
Sustainable Buildings for China

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ABSTRACT

As environmental concerns become more important at the local, regional, and global level, more awareness must be paid to the development of sustainable buildings. Buildings are accountable for a large portion of resources and energy, in addition to producing a substantial amount of environmental pollutants. In developing countries, it is important to follow more environmentally conscious paths than earlier western world precedents, with the goal of ensuring that they reach comparable standards of living. It is projected that future buildings will consume about one-third of the total energy in China. The largest obstacle to the improvement in building energy effectiveness is the lack of means to encourage widespread adoption of efficient measures. The aim of this project is to identify new technologies and applications of existing technologies that will significantly increase the efficiency of new and renovated Chinese buildings. The focus will be on the design, prototype testing, and evaluation of several residential projects. The approach uses three demonstration buildings of varying natures as initial, sustainable prototypes in large- to mid-scale housing developments. Also of importance is that these approaches toward energy efficiency appeal to Chinese builders and consumers and that they are convinced of the inherent advantages in sustainable strategies.

Our focus is on residential buildings in large Chinese cities, including Beijing, Shanghai, and Shenzhen. We are currently involved with three projects; the first is scheduled to begin construction in the latter part of 2000. The projects include the design of a demonstration portion of a large-scale residential community outside Beijing, three mid-rise multi-story housing units in Shanghai's Taidong Residential Quarter, and a low-rise residential community in Shenzhen City.

The goal of the project is to explore design, technology, and implementation of environmentally responsive urban housing in China. Principal goals include minimizing solar gains in the summer, improving air quality and ventilation, and reducing energy consumption of buildings. This investigation is being carried out through the careful design of individual building interiors and exteriors with respect to building groupings. Assumptions are tested through the use of computational tools for the accurate modeling of computational fluid dynamics, post-occupancy comparisons, as well as actual building evaluations. The designs introduce innovative technologies as well as envelopes incorporating traditional technologies such as shading and natural ventilation. Most importantly, the designs will make use of local materials and construction methods as well as local building conditions and lifestyles. The projected energy savings of these designs and technologies will be presented for projects in different climatic regions of China.

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