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*"Gheorghe Asachi" Technical University of Iasi, Romania*


# GREEN INVESTMENT AND OPERATIONAL PROBLEMS FOR POWER SUPPLY CHAIN CONSIDERING DUAL MARKETS AND GENERATION RIGHTS TRADING

**Jingrui Jiang[1], Xi Yang[1], Zhuxiu Wang[1], Chunjuan Zhao[1], Xuanxuan Mao[2*], Wenliang Bian[2]**

*[1]Economic and Technological Research Institute of State Grid Gansu Electric Power Company, Lanzhou 730000, China*
*[2]School of Economics and Management, Beijing Jiaotong University, Beijing 100044, China*

## Abstract

In a context where major players in the power industry are placing increased emphasis on green development, participants within the power supply chain are presented with a broader array of technological options and channels for curbing carbon emissions in their operational decision-making processes. Navigating this intricate landscape demands a deeper well of knowledge to guide optimal decision-making. This study examines the decision-making challenges faced by a power supply chain comprising a thermal power producer, a power distributor, and a significant power consumer. First, we establish a Stackelberg game model to analyze the equilibrium of this scenario, taking into account the combined influences of the carbon trading market and the power trading market. Second, we enhance our game model by introducing a generation rights trading process into the power trading market, integrating it with a three-stage bargaining process to uncover the supply chain's optimal decisions. Subsequently, a numerical analysis is conducted to provide valuable managerial insights. Our findings highlight that an increase in the low-carbon preference of large power consumers encourages thermal power producers to invest in low-carbon technologies, thereby augmenting the rate of carbon reduction. Simultaneously, a rise in carbon prices facilitates the low-carbon transformation and development of the power supply chain, although increased investment costs in low-carbon technologies exert a negative influence. Furthermore, our analysis demonstrates that while generation rights trading may not always yield direct benefits for supply chain participants, it plays a crucial role in reducing carbon emissions across the entire supply chain, thereby promoting the sustainable development of the power industry.

*Key words:* carbon trading market, generation rights trading, green investment, green supply chain management, power trading market

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[*] Author to whom all correspondence should be addressed: e-mail: 22110185@bjtu.edu.cn; Phone: +86-010-51687040; Fax: +86-010-51684925