

Need of Sustainable Green Buildings

C.S.KULAT, S.S SURATKAR, A.S GAWANDE

Civil Engineering Department, College Of Engineering and Technology, Akola

ABSTRACT:

Adoption of Green Building Technology has become mandatory for ensuring sustainable development. However, its wide acceptance would require critical examination of various aspects like energy conservation, cost, strength and durability. Use of modern electronic controls and smart devices can enhance the functionality and performance of green building. Architects should get equipped with technical know-how for planning and designing intelligent green buildings to meet the future needs.

I. Need of Green Concept:

Due to fast rate of migration from rural to urban centers, urbanisation has become a complex problem for controlling heterogeneous growth. Increasing urbanization has given a boost to building industry and number of bungalows, building complexes and multi storied buildings are being designed by architects and engineers with innovative concepts and enhanced features. However, it is observed that in many cases, environmental aspects are ignored leading to uncomfortable habitat and increased maintenance and energy requirements. Efforts are made by the government by making amendment to the constitution (73rd & 74th amendment) to restrict conversion of the valuable green cover in the process of fast urbanisation. Green building concept needs to be realized by all concerned with building activity and studied in detail by designers and planners for better built environment. Green or eco-friendly building is often considered as the luxury of wealthy people which is not correct. In fact, it is the necessity of common middle class man who cannot afford to provide air conditioning or pay exorbitant electricity bills.

II. Critical Appraisal of Green Technology:

Green Technology is mandatory for ensuring sustainable development. However, in spite of all out awareness campaigns and promotional efforts, the adoption of this technology has remained marginal and restricted to environmentally conscious or wealthy people with main motive of value addition rather than economy and energy conservation. In case of building industry, the green tagging of building enhances the value and supercedes other non-green competitors in attracting customers. The cost aspect of green building and loss of other functional requirements like security and durability are often concealed by green builders leading to a failure in convincing common man to adopt green building design.

The main functions of the building are,

1. To give shelter from environmental factors like Sun's heat, rain, wind and extreme vagaries of nature like flood and hurricanes.
2. Provide security to life and property.
3. Provide privacy.
4. Durability and Strength.
5. Aesthetic beauty
6. Comfortable living

Civil engineering considers strength, durability and cost as the main criteria while selecting materials, planning and construction. Architecture gives more stress on aesthetics and comfort and pays attention to fulfilling psychological needs of occupants. Green building techniques seek to conserve and utilize natural resources, emphasize eco-friendly construction and think of minimum carbon footprint on global scale.

III. Integration of IT and Green Technology:

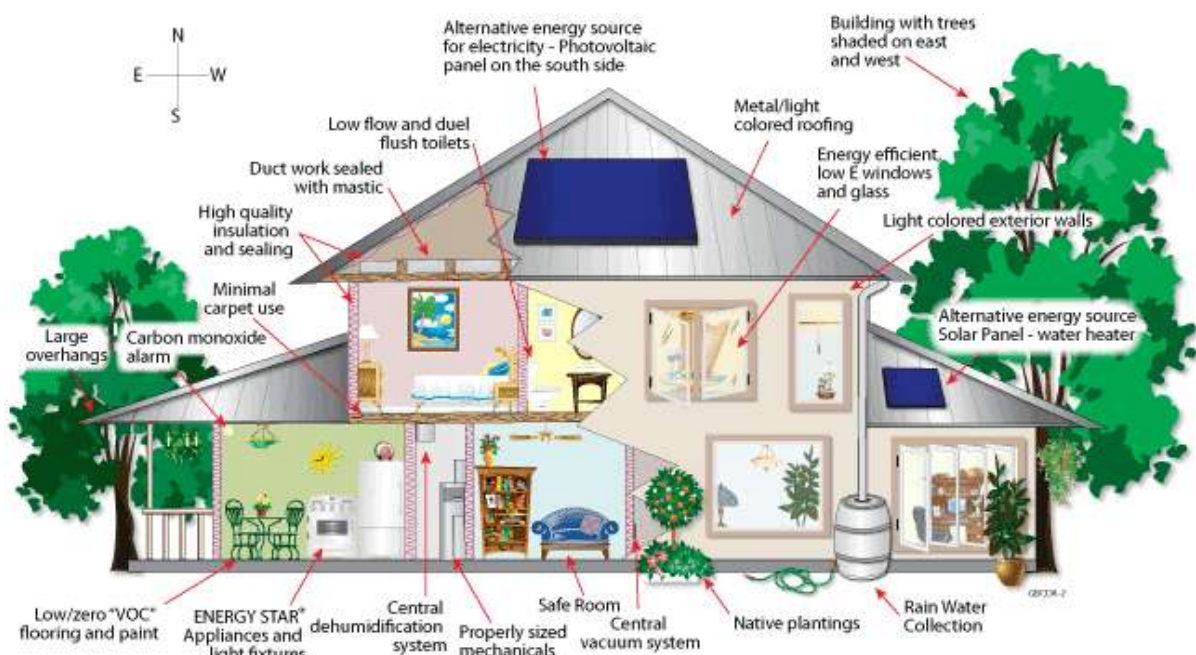
Green building is need of tomorrow's future and old methods of construction and use of natural materials though more eco-friendly can not provide for the needs of tomorrow like space economy, security, modern gadgets and amenities and flexibility in energy management. Fortunately advances in IT and automation controls can make the green building intelligent providing security, energy conservation and weather responsive automated operations. Use of solar energy, LED lighting, Rainwater harvesting, preservation of indoor air quality and thermal comfort zone and waste minimization can be made highly effective and economical through sensor based controls and appliances.

