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KEY FACTOR DECOMPOSITION AND SCENARIO PROJECTION ANALYSIS OF CARBON EMISSIONS UNDER DOUBLE-CARBON: EVIDENCE FROM HEBEI PROVINCE, CHINA

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Abstract

Addressing the unprecedented growth in China's carbon dioxide emissions over the past few decades and, to that end, realizing efficiency gains in emission reductions under the " Double Carbon " target is critical. This is significant for the development of China's green economy. Hebei Province is a major province in China in terms of energy consumption and carbon emissions. This research utilizes the IPCC emission factor method to calculate the total carbon emissions in Hebei Province from 2000 to 2021. Furthermore, it applies the Generalized Divisia Index Method (GDIM) to analyze the driving factors of carbon emissions in Hebei Province and utilizes a Multilayer Perceptron (MLP) model to predict the carbon emissions in the region. The results show that from 2000 to 2021, the total carbon emissions in Hebei Province showed an overall upward trend, while energy intensity showed a downward trend. Economic growth is the main driving factor for carbon emissions growth, while carbon intensity of output is the main factor inhibiting carbon emissions. The MLP neural network model can effectively predict carbon emissions, and the prediction results show that Hebei Province will achieve carbon peaking in 2029, 2027, and 2026 under the baseline scenario, low-carbon scenario, and enhanced low-carbon scenario, respectively.

Key words: carbon emissions, carbon peak, driving factors, GDIM, MLP prediction

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