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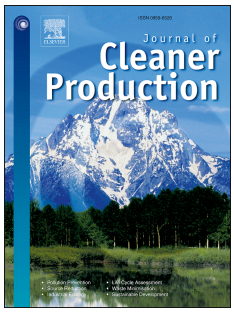

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Industrial eco-efficiency in China: A provincial quantification using three-stage data envelopment analysis

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Abstract: The coordinated development of industrialization and the ecological environment is vital to achieve ecological civilization in China. Integratively considering the economy, energy and resources, and environment, this study aims to measure the industrial eco-efficiency of 30 provinces (autonomous regions and municipalities) in China between 2005 to 2013. A three-stage data envelopment analysis (DEA) modeling approach is adopted to eliminate interference of the external environment and statistical noise with industrial eco-efficiency measurement. The results show that regional industrial eco-efficiency in China is affected by the factors of the environmental regulation, technological innovation, level of economic development and industrial structure. After eliminating the impacts of external environment and statistical noise, China's national average industrial eco-efficiency declines by 30%. Between 2005 to 2013, the industrial eco-efficiency of the 30 provinces increases but at different rates of growth. The variation of overall regional industrial eco-efficiency is primarily caused by scale efficiency. Furthermore, all the 30 provinces are classified into four groups to interpret the causes of variation and differences of regional industrial eco-efficiency. In general, the management and technology level and the economy of scale of industries should be improved simultaneously, even though specific opportunities for industrial

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