IV. Panorama of smart home appliances:

Numerous smart control devices are available in market which can be deployed easily for ensuring security, comfort and for energy and water conservation. Restricted access control, intruder alarm, dimmer light controls, bluetooth, Wi-Fi and/or net enabled smart devices, smoke detector, sensor based plumbing fixtures, automatic controls for opening and closing of venetian shutters or blinds etc. Siemens, Tata Honeywell and ABB are some of the world's largest producers of such controllers. Coupled with it, there are variety of innovative products like wind powered fans, waterless urinals, dual flush latrines, Light tubes, LED lighting systems, solar power equipments which can help in achieving green objectives.

V. Sustainable Green Buildings of Tomorrow:

Energy, buildings, and the environment are interlinked in a symbiotic relationship, and the results of this interaction can be optimized for maximum gains by convergence of Green and Sustainable building concepts. An intelligent building is one in which the building fabric, space, services and information systems can respond in an efficient manner to the initial and changing demands of the owner, the occupier and be in harmony with the environment. Sustainable buildings not only have energy efficiency but also have safety and telecommunications systems and other required automations propelled by innovations.



VI. Design of Sustainable Green Building:

The ability to perform accurate whole building energy, water, and carbon emission analysis early during the design phase is essential for green building design. Simulating a building's energy use is a hard problem, requiring not only a model of the building and the materials that make it up but also a model of the building's location, with the path of the sun through the year and weather data that is accurate and detailed, including humidity, wind, simple daytime-night-time temperatures, and a host of other location specific parameters. There are many modelling and simulation tools for design of green building

1. Simplified Whole Building Energy simulation tools include: ASEAM, Carrier HAP, Energy-10 and TRACE 600.
2. Detailed simulation tools include: BLAST, DOE-2, ESP-r.
3. Lighting and Day lighting Simulation - ADELINe, RADIANCE, SUPERLITE
4. Solar System Simulation - TRNSYS
5. Ecotect is a whole-building simulator that combines an interactive building design interface and 3D modeller with a wide range of environmental analysis tools for a detailed assessment of solar, thermal, lighting, shadows & shading design, energy & building regulations, acoustics, air flow cost & resource performance of buildings at any scale. It can be used as plugin in Autocad.
6. A computable Revit design model is a great fit for the analyses needed for sustainable design — even during schematic design. As soon as the layout of a building's walls, windows, roofs, floors, and interior are established, a Revit model can do whole building analyses.
7. Green Building Studio Web service meet ASHRAE Standard 140 and is certified by the U.S. Department of Energy. Built specifically for architects and using gbXML for data exchange across the Internet, the GBSWeb service can be used for building designs and sophisticated energy analysis.

Selection of a simulation program should consider the project requirements, time and cost, availability of computer system and experience of the user. Once the building completed and people use it, it should be monitored for the actual performance.

VII. CONCLUSION:

The architects and engineers should learn the basic concepts of green and eco-friendly building and make appropriate changes in methods and materials they are using for the building design. In order to achieve desired green rating, they should use modelling and simulation tools after necessary customization to suit client's specific requirements and site constraints.

References:

- [1] **Building Environmental Science and Technology (B.E.S.T)** <http://www.energybuilder.com/index.htm>
B.E.S.T. is a green building consulting firm. The site is very heavy on good content for green building.
- [2] **Center of Excellence for Sustainable Development: Green Buildings** <http://www.sustainable.doe.gov/buildings/rescon.shtml>
U.S. Department of Energy site with a nice overview of green building.
- [3] Dr. S. V. Ranade, Chairman ,Dnyandeep Education &Research Foundation, Sangli