

Driving forces of changes in CO₂ emissions of China

Topic: Modelling energy use and production in interindustry models

Author: Chen Pan

Co-Authors: Jianwu HE, Shantong LI, Dequn Zhou

After the rapid growth in CO₂ emissions of China between 2002 and 2007, changes have happened in China's CO₂ emissions. After 2007, the growth rate has declined, and the roles of the provinces and sectors have been changing. However, the driving forces behind these changes have not been investigated at the provincial level. To identify the key driving forces behind the changes in CO₂ emissions of China, we perform a two-stage, six-factor Structural Decomposition Analysis based on China's most up-to-date provincial Multi-Regional Input-Output tables for the period 2002-2012. The changes are decomposed into effects from changes in CO₂ intensity, production structure, sources of intermediate use, sources of final demand, products mix of final demand, and scale of final demand.

The results show that (1) the dominant demand of the growth in China's CO₂ emissions has shifted from investment led by the eastern provinces and exports in 2002-2007 to investment alone in 2007-2012, with the largest contribution from the western provinces; (2) the CO₂ intensities of resource-based high-emission sectors continuously improved from 2002 to 2012, but some sectors with low final CO₂ intensities but high industry chain emissions, such as the construction sector, indicated high carbonization trend; (3) the changes in the sector structure of final demand have contributed to the increase in China's CO₂ emissions, mainly caused by higher shares of electricity and equipment; (4) structure of the product sources helped decrease CO₂ emissions in 2002-2007, but led to an increase in CO₂ emissions in 2007-2012, mainly because the sources of products have shifted from the eastern provinces with low CO₂ intensities to those eastern provinces with relatively high CO₂ intensities and the less developed central and western provinces.

These findings suggest that in the future, more attention should be given to the central and western provinces, as well as the rapidly-increasing investments. Not only the improvement of CO₂ intensity, but also the decarbonization in production structure should be highlighted. In addition, efforts should be made to improve the demand structure from the perspective of emission mitigation.