

GREEN BUILDINGS IN CHINA: CONCEPTION, CODES AND CERTIFICATION



Issue Brief

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INTRODUCTION

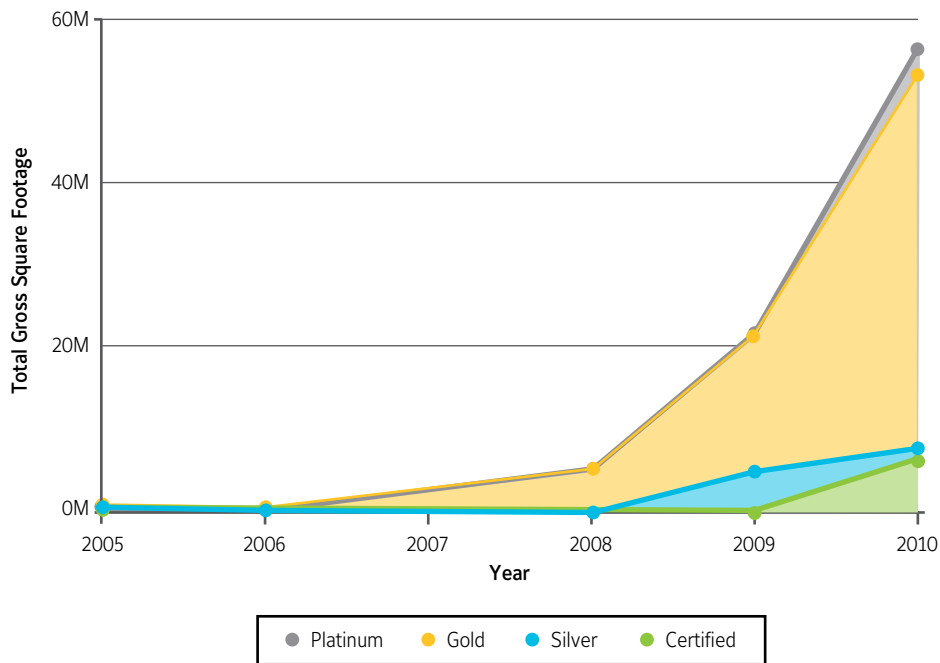
The past few years have seen significant growth in green buildings in China. The majority of green buildings today are demonstration projects and government buildings. Among building owners, the strongest motivations for building green are energy cost savings, energy security, and following existing building policy.¹

Despite rising interest in green buildings, barriers remain. Among the biggest barriers is a lack of consensus on what makes a building green, and in particular a proliferation of different national, provincial and city green building standards. The higher up-front cost of green buildings is also a significant barrier, as are the new challenges green buildings pose to design and architecture professionals.

OVERVIEW

The green building market is emerging rapidly in China. According to United States Green Building Council (USGBC), China now has more than 80 million square feet of LEED-certified buildings, many of which were certified in 2011 (Figure 1). Similarly, the Chinese Three-Star Green Building Certification program, which started in 2006, has seen significant growth. Information about the total number of buildings certified under that program is not available, but experts estimate that China now has roughly 200 buildings certified at the Three-Star (highest) level of that program. Most of these are government buildings.

Figure 1. Gross square feet of LEED-certified buildings in China by level and by year (2005-2010)



¹ "2011 Energy Efficiency Indicator Study: China Regional Results." Institute for Building Efficiency, July 2011.

Source: United States Green Building Council

Because of rapid urbanization in China, the building market is booming: by 2020, builders are expected to construct 215 billion square feet (20 billion square meters) of new construction in the country.² Even though the green building certification market is still small compared to overall annual building construction rates, it appears interest in learning about green buildings is also growing rapidly. According to Baidu, the most popular online search engine in the Mandarin language, the volume of searches with “green building” as a keyword has increased substantially in the last few years (Figure 2).

² “Building Energy Codes,” World Resources Institute, China FAQs. May 19, 2010.

Figure 2. Internet search engine trends of “green building” keyword in Baidu in recent years.



Source: Baidu Index

To understand the mechanisms behind the growth of China’s green building market, it is necessary to answer two specific questions:

- What is the definition of green buildings in China?
- What are the motivations for and barriers to the development of green buildings in China?

DEFINITIONS OF GREEN BUILDING IN CHINA

China’s Three-Star certification program is an integral part of the national Green Building Evaluation Standard (GBES), which defines green buildings as “buildings that save a maximum amount of resources (including energy, land, water, and materials), protect the environment, reduce pollution, provide healthy, comfortable and efficient space for people, and exist harmoniously with nature” throughout their lifecycle.

The GBES sets the official definition of green buildings in China, but, there are dozens of other definitions in the country that fall into three broad categories: local, project-based, and international.

