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# Low carbon rural housing provision in China: Participation and decision making



Wenling Liu <sup>a,b,\*</sup>, Gert Spaargaren <sup>b</sup>, Arthur P.J. Mol <sup>b</sup>, Nico Heerink <sup>c</sup>, Can Wang <sup>a</sup>

<sup>a</sup> School of Environment, Tsinghua University, Beijing, China

<sup>b</sup> Environmental Policy Group, Wageningen University, The Netherlands

<sup>c</sup> Development Economics Group, Wageningen University, The Netherlands

## A B S T R A C T

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Under the national strategy of 'building a new socialist countryside', concentrated rural housing is increasing in some rural regions in China. In this research we use three case studies to analyze decision making on concentrated rural housing and the potential for future low carbon rural housing. The empirical results show that concentrated rural housing can improve both the energy efficiency of houses and the living conditions of households, compared to traditional stand-alone modes of housing. Providers are the major decision makers with regard to the kind of materials, technologies and energy networks applied in rural housing development. Local governments, private property developers and local (energy) authorities in principle have the power to select and apply low carbon alternatives. The involvement of Chinese householders in concentrated housing project turns out to be low or non-existent. The introduction of market incentives, stricter building regulations, better decision making processes and communication with householders are relevant social factors for improving low carbon housing provision in rural China.

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## 1. Introduction

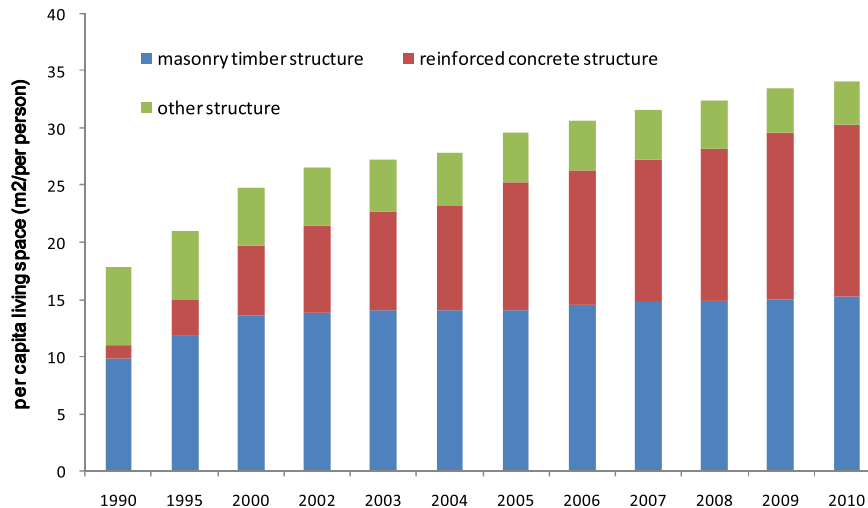
Despite its scarce attention so far in policy and sciences, rural domestic energy consumption is an important factor in climate change mitigation and energy security in China (Liu et al., 2012). Rural housing is not only of fundamental importance for rural citizens but also a key element determining greenhouse gas emissions. The style of rural housing strongly affects household energy consumption and the options to reduce carbon emissions. On the one hand, the connection to regional or local energy infrastructures determines to a major extent the energy options of rural households for space heating, cooking, water heating, lighting and so on. On the other hand, the way the houses are built – for instance in terms of materials applied, energy related technologies adopted and energy infrastructures put in place – directly affects domestic energy demand. The type of buildings and the infrastructures connected to them do lock-in energy consumption (practices) of

householders to a considerable extent. For example Sahakian (2011) showed that the long-term intensive energy use of houses in Metro Manila, Philippines, was rooted in the no or low passive ventilation constructions that were applied when mimicking Western architectural styles.

Under the national strategy 'building a new socialist countryside', rural housing provision (and renovation) in China has diversified in recent years. Especially, since land scarcity became more prominent in rural China, concentrated housing projects intensified. It is unknown, however, whether, to what extent and how low carbon requirements are being considered during concentrated rural housing provision and renovation. With the building sector being identified as one of the largest GHG emission sources (Colombier and Li, 2012), low carbon rural housing has become important to tackle climate change. Against this background, it is important to know who decides on the housing provision and what low carbon alternatives are being applied. It is often argued that communication and user participation are crucial for effective sustainable housing projects, since users have to accept and incorporate low carbon alternatives into their everyday housing situation (Lizarralde and Massyn, 2008). User or community participation is usually associated with so-called bottom-up approaches (El-Masri and Kellett, 2001) and 'grass root' development.

