide technical guidance. It is of great significance to carry out energy conservation and emission reduction in our country.

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