HANDBOOK ON ENERGY CONSCIOUS BUILDINGS

Prepared under the interactive R & D project no. 3/4(03)/99-SEC
between
Indian Institute of Technology, Bombay
and
Solar Energy Centre, Ministry of Non-conventional Energy Sources

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Preface

The global energy scenario has undergone a drastic change in the last two decades. Due to ever growing demand and shortage of supply, the cost of fossil fuel (coal, oil and natural gas) is increasing day by day. Increasing consumption has led to environmental pollution resulting in global warming and ozone layer depletion. Consequently, the era of fossil fuel is gradually coming to an end and the attention is focused on the conservation of energy and search for renewable sources of energy, which are environmentally benign.

Buildings are major consumers of energy insofar as their construction, operation and maintenance are concerned. Though this is not very well quantified in India, yet there is ample scope for energy savings. The indoor environments are becoming increasingly important for human comfort and from health point of view. It is estimated that almost 50% of the global energy demand is due to buildings. Thus, the energy conscious architecture has evolved to address these issues. It involves the use of eco-friendly and less energy intensive building materials, incorporation of passive solar principles in building design and operation including daylighting features, integration of renewable energy technologies, conservation of water, waste water recycling, rainfall harvesting and use of energy-efficient appliances in buildings.

In spite of access to a large information base on various features and techniques, and despite pioneering work in this field by architects the world over and in India, the energy conscious design approach is not very widespread. The expertise developed at various Indian institutes has not percolated to architects at large, especially in a form that can directly be implemented in their designs. This book is an effort to orient the thinking of practising architects towards the importance and benefits of energy conscious architecture. The book provides information on basic principles, climatic conditions of India, passive solar approaches, general recommendations, specific guidelines and integration of renewable technologies in buildings. It contains a number of illustrations, working drawings, examples, case studies and references. In addition to practicing architects, it will also be a useful reference book for students of architectural and building scientists. Those who are conversant with the basic aspects of climate and passive solar architecture may skip Chapter 2 and 3 and refer to Chapter 5 for guidelines.

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7.4 Solar Energy Centre, Gurgaon
7.5 H.P. State Co-operative Bank Building, Shimla
7.6 S.O.S. Tibetan Children's Village, Choglamsar

References
Having examined the effect of buildings on energy consumption, these studies indicate that the physical form of a city has a notable impact on the amount of energy consumed in its spaces. The present study identified the variables that affected energy consumption in residential buildings and analyzed their effects on energy consumption in four neighborhoods in Tehran: Apadana, Bimeh, Ekbatan-phase I, and Ekbatan-phase II. After extracting the variables, their effects are estimated with statistical methods, and the results are compared with the land surface temperature (LST) remote sensing data. Energy-efficient building design has far-reaching benefits. Not only does it reduce energy consumption and costs, but it also increases occupant comfort. Environmental Conditions. Site climate has a massive impact on energy-efficient building design. In areas where the temperature is especially warm or cold most of the year, the right material must be used to combat the effects of the climate on the building. Daylighting is also always a factor. So, proper siting must be considered, as the spaces inside of the building with direct solar exposure will be warmer than the spaces that are located away from direct solar exposure. Stefano Panzieri. 9. Energy efficiency in building renovation. 9.1 Energy audit of existing buildings (methodologies and tools for the energy audit of existing buildings), Constantinos A. Balaras and ELENA DASCALAKI. 9.2 Definitions and Topics in energy behavior of compact urban fabric. Edoardo Currà, Carlo Cecere, Helena Coch, Michele Morganti and Agnese Salvati. 9.3 New technologies in energy efficient building renovation. Very useful book for researchers and students. On Handbook of Energy Efficiency in Buildings.