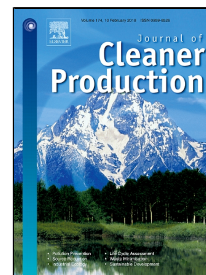


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Energy efficiency in China's iron and steel industry: Evidence and policy implications

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Abstract

Currently, the iron and steel industry (ISI) accounts for more than 16% of China's total energy consumption. Improving energy efficiency (EE) and promoting energy savings in this industry have vital significance for China's further sustainable development. Using provincial panel data from 2000-2014 and meta-frontier data envelopment analysis (DEA), this paper investigates EE and the energy-saving potential (EP) of China's ISI by considering regional technology heterogeneities. The results show that (1) from 2001 to 2014, EE in China's ISI achieved significant improvement. Technological progress is the most powerful driving factor, while the declines in scale efficiency and pure technical efficiency are two obstructive factors; (2) the sources of energy inefficiency (EI) show distinct spatial difference characteristics. EI in the eastern region mainly stems from scale inefficiency and pure technical inefficiency, while that in the central and western regions stems from three aspects of scale inefficiency, pure technical inefficiency, and technology gap; and (3) there is considerable EP in China's ISI, which represents nearly 80% of ISI's current total energy consumption. Because the sources of EP vary across regions, the focus of future work for China's regional ISI should also vary.

Keywords: meta-frontier; DEA; global Luenberger index; technology gap; EE; China

1. Introduction

Due to the economic boom, the ISI in China has enjoyed rapid growth. Fig. 1 indicates that from 2000 to 2014, the production of pig iron and crude steel increased sharply. In the meantime, China's share of world steel production and use increased from less than 20% to more than 40%. However, this remarkable development is driven by a distinct energy-intensive mode. As shown in Fig. 2, from 2000-2014, energy consumption in the ISI of China increased from less than 200 million tons (Mt) to more than 700 Mt. In 2014, the ISI's share of China's total energy consumption was more than 16%. In addition, because energy in China continues to be dominated by coal, the enormous amount of energy consumption by the ISI has triggered a series of environmental problems. To achieve cleaner production and sustainable development, the Chinese

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