

Container Ports Multimodal Transport in China from the View of Low Carbon

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Abstract

The study uses the carbon dioxide emission calculation model published by IPCC to measure carbon dioxide emissions and fuel inputs of the three types of multimodal transport (road-sea, railway-sea, and river-sea) in ports of China. Then, we make a case study on Shanghai port. Combined with carbon taxes launched around 2012 in China, this paper calculates the carbon taxes on the three types of multimodal transport and makes a pairwise comparison between roadway/railway, roadway/waterway and waterway/railway. The results show that increasing the proportion of railway-sea transportation and river-sea transportation to a reasonable level will achieve great energy saving, emission reduction, and economic benefits. According to different transportation network features, this paper applies Cluster analysis to raise separately suggestions for long-term development of coastal container ports in China based on low-carbon thinking.

Key words : Low carbon port, multimodal transport, Carbon dioxide emission, Cluster analysis

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I. Introduction

Global warming is getting more and more attention. The whole society focuses on the low carbon and many experts do low carbon studies on industries. However, there is little research on low-carbon ports. According to the data from United Nations, since 1990, the emission of greenhouse gas from global trading vessels has increased by 85% and the emission of greenhouse gas from the shipping activities each year accounts for more than 3% of the global gross emission, which exceeded that of all the economic departments of the United Kingdom putting together. Therefore the study that focuses on the necessary and feasibility of developing low-carbon ports is urgent.

Low carbon economy means an economy model based on the low power consumption, low pollution and few carbon emissions. Although port industry makes remarkable economic benefits, it causes serious damages to environment meanwhile. Shipping and hinterland transportation account for a large proportion of the world's energy consumption and carbon emission. If the transport modes can be adjusted, from the perspective of energy saving and the reduction of carbon emission, the low-carbon development in seaport will be realized feasibly.

This paper attempts to provide data support and practical guidance for building low-carbon ports. Shanghai port, the largest scale and highest reputation port in China, has been chosen as a case for empirical study. This paper is divided into six parts. The first part is introduction. It introduces the background, methodology and objective of the paper. The second part includes literature review and background of low carbon ports in China. The third part is CO₂ emission of multimodal transport. It introduces the method to calculate CO₂ emissions of transportation and estimates the CO₂ emissions of the three multimodal transport modes, road-sea, rail-sea and river-sea transport. Then, it compares the structure of multimodal transport system of seaports between China and Europe.

The fourth part is empirical study of low carbon port based on the case of Shanghai port. In this part, it compares the three types of multimodal transport of Shanghai port in CO₂ emissions and energy inputs. It also analyzes the

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