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DRIVING FACTORS OF PROVINCIAL CO₂ EMISSIONS IN CHINA’S STEEL INDUSTRY: AN LMDI APPROACH

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Abstract

As a major contributor to China's greenhouse gas emissions, the steel industry plays a pivotal role in achieving national carbon-peak and carbon-neutrality goals. To identify the key factors driving and constraining CO₂ emissions, we employed the Logarithmic Mean Divisia Index (LMDI) to decompose the factors influencing CO₂ emissions from China's steel industry at both national and provincial levels from 1997 to 2019. At the national level, we identified the energy consumption level per unit of steel (cumulative contribution rate, -62.54%; consistent negative values during 1997–2019) as the primary factor suppressing CO₂ emissions, whereas per capita GDP (128.64%, consistent positive values during 1997–2019) and population (7.00%) were the dominant driving factors. At the provincial level, the dominant influencing factors were significantly heterogeneous. For example, industrial development in Hebei and Jiangsu was strongly dependent on energy resources, whereas that in Inner Mongolia was limited by a failure to reduce the energy consumption level per unit of steel, both of which led to increased CO₂ emissions. The industrial CO₂ emission intensity and industrial structure coefficient promoted CO₂ emissions during rapid economic development (2001–2006) but inhibited emissions during other periods. By highlighting the need to tailor differentiated emission-reduction strategies to the dominant influencing factors in each province, this study provides a scientific basis for achieving carbon peak and carbon neutrality in China's steel industry.

Key words: CO₂ emissions; driving factor analysis; LMDI method; steel industry

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