Multi-regional input－output analysis for energy requirements and CO_2 emissions in China

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Abstract

(1) Overview

Energy is one of the most important material bases for the economic growth and social development of a country or region. Scientific forecasts and analysis of energy consumption will be of great importance for the planning of energy strategies and policies. With a vast territory such as those to be found in the regions of China, there are differences in physical geography, local economies, demographics, industry structure, etc. In particular, there are prominent differences between the most-developed coastal regions and the central and western part of China. Such variations lead to obvious discrepancy amongst their energy reliance and energy-requirement structure. In order to facilitate harmonious development of energy and economic composition in all regions, and to avoid the biases caused by merely considering scenarios at the national level, it is of great importance to further study the future energy requirements at the regional level as well as at the national level (Fan et al., 2007; Wei et al., 2006). Such a study is of great help when considering local requirements and to support regional energy development programs, and to harmonize resource-based advantages among/between regions. What is more, the analysis of future regional CO_2 emissions could serve to provide academic bases for the allocation of environment-related rights and obligations among/between regions in future.

(2) Methods

In this study, China is divided into eight economic regions. A multi-regional input－output model (Miller and Blair, 1985) for energy requirements and CO_2 emissions in China was established, and employed to perform scenario and sensitivity analysis for each economic region in year 2010 and 2020.

(3) Results

Regional energy requirements for year 2010 and 2020 are presented in Figs. 1 and 2, respectively. From Figs. 1 and 2 it can be seen that, in both analysis years the Central region occupies the largest share of total national energy requirements, whose share would be 25.22 – 25.75% in year 2010 and slightly less to 22.55 – 23.63% in year 2020. The smallest shares were occupied by Beijing-Tianjin in both analysis years, in all scenarios.

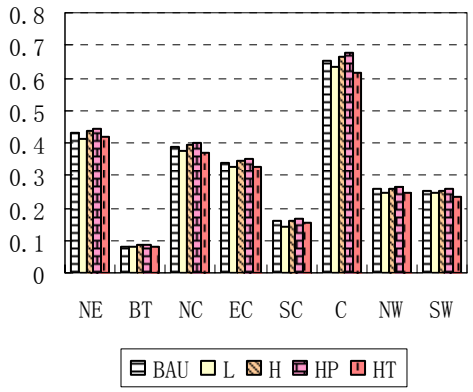

Fig. 1. Regional energy requirements for year 2010 (billion tce)

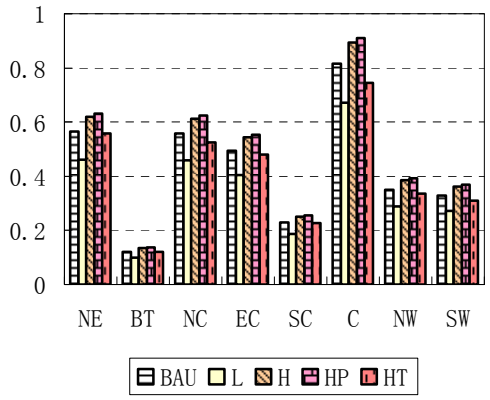

Fig. 2. Regional energy requirements for year 2020 (billion tce)

Other results of this study include regional energy requirements by fuel types, i.e. coal, crude oil and natural gas, regional CO_2 emissions in both total and per capita, regional energy/emission intensities, etc.

(4) Conclusions

Results of this study show that up to year 2020, improvement in energy end-use efficiency for each region could generate intra-regional energy savings. Therefore, continuing efforts should be taken to advance improvements of energy end-use efficiency for each region. At the national level, the effectiveness of inter-regional energy transfers, and efficiency improvements in Central and Northwest regions should be accelerated as much as possible. However, population growth will be an obvious driving force for additional energy requirements and cause greater CO_2 emissions across all regions. This demand will increase with the growth of the economy and improvement in household incomes. Population growth in one region will not only significantly affect energy requirements of the region itself, but also drive up energy requirements of the other regions. During this important period in time when China is making efforts to build a well-rounded society, the basic state policy of family planning should be enforced for each region.

References

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