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基于多区域投入产出(MRIO)的中国区域居民消费碳足迹分析

### Carbon footprint accounting of regional household consumption in China through multi-regional input-output model

关键词: [碳足迹](#) [居民消费](#) [多区域投入产出](#) [可持续消费](#) [间接碳排放](#)

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**摘要:** 近年来,居民消费活动和环境的关系逐渐受到关注,而与温室气体排放相关的研究更是其中的热点.因此,本文采用"居民消费碳足迹"概念来定义特定居民消费活动所导致的直接和间接温室气体排放的总和,主要包括CO<sub>2</sub>、CH<sub>4</sub>、N<sub>2</sub>O 3种温室气体;构建了基于环境扩展的多区域投入产出(Multiregional input-output, MRIO)模型的碳足迹核算方法,并以2007年中国8个区域为例对其居民消费碳足迹的数量、构成、分布及转移进行了分析.结果显示,2007年全国居民消费碳足迹总量达到31.74亿t(以CO<sub>2</sub>当量计).此外,碳足迹还呈现出区域差异明显、间接排放大于直接排放、城乡差距过大等特征.人均碳足迹方面,发展水平较高的京津、东部沿海地区明显高于相对滞后的西北、西南区域.研究还对碳足迹的区域分布和转移进行了深入探讨.结果发现,东北、京津、西北和西南区域转移收支为负,表示这些区域为其他区域承担的排放大于其他区域为其承担的排放;剩余的北部沿海、东部沿海、南部沿海和中部区域情况则正好相反.这些结果对现阶段中国制定具体区域消费政策或分配碳减排责任等具有参考价值;本研究的方法论也适用于研究其他环境因子及足迹因子与居民消费的关系.

**Abstract:** The relationship between household consumption activities and environment has been frequently discussed in recent decades, among which the greenhouse gas (GHG) emissions associated with household consumption are of the greatest interests. The concept of "carbon footprint (CF) of household consumption" was adopted in this study to identify the total greenhouse gases (mainly carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O)) caused by consumption activities directly and indirectly. An extended multi-regional input-output model is then built for CF accounting. As a case study, the quantity, constitution, distribution and transformation of household consumption CF between eight regions in China were investigated. The results showed that the CF amount of China reached 3174 million tons. There were big differences between urban and rural area, and the indirect emissions were greater than the direct emissions. In terms of CF per capita, the economic developing areas like northeast area and northeast were higher than the economic developed areas like Beijing-Tianjin and eastern coastal (EC) area. The CF distribution and transformation between regions was also investigated. The CF emissions from NE China that were taken by other areas are greater than those from other areas that were taken by NE China, with similar case for Beijing-Tianjin, NW China, and SW China. In comparison, coastal areas and central China are in an opposite situation. The results of this study are useful for the formulation of the specific regional consumption policy and carbon emission reduction distribution responsibilities. This MRIO framework is also applicable to study the relationship between household consumption and other environmental and footprint factors.

**Key words:** [carbon footprint](#) [household consumption](#) [multiregional input-output](#) [sustainable consumption](#) [indirect carbon emissions](#)

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