

A Study on the Classification Reconstruction of Chinese Villages and Key Influencing Factors of Carbon Emissions from the Perspective of Rural Housing Construction

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Abstract : The world is currently facing both climate change and an ecological crisis. In response to these challenges, China has set the Carbon Peaking and Carbon Neutrality Goals to mitigate environmental impacts. Concurrently, the country is advancing a rural revitalization strategy, placing significant emphasis on rural development. Rural housing plays a central role in the lives of farmers, and there is a strong demand for improving the quality of these homes as part of their aspiration for a better life. Carbon emissions associated with the construction and operation of rural housing are a significant contributor to the overall carbon emissions in rural areas. To meet China's carbon reduction goals, it is crucial to develop effective strategies for decarbonizing rural housing, achieving a balance between enhancing housing quality and controlling carbon emissions. Given the vastness of China's rural areas, the economic development, natural environment, and other conditions vary significantly across regions, resulting in considerable disparities in agricultural housing construction. Therefore, classifying and restructuring villages based on the characteristics of rural housing construction, and identifying key factors influencing carbon dioxide emissions in these different categories, are essential steps for achieving carbon reduction in rural areas. In this study, data on rural housing construction and socioeconomic conditions from 132 counties across 28 regions in China were collected through field surveys, and the CO₂ emissions were calculated. Using the k-means clustering method, the villages were categorized into three types, and spatial visualization was then carried out using ArcGIS. Lastly, the heterogeneity of these three types of villages was analyzed and compared, and 14 indicators, such as housing construction elements and CO₂ emissions, were quantitatively assessed using statistical methods like correlation analysis. The results indicate that modernized and developed villages have the largest proportion, and their distribution in China follows a pattern of 'higher in the south, lower in the north' and 'higher in the east, lower in the west,' with a gradual decrease across regions. Additionally, it was found that there is a strong correlation between rural housing construction indicators, such as the degree of kitchen modernization and the vacancy rate of farmhouses, and the carbon dioxide emissions of villages in this category. Based on the perspective of rural housing construction, this study reconceptualizes the classification of Chinese villages and explores the key factors influencing carbon emissions in order to help policymakers design more targeted decarbonization strategies for rural housing. Ultimately, this approach supports a balance between reducing carbon emissions and improving the quality of rural housing in the future.

Keywords : carbon dioxide emissions, environmental regulations, residential carbon emissions, rural areas, sustainable development

Conference Title : ICAE 2025 : International Conference on Applied Energy

Conference Location : Tokyo, Japan

Conference Dates : April 17-18, 2025