



Paradigm shift toward sustainable commercial project development in China



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A B S T R A C T

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Promoting the stewardship of sustainable development is considered an essential component of business processes in all walks of life. By fully considering the external factors that could affect the achievement of long-term value, Chinese commercial developers have initiated sustainable design technologies to reduce pollution and the extra environmental costs associated with construction, operation, and eventual decommissioning activities involved. This paper investigates the sustainable technologies applicable in the process of developing commercial projects and their implementation by presenting an exemplification framework for achieving building efficiency and sustainability. A list of green technologies applied in the sustainable buildings is investigated. By comparing the differences in two real world projects, it is found that most of the sustainable technologies involved have been implemented in the planning, control and construction stages, while being virtually ignored in the operation and maintenance stages. The paper also concludes that it is difficult to provide mutual benefits among various stakeholders in achieving sustainability objectives. The more challenging task of creating a demonstrable concern for a healthy and green built environment needs to be addressed in the future.

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Introduction

Sustainable development involves every business organization in shifting their thinking from an “ecological or living systems world-view” to one of “co-evolution of human and natural systems in a partnered relationship” (Cole, 2012). This paradigm shift has helped re-establish an integral relationship between natural processes and human activity (McDonough, 1992) ever since the concept offered by the World Commission on Environment and Development: “Meeting the needs of the present without compromising the ability of future generations to meet their own needs.” The building sector has always been considered a very significant battlefield for promoting sustainable development by more sustainable practices in the planning, design, specification, procurement, construction and facility management phases. Increasingly, sustainable construction projects have been built in Europe, America, China and elsewhere (McGraw Hill Construction, 2008). This has recently reached booming proportions in many developing countries, such as China. In fact, with the central government’s announcement of policies to limit the number of residential homes for sale, commercial project development has become the latest focus for real estate developers in China. One typical commercial development type is HOPSCA, first born in La Defense, Paris, in

1986, is an urban complex that collects hotels (H), office buildings (O), ecological parks (P), shops(S), convention centers(C), and high-grade apartments (A) (Hu et al., 2011). HOSPCA is multi-functional, modern and comprehensive city-dimensional space that is mostly located in the downtown area of China’s big cities, including Beijing, Shanghai, Tianjin and Hangzhou. It is not only a construction of the urban complex, but also a centralized product that brings the convenience of business to urban development. Though the major goal of commercial project developers is to make profits rather than demonstrating social responsibility, the external environment has gradually obliged commercial developers to develop green commercial projects in order to comply with the (future) regulatory environment.

Urbanization is occurring rapidly in China, with large infrastructure projects, buildings, commercial HOPSCAs and transportation systems being built in order to meet an ever-increasing demand. The objectives of achieving sustainable building projects include minimizing external resource inputs and residual outputs to and from the building system, maintaining a non-toxic environment, sustaining a high quality of life, and financing infrastructure in an equitable and efficient manner (Field, Heaney, & Pitt, 2000; Hellström, Jeppsson, & Kärrman, 2000).

How to implement a successful sustainable project, however, is a challenging question for China. First and foremost, it is important to develop a technology toolkit that is appropriate for the China situation. The proponents of sustainable design argue that green

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technologies and design systems will enhance interior environmental quality and thus be more conducive to human health and productivity (Browning & Romm, 1995). One approach is to use existing methods from the international community, where green technologies have been promoted in many countries and regions. Vegetated roof systems, or green roofs, for example, have been in use in Europe for many years (Dietz, 2007). Noise abatement technology (Engel-Yan et al., 2005), solar PV systems (Zhang, Shen, & Chan, 2012), ground source heat pump technology (Doherty, Al-Huthaili, Riffat, & Abodahab, 2004) and efficient equipment and appliances for natural ventilation technology (US Department of Energy, 2009) are also considered to be effective means of reducing energy consumption and carbon emissions.

Until now, most of the literature is based on the applicability and adoption of sustainable commercial buildings in different geographical locations in the world including China (Dietz, 2007; Edwards & Turret, 2000; Kibert, 2008; Long Range Planning, 2008; Zhang et al., 2012). However, although it is easy to choose among the many green technologies available, the real difficulty lies in their implementation and operationalization. In fact, there are very limited studies of the extent to which commercial projects have applied sustainable technologies and the practical implementation issues and benefits involved. In response, this paper uses case studies to examine the sustainable technologies that have been applied, their practical implementation within the building process and benefits to the various stakeholders in the development process of commercial projects. This profile demonstrates and compares the differences between two typical projects.

