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Study on developing status and appropriate technologies analysis of green residential buildings in Hunan Province

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Abstract

Green buildings have become an inevitable trend due to the implementation of the Evaluation Standard for Green Building (ESFGB) in China. Because of its geographic location in the central-south region of China, Hunan was developed relatively late compared to other more industrialized regions of China. However, with the local government's attention and focus, Hunan has made enormous progress and caught up rapidly. Green residential buildings grow even faster than green public buildings. The overall floorage of residential buildings is about two times of public buildings among these Green Building Labelling (GBL) schemes in the past five years. In this paper, 34 GBL residential building schemes of Hunan Province were analyzed through data analytics including quantity and floorage, star level proportion and geographical distribution to reveal the developing status of green residential buildings. Meanwhile, technologies used in these schemes were divided into five categories including Land Saving, Energy Saving, Water Saving, Material Saving and Indoor Environment in accordance with Evaluation Standard for Green Building in Hunan Province (ESFGBHP). Then the technology using frequency of GBL residential schemes were counted and sorted by different categories and star levels. Combined with specific technology cost, the relationship between frequently-used technologies and incremental cost of different categories and star levels were discussed.

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Keywords: Green Residential Building; Developing Status; Appropriate Technologies; Hunan Province

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1. Introduction

Implementation of ESFGB has been officially launched in China since 2008 and great achievements have been made through 8 years of development of GBL. By the end of 2015, 3979 GBL schemes were certificated and the overall floorage reached to 460 million square meters [1]. GBL scheme can be divided in to two different building types and two different appraisal stages. One building type is GBL Public Building Scheme (GBLPBS) and the other is GBL Residential Building Scheme (GBLRBS). One appraisal stage is GBL Design Stage (GBLDS) and the other is GBL Operation Stage (GBLOS). Certificated GBL scheme can be divided into 3 star levels, i.e. one-star, two-star and three-star which is the highest level [2]. Green buildings were developed relatively late in Hunan Province as a central-south region where economic development grew relatively slow. But green buildings have been developed rapidly with the government's attention and promotion since 2012. Evaluation Standard for Green Building in Hunan Province (ESFGBHP) was formulated first in 2009 and 126 GBL schemes were certificated in Hunan Province with floorage of 13.33 million square meters by the end of 2015 [3].

According to statistical data, 81 schemes of Hunan Province, including 47 GBLPBSs with floorage of 3.13 million square meters and 34 GBLRBSs with floorage of 6.31 million square meters passed the appraisal of GBL in the past five years. Although the number of public schemes is much more than that of residential schemes, the overall floorage of residential schemes is over two times than that of public buildings.

Residential buildings are a building type that most closely associates with human life. Therefore, the development of green residential buildings for energy savings, living environment improvement, and environmental pollution reduction is of great significance [4]. For developing countries, green residential buildings should be developed based on the selection of appropriate technologies. The purpose of appropriate technology implementation is to solve comprehensive problems through a positive interaction mechanism for specific object with the local natural, economic and social environment to obtain the best comprehensive benefit [5].

Due to the limitations from technology, material and cost, the research and implementation of green residential buildings are relatively slow in China. However, in most green building technology research, technology is considered separately. Boeck et al. [6] provided an updated review of improving energy performance of residential buildings. Zhang [7] analyzed the measures of land saving being used in green residential buildings. Chai [8] studied the comprehensive benefit in full life cycle and incremental cost of water conservation in green buildings. Mohamed Ibrahim [9] studied the financial and environmental returns attained by recycling construction waste from selected projects which conform to the U.S. Green Building Council standards. Al horr [10] established the links between IEQs and occupant well-being and comfort. Nevertheless, appropriate technologies are rarely studied as a whole in green buildings, especially with incremental cost.

The aim of this study is to demonstrate the developing status of GBLRBS in Hunan and the inner-relationship between the frequently-used technologies and incremental cost by analyzing all GBLRBSs in the past five years.

2. Developing status of GBLRBS

In this paper, all 34 GBLRBSs of Hunan Province in the past 5 years were analyzed through data analytics including quantity and floorage, star level proportion and geographical distribution to reveal the developing status of green residential buildings.

2.1. Quantity and floorage

Table 1. GBLRBS quantity variation (2011-2015).

Scheme type	2011	2012	2013	2014	2015	Total
One-star	0	2	3	9	15	29
Two-star	0	2	1	0	1	4
Three-star	0	0	0	1	0	1
Subtotal	0	4	4	10	16	34



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پیگیری خرید مقاله

پس از خرید هر مقاله، یک کد رهگیری منحصر به فرد به شما تقدیم خواهد شد که با استفاده از آن می توانید وضعیت خرید خود را پیگیری فرمایید.

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پیگیری سفارش ترجمه

با ثبت کد رهگیری پرداخت، می توانید سفارش خود را پیگیری نموده و به محض اتمام ترجمه، فایل ترجمه مقاله خود را دانلود نمایید □

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