• Local operational definitions

The China three-Star program is a national standard but offers provincial flexibility. The national China Institute for Building Sciences is the only agency authorized to grant Three-Star status to buildings, whereas provincial-level Institutes for Building Sciences are authorized to certify One- and Two-Star buildings.

According to the GBES, when certain items in the standard are not compatible with the geographic or climate conditions of the local area, local assessment and certification authorities can choose to eliminate those items in the evaluation process. As a result, practices for green building certification vary across provinces. In addition, the rigidity in measurement differs from province to province.

Some provincial-level authorities, such as those in Zhejiang, Chongqing, Shanghai and Shandong, have enacted provincial GBES as adapted versions of the national GBES. Many other provinces are developing their own versions. In addition, several city-level authorities have developed an extra layer of standard. For example, the city of Taiyuan in Shanxi Province enacted its local GBES in 2008, three years before similar legislation at the Shanxi provincial level. The Taiyuan standard is much more stringent than its provincial counterpart. For example, the Taiyuan GBES mandates that for green public buildings, the total area of glass curtain wall must not exceed 10 percent of the total exterior window area, a requirement not found elsewhere. According to Taiyuan officials, the standard is made stringent to align with the city's strategic transition to green growth.³

While these local standards vary in the operational definitions of green buildings, they agree upon the conceptual definition of green buildings, as defined by the China GBES. However, the conceptual definition is so broad that it leaves ample room for local specification. As a result, variations in the operational definition are significant enough to make green buildings in one locality unable to qualify in another. For example, the Jiangsu Province GBES requires all green public buildings to have at least 10 percent of hot water heated by renewable sources of energy – a requirement unseen in other provinces' GBES. In addition, the Jiangsu GBES has 39 "regular assessment indicators" for public buildings, whereas the Fujian Province version has 71.

Aside from different definitions at different levels of the government, different standards operate at the same level of government. For example, the city of Shanghai has both a GBES (voluntary) and a Building Energy Efficiency Standard (mandatory). The Building Energy Efficiency Standard is much more technical than the GBES, but it does not cover aspects of green buildings other than energy efficiency. Several other cities in China have the same dualism.

• Project-based definitions

Large development projects, such as the 2008 Beijing Olympics and the Sino-Singapore Tianjin Eco-City (SSTEC), usually set their own green building standards that differ from government GBES, either because the developers think existing standards set too low a bar, or because they desire to set a higher green commitment.

In fact, the Green Olympics Building Evaluation Standard (GOBES) was the first domestic green building standard in China, established in 2003. In drafting the GOBES, Tsinghua University collaborated with several research institutes in China and consulted a number of international standards. The GOBES

³ http://www.qh.xinhuanet.com/xnfdci/2007-11/23/content_11750646.htm, accessed August 20, 2011. [in Chinese]

resembles Japan's Comprehensive Assessment System for Built Environment Efficiency (CASBEE) in many ways, because its creators believed Japan's natural and social conditions were similar to those of China. Buildings in the 2008 Beijing Olympics all comply with the GOBES. Furthermore, the GOBES became the foundation for the China GBES in 2005, when the Ministry of Construction (now the Ministry of Housing and Urban-Rural Development, or MoHURD) decided to establish a national standard.

The GOBES might seem a special case because it was established before the China GBES. However, the SSTECH GBES was established in 2008, two years after the enactment of the China GBES. The SSTECH standard was drafted by Tianjin's local authorities, in collaboration with their counterparts in Singapore. It takes into consideration specific conditions of the project area, such as daylight periods and indoor-outdoor air temperature differences. The standard is largely adapted from the China GBES, but it contains certain items that are absent in the national standard. For example, the SSTECH standard requires that clay should not exceed 20 percent of total wall material, while the national standard has no such requirement. All permanent construction in SSTECH must comply with the standard. Furthermore, the standard is endorsed by MoHURD and the Singapore Building and Construction Authority (BCA).

Shanghai's 2010 World Expo, another mega-project, does not have a GBES that is similar to SSTECH's because the Expo was seen as an opportunity to explore the definition of green buildings. National pavilions were designed by corresponding national governments, who subscribe to green building standards of their own. In other words, the Expo does not have a single project-based standard, but a number of project-based standards.

The existence of project-specific green building standards creates an additional layer of bureaucracy in China's green building market. The projects are well-intentioned in creating standards most suitable for themselves, but the numerous standards have the unintended consequence of being confused with national and provincial standards, which are more authoritative than project-specific standards.

• **International standards**

In addition to previously mentioned LEED and CASBEE, other international rating systems are used in China, though less widely. These include Britain's Building Research Establishment Environmental Assessment Method (BREEAM), Canada's GBTool, the National Australian Built Environment Rating System (NABERS), and many others. These international standards are more commonly applied to buildings intended for use by international corporations.

