

Research on the Spatiotemporal Dynamic Evolution of China's New Quality Productive Forces in Energy

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Abstract

The development of new quality productive forces in the energy sector tailored to local conditions is directly linked to national energy security and the green transition of economic and social development. Based on the United Nations Sustainable Development Goals for clean energy and China's carbon peaking and carbon neutrality strategy, this paper constructs a multi-dimensional indicator system for new quality productive forces in the energy sector, and measures the level of such productive forces across 31 provinces in China from 2013 to 2022 using a machine learning model. Combined with Moran's I index, Dagum Gini coefficient, spatial Markov chain and kernel density estimation, this paper analyzes the spatiotemporal dynamic evolution rules of the aforementioned level, and forecasts its future development trend. The findings are as follows: First, the overall level of China's new quality productive forces in the energy sector presents a growing trend, with significant regional development disparities. The eastern region maintains a sustained lead, the central and western regions achieve steady growth, while the northeastern region has long been at a low level with weak growth momentum. Second, China's new quality productive forces in the energy sector have not formed a significant spatial agglomeration pattern, but a spatial lock-in effect exists. The overall disparity has gradually shifted from being dominated by the intensity of transvariation in the early stage to being dominated by inter-group disparity. Third, from 2030 to 2060, China's new quality productive forces in the energy sector will maintain steady growth, with regional balance gradually optimized. The eastern coastal provinces will continue to lead, while the northeastern region will remain at a relatively low level. Against the backdrop of the carbon peaking and carbon neutrality strategy, measuring China's new quality productive forces in the energy sector and revealing its spatiotemporal dynamic evolution characteristics can provide scientific empirical support for accelerating the construction of a new energy system and advancing carbon peaking and carbon neutrality in an active and prudent manner.

Keywords

New Quality Productive Forces, Energy, Spatiotemporal Dynamic Evolution, Machine Learning, Carbon Peaking and Carbon Neutrality Goals