A COMPREHENSIVE OVERVIEW OF SOFTWARE PROGRAMS FOR GREEN BUILDING DESIGN

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Abstract

Buildings are energy gluttons and produce a large portion of the total green house gas emissions, air pollutants, and solid wastes. Against the background of the predominant contribution of buildings to the global climate change and other energy-related environmental issues, much effort have been made to develop appropriate software programs for a better building design with respect to environmental performance. However, in practice, it is natural for designers to ask the following two questions. First, how to select from the available programs for the design tasks in hand? Second, what improvements can be made for the current programs in order to better suit them with practical requirements? With the above two questions, an overview of the programs for green building design is presented in this paper. Due to the large number of programs falling into the scope of this study, a classification system was established to group the available programs into several categories for discussion. A few representative programs for each category were selected and briefly discussed with emphasis on their pros and cons. On the basis of the programs' analysis, a model is proposed at the end of this paper to hopefully address the drawbacks of most programs for green building design.

INTRODUCTION

In remote antiquity, our ancestors lived in sheds or caves to protect them from adverse climatic conditions. With improved technology, buildings are being built higher and more luxurious. People can enjoy the comfort brought by advanced equipment and complicated mechanical systems such as heating, ventilation, air-conditioning, and artificial lighting. However, new problems appear. The energy crisis in the 1970s warned people of over-dependence on fossil fuels and prompted people to take energy-efficiency measures (Susan 2001). In the last two decades, global warming, an ever-thinning ozone layer and deteriorating living areas are being gradually realised and verified by scientists. It has been the common recognition across the whole world that effective measures must be taken to pursue sustainable development. Buildings are the main consumers of resources - energy and materials, and their influence on the environment cannot be underestimated. In the U.S.A, for example, the construction industry (including infrastructure) is responsible for some 15% of CO_2 equivalent emissions (Hendrickson & Horvath 2000). In the European Union, buildings are estimated to consume approximately 40% of the total energy, and are also responsible for some 30% of CO_2 emission, and generate approximately 40% of all man-made waste (Sjöström & Bakens 1999). Furthermore, the sick building syndrome reported by persons living in modern houses even urged designers to rethink the traditional design criteria. They now face the challenge of designing both comfortable and healthy houses, physically and psychologically, the insides and outsides, as is the essence of the green building.