\* Corresponding author. Room 1004, Sino-Italian Tsinghua Ecological and Energy Efficient Building, Tsinghua University, Beijing 100084, China. Tel.: +86 62794115 8007.

E-mail addresses: [liuwenling@mail.tsinghua.edu.cn](mailto:liuwenling@mail.tsinghua.edu.cn), [wenling.liu@wur.nl](mailto:wenling.liu@wur.nl) (W. Liu).



**Fig. 1.** Per capita living space of rural residents and housing structure in China.  
Data source: China Statistical Yearbook, 2011[11]

This is contrasted with top-down approaches, where housing is provided and decided by centralized actors with the help of command-and-control rules. While promoting low carbon housing never follows only a bottom-up or a top-down approach, the specific combination of approaches and the actor constellation vary considerably under different circumstances and in different countries.

In China, rural housing is related to aspects of migration, employment, land use, energy consumption and natural environment (Long et al., 2010). Concentrated rural housing projects typically relate to migration, the need to find the right balance between construction land and agricultural land, and more than incidentally to controversies around land use changes (Long et al., 2009) and equity issues (Wainwright, 2012). However, issues of land use changes, enforced migration and equity issues are not at the center of our analysis. We look into decision making, communication and participation around introducing low carbon alternatives into rural housing projects. Three different models of housing decision making in rural China are distinguished and analyzed on the actors and potential to introduce low carbon energy options. The next section introduces the background of rural housing provision in China, followed by section three that provides our analytical framework and methodology. Section four elaborates and compares the empirical results from our three case studies. The final section discusses the results and concludes on future policies for a rural low carbon transition.

## 2. The background of rural housing in China

Houses are basic fixed assets and a major family property for many rural households. For a long time, rural housing provision fell behind urban housing provision. However, since China's reform and opening-up, construction of rural housing has changed dramatically. As shown in Fig. 1, the living space per capita of rural residents increased from 8.1 m<sup>2</sup> in 1978 to 34.1 m<sup>2</sup> in 2010 and rural housing quality also improved and diversified (Li, 2011). 70% of new constructed rural houses in 2010 were with reinforced concrete structure versus 26.2% with masonry-timber structure (RCBEE, 2012). This followed from a change in China's rural housing policy. In the 1980s, with a national demand to ensure or increase living space of rural residents, housing policy focused on the

quantity of housing provision, while more recently attention shifted to housing quality. Especially in the context of global climate change mitigation, energy efficiency of construction works and houses has become a focal point in recent years. Trial energy technology policy of rural housing has been established, stimulating the adoption of energy-efficient technologies regarding building walls, windows and space heating systems.<sup>1</sup> Renewable energy technologies in rural construction have also received widespread attention in China (Zhu et al., 2011).

Rural housing in post-1949 China shows some unique and special characteristics. The principle 'one household one house' was set in the 1950s and has not altered basically (Liu, 2008). Rural residential land is owned by the village collective, and every rural household is eligible to apply for one piece of residential land for free (practices may vary between regions). Rural households could build their own houses, but at the same time these houses are not tradable in the market and transfer of rural residential property is legally confined within the village. Thus rural housing differs from the rapid privatization of urban residential property (Wang et al., 2012). In all, rural households own the house property and have been given responsibility for financing, construction, management, maintenance and use of their houses (Li, 2011). Current policy empowers rural households with the rights of decision making, which however leads to several problems.

Recently, problems in rural housing construction have gradually emerged. According to the Ministry of Housing and Urban-Rural Development, one commonly finds irregular and reckless construction not following the construction plan, lack of 'scientific' design and simple reproduction of urban housing design, absence of inspection and supervision on materials and construction process, and serious waste of land, materials, funds and energy.<sup>2</sup> Hence, the quality, functions and energy efficiency performance of rural housing cannot be guaranteed. In northern China, most rural houses are stand-alone, and brick walls have replaced mud walls in the past few decades. The thermal resistance of a brick wall is only 1/3–1/2 of a mud wall, and 1/3 of that required in the urban

<sup>1</sup> The Ministry of Housing and Urban-Rural Development in China. Rural housing construction and technology policy. 2011.9. [http://www.mohurd.gov.cn/zcfg/jsbwj\\_0/jsbwjjskj/201109/W020110919014847.doc](http://www.mohurd.gov.cn/zcfg/jsbwj_0/jsbwjjskj/201109/W020110919014847.doc).

<sup>2</sup> See footnote 1.

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