

Study on sustainable development of rural household energy in northern China

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Abstract

The status of rural household energy consumption plays an important role in farmers' daily life, especially in developing countries or regions. Here, we review the evolution of the rural household energy consumption structure in northern China from 1996 to 2005. Studies indicate that the proportion of straw, firewood, and coal consumption in total energy consumption have remained at 88.8–91.0%, whereas the proportion of high-quality commercial energy and modern renewable energy is still very low. The main challenges for the sustainable development of rural household energy supply are an unreasonable energy consumption structure, low-energy efficiency, serious environmental degradation, a large gap in energy supply among regions, and difficulty in developing renewable energy. We suggest some countermeasures to overcome the obstacles involved in the sustainable development of rural household energy in northern China, from energy sources to sociopolitical policies.

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Keywords: Household energy consumption; Northern China; Rural areas; Renewable energy; Sustainable development

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1. Introduction

Rural household energy consumption structure is an important index reflecting rural economics and the living standards of farmers. Over the long term, rural household energy consumption in China has mainly depended on traditional biomass energy, such as straw and firewood, which has low-energy efficiency, negative environmental effects, and can cause unsanitary conditions both indoors and outdoors [1–3]. With the development of the social economy, the improvement of farmer living standards, and strengthened awareness of environmental protection, the energy consumption structure has been gradually ameliorated; the proportion of commercial energy consumption increased from 15.7% in 1980 to 45.0% in 2005 [4,5].

Many factors affect the rural household energy structure, including the economy, society, culture, local energy sources, and climate [6,7]. The rural household energy structure is distinct in different regions of China because the country has a complex distribution of physical geography and social economy. In particular, an obvious distinction exists between northern and southern China because of the longer cold season, more fragile environment, and poorer economic status of northern China [8,9], which appears in the greater heating energy consumption and huge potential for increasing energy demands in the future. With the implementation of the development strategies proposed in recent years, i.e., “Building an overall well-off society,” “Coordinating urban and rural development and coordinating regional development,” “The great development of west China,” “Revitalizing the Northeast old industrial base,” and especially, “The construction of a new Socialist rural China,” rural areas of northern China will have important development opportunities. With development, the rural household energy consumption will change dramatically, and may be a serious challenge to rural energy systems and the environment. Thus, research is needed to understand the evolution of the rural household energy structure and its conflicts with sustainable development in northern China, which are extremely relevant to the balance of energy consumption and supply, rural energy security, and sustainable social, economic, and environmental development throughout China.

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