This article is structured as follows. First, attention is given to the progress of sustainable development in the construction and real estate industry in China. This is followed by a presentation of sustainable development technologies as a means of achieving a green built environment future. We then examine how the technologies are addressed in practice, drawing on data collected from two ongoing commercial property projects. The different benefits are identified through interviews with the various stakeholders, and the differences in the various sustainable technologies used in the two cases are compared. Finally, suggestions for further research in sustainable commercial development are presented.

Sustainable project development practice in China

Currently, governments throughout the world are actively pursuing solutions to persuade business sectors to contribute to the mission of sustainable development. In China, a dramatic shift toward scalable low-carbon provincial and green development has been occurring during its rapid urbanization process. This is evidenced by the long and sustained governmental policy efforts over the past 8 years. By the year 2010, 27 low-carbon pilot cities/towns/communities have been introduced in China.

Generally, the Chinese government has promoted four types of low-carbon community initiatives:

- the National Low-Carbon Ecological Demonstration City (supported by the Ministry of Housing and Urban-Rural Development and focused on eco-city theories and indicator systems);
- the National Experimental Low-Carbon City (supported by the National Development Reform Commission (NDRC) and aimed at building a statistical and management system for green house gas emissions and advocating low-carbon living and consumption modes);
- National Comprehensive Supporting Reform Trial Areas to Build a “Two-oriented Society (supported by NDRC and intended to develop good systems for energy saving and environment

protection and to transform the mode of economic development to coordinate the population, resources and environment”);

- an International Cooperative Low-Carbon Eco-Community (e.g. the Sino-Singapore Tianjin Eco-City; Sino-Swedish Low-Carbon Eco-City; Caofeidian International Eco-City and Sino-Finland Gongqing Digital Eco-City).

In line with these demonstration projects, the Chinese government has promulgated a series of policies and documents to promote green development, as shown in Table 1.

By initiating the Green Eco-Housing Sample Projects Program since 2002, 23 eco-housing sample projects were established in 20 cities across 14 provinces at the end of 2007, (Nie 2007; Zhang, Shen, & Wu, 2011). These sample projects embody various green features, such as solar energy and prefabrication concrete technology. China's NDRC introduced its low-carbon pilot provinces and cities program in summer 2010. This program is administered by the State Development Reform Committee (SDRC). The five provinces taking part in the pilot project are Guangdong, Liaoning, Hubei, Shaanxi and Yunnan; the eight cities are Tianjin, Chongqing, Shenzhen, Xiamen, Nanchang, Guiyang, Baoding and Hangzhou.

The results clearly show the positive effects of the green building practices used. According to the “Building a Monitoring and Index System for China's Livable Cities” project by the Asian Development Bank, the livability index of Chinese cities has maintained steady growth in recent years, with Beijing, Guangzhou, Wuhan, Shanghai and Lanzhou having a growth of over 15% from 2000 to 2007 (Wong, 2011).

Research methods

The research data in this study was obtained by content analysis of literatures, existing research reports, case studies and structured face-to-face interviews with the various stakeholders, including project managers, developers, owners, occupants and designers. The content analysis of existing literature and research reports was adopted to examine the green technologies applicable in implementing sustainable buildings (presented in the previous section).

Two case study projects were used to investigate the extent of use of typical sustainable technologies and the major associated benefits accruing to their stakeholders in practice. The first is a HOPSCA project in Chongqing, adjacent to the central business district in the Yuzhong District. This city-core redevelopment project is positioned to support Chongqing's development into a commercial and financial hub for Western China. With a planned gross floor area of 3.6 million m² upon completion, the project seamlessly integrates with the city's central business district. The second is a HOPSCA project situated in the CBD district of Shenzhen, with an area of 43,428.3 m² and a total

Table 1
Documents and program relating to green development in China.

Documents and programs	Year
Green Eco-housing Sample Projects Program	2002
Interim and long-term energy saving specific plan	2004
Law of renewable energy	2005
Declaration on clean development and climate new partnership in Asia and Pacific	2005
The Joint declaration on climate change between China and European Union	2005
National Assessment report on climate change	2006
China National Plan for responding to climate change	2007
Renewable energy and new energy international cooperation plan	2007
National operational targets to achieve low-carbon growth (such as reducing carbon intensity per unit of GDP 40–45% by 2020 from 2005 levels)	2009
NDRC low-carbon pilot city program	2010

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