MOTIVATIONS FOR GREEN BUILDING

Most green buildings in China are demonstration projects. There are national, provincial, and sometimes city-level demonstration projects. A project can also be designated as demonstrative by more than one level of the government. Demonstration projects receive funding from the government and are granted an award after completion, if the construction appropriately implements the design. Government funding can cover the additional cost of green buildings and may also reduce the cost in some cases. Some developers consider demonstration projects more profitable than regular projects because of the relative ease in getting government funding for green building projects that apply cutting-edge technology.

A key feature of demonstration projects is their size. They are typically large – often over 20,000 square meters (215,000 square feet). The Chinese government usually works with large developers on large demonstration projects to ensure their success, because large developers are more experienced and large projects are more convincing as demonstrations.

Aside from demonstration projects, there are a significant number of green-certified government buildings. The rationale for greening government buildings is similar to that for demonstration projects: Chinese leaders believe that to initiate change, the government must step forward as a pioneer, and that as government spending in a given area becomes substantial, the market will mature and attract private-sector investments. Green building is no exception. According to the Ministry of Finance and the MoHURD “Memorandum on Deepening Public Building Energy Efficiency,” published in May 2011, all newly constructed government buildings in China must meet energy efficiency standards, as defined by MoHURD. New government buildings now must be inspected and approved as “green” by local authorities before they are put into use.⁴ In addition, several provinces and municipalities have retrofitted their government buildings to be more resource-efficient. China has not yet seen a large increase in private investments in green buildings, although policymakers are optimistic about the future.

From the perspective of building owners, energy savings is the most important driver of green buildings. All other conditions being equal, green buildings consume significantly less energy than traditional buildings. This has been the biggest incentive for building owners to prefer green buildings. Brand image is also an important consideration for many owners. In particular, multinational companies and organizations consider it crucial to occupy green office buildings across the globe as part of their corporate social responsibility initiatives.

BARRIERS TO GREEN BUILDINGS

Developers, building owners and policymakers view the up-front costs as the biggest barrier to green buildings. On average, Chinese decision-makers expect a 3.5-year payback on building efficiency measures.⁵ At present, the additional cost of green buildings is usually borne by government funding awarded to demonstration projects. By definition, this model will not last long.

Economic analyses conducted in the private and public sectors currently do not include externalities, which would support investing up front in green buildings to reduce social, environmental and operating costs. Many government agencies and non-governmental organizations advocate for the incorporation of social costs and environmental costs in the economic analysis. A carbon tax was also proposed by an official from the National Development and Reform Commission during a press conference in 2010.⁶

However, it remains unclear what items should become part of the social cost of construction. Until better accounting methods are proposed and adopted, the current economic calculation for development projects is unlikely to change in favor of green buildings.

Furthermore, green buildings pose new challenges to building design and architecture professionals. Green buildings introduce issues, such as resource conservation and pollution management that were absent in conventional instruction on building design and architecture in China. Some architects in China are resistant to green building projects because they do not clearly see the value.

⁴ http://www.gov.cn/zwqk/2011-05/11/content_1861716.htm, accessed August 20, 2011. [in Chinese]

⁵ Institute for Building Efficiency, 2011, Energy Efficiency Indicator Survey, <http://www.institutebe.com/>

⁶ <http://finance.sina.com.cn/j/20101201/08229036494.shtml>, accessed August 16, 2011 [in Chinese]

CONCLUSION

MoHURD released its first set of incentives for complying with the China GBES as part of the 12th Five-Year Plan in 2011. MoHURD will subsidize new Three-Star-certified green buildings at the rate of RMB75 (US\$12) per square meter.⁷

With this incentive, MoHURD expects to see a dramatic increase in Three-Star-certified buildings in the next five years. However, it remains unclear whether Three-Star will become the dominant green building rating in China. In addition, the government will start a project to revise the China GBES later in 2011. That project expects to create a standardized version of the GBES that can be uniformly applied to all localities in the country.

At present, however, due to the variety of green building codes and standards being used in the nation, the industry as a whole has not reached any consensus on the definition of "green buildings." As a result, different meanings are attached to the term, and people can easily talk past each other in conversations on green buildings.

There are many obstacles to the development of green buildings in China, but one of the biggest is lack of consensus over what makes a building green. If China had a more widely accepted (and well-specified) definition of green building, efforts to save energy and resources and to mitigate pollution in the building sector could be more focused, and investments from both the private and public sectors could be more effectively channeled to develop truly green buildings. This is the path by which a sustainable green building market will likely emerge.

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⁷ <http://house.focus.cn/news/2011-03-29/1245116.html>, accessed August 16, 2011 [in Chinese]

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