



Research Article

Journal of Environmental Science, Computer Science and Engineering & Technology

Available online at www.jecet.org

Engineering & Technology

Green Buildings: It's Importance in present Indian scenario

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Received: 1 March; 2012; Revised: 20 March 2012; Accepted: 24 March 2012

ABSTRACT

Engineers and architects have choices of the materials and products they use to design. When it comes to environmental aspects, an engineer or an architect's must use such material, products and design which would be beneficial to the environment and from where it benefits to the people. Here in this paper we are going to represent the work of such building construction which is termed as green building construction. This tries to eliminate the problems related to different issues for example environment, which are mentioned in this paper and also solution to the problems. Many new technology and improved methods are introduced in the field of construction which surely helps in making good environmental conditions. In this paper an overview of how different methods, products and designs are using nowadays and which should be used further are presented.

Keywords: Green buildings, eco-friendly, building construction

INTRODUCTION

A green building^{1,2} is that building which is constructed at a well planned location with proper orientation, design, and with eco friendly and sustainable materials³. Green represents nature. The concept of green building is attached with environment and nature. The building should be surrounded with trees, plants and grass to provide natural greenery. The building should gives to its occupants healthy and comfortable environment in all climates, gives natural pollution free air and light through doors, windows and ventilators without any artificial means. For particular requirements it has solar, wind power and eco friendly electrical, mechanical etc. devices⁴. A green building⁵ should have all safety devices. It should be provided with potable water, having proper drainage, sewerage and rainwater harvesting system^{6,7}.

Why "GREEN BUILDINGS"?

Major problems and their solutions: With increasing urbanization, natural resources are being utilized rapidly and without any planning and equivalent replenishment. This is not sustainable development. If such a situation continues for long, the disparity and problems in living conditions will create social problems and revolt. Also, future generations will not have any natural resources.

By this study we point out some problems which are given below:

1. The problem of Population: The population in India is increasing at a very fast rate. The facts may be found from the following table.

Table-1: Human population per sq.km of country area

Country	Year		
	1947	2009	2049
India	121	350	581
China	—	132	141
USA	—	34	49

The population figures of 2009 are India 350 person per sq.km, China 132 person per sq.km and USA only 34 person per sq.km. With the increase in the population the house demand will also increase. For India it is of the top concern as by the year 2049 having the same country area 581 persons sharing resources of one sq. Km. area against China 141 and USA only 49. From the present day crowd, it can be well imagine what will be the crowd condition of India in 2049. A drastic action is needed otherwise it will be too late to cope with this situation.

2. Area problem: From the given **Table -2** it can be seen that in a single storey apartment of 24 houses for 96 persons the open area is 25200 square feet, whereas for a 15 storey apartment of 360 houses for 1440 persons the open area is again same only 25200 square feet. Accordingly if a builder claim that his 15 storey apartment has 70% open area of covered area then the open area should be 378000 square feet and not 25200 square feet.

Table-2: Actual open area shared by number of people:

Storey of building	Total Houses	Covered Area square feet	Ground open Area square feet	Persons living in total apartment
1	24	36000	25200	96
5	120	180000	25200	480
10	240	360000	25200	960
15	360	540000	25200	1440

Suppose per house there is one car, then a single storey apartment will have 24 cars and a 15 storey apartment will have 360 cars. In a 15 storey apartment where is the open space will be left for trees?

3. Building consumptions problem: It is broadly estimated that buildings worldwide consume about 40 per cent of the planet's materials resources and 30 per cent of its energy. The construction of buildings is reported to consume 3 billion tons of raw materials per year and generates between 10 and 40 per cent of the solid waste streams in most countries. The manufacture of many of the materials used in buildings require the consumption of large amounts of energy derived from the fossil fuels and the displacement of mega-tonnes of earth during the course of mining. The energy input in GJ/tonne for aluminum is 190, plastics 80-100, steel and other metals 30-50, glass 20 and cement/concrete products 1.3-5.

Thus it is clear from this data that a single building consumes a lot!!

4. Pollution problems:

- In the financial year 2009-10 India produces 200 million tonnes of cement. In the production of this cement 186 million tonnes of CO₂ was emitted in the atmosphere during financial year of 2009-10. Thus, in India 0.93 kg of CO₂ is emitted in the production of one kg of cement
- CO₂ emission is world problem, but for India in addition to CO₂ it has problems of Air, Water, Soil, Food and Noise pollutions. Less density populated countries may cope with these problems but for India it is of the top concern. The population figures of 2009 are India 350 person per sq.km, China 132 person per sq.km and USA only 34 person per sq.km. The figures of 2006 CO₂ emissions are USA 658.60 tonnes per sq.km, China 611.76 tonnes per sq.km and India 459.35 tonnes per sq.km. Everyone should contribute his or her efforts to save the environment from pollution.

These are some of the major problems of Indian society which are directly and indirectly connected with the environment, nature and finally to the people.

The dreams of our future will shatter if proper steps are not taken in time. Hence, nature's basic rule is to be adopted,

'REDUCE, REUSE AND RECYCLE'

i.e., reduce the requirement, reuse the waste and recycle to use. This is the only concept of making "Green buildings".

The essential requirement in this respect is to adopt the "green building" practice. It is a process to create buildings and infrastructure that minimize the use of resources, reduce harmful effects on the ecology and create healthier environments for people. Green buildings are expected to exhibit a high level of environmental, economic and engineering performance which is also called Eco-friendly practice that includes:

1. Adequate land use and better site planning so as to not disturb the natural resources like trees, lakes, rivers etc.
2. Conservation of electricity and efficient practices.
3. Renewable and non-conventional energy generation, alternative fuels, etc.
4. Water management including drainage, waste water disposal, rain water harvesting etc.
5. Maintaining good air quality.
6. Human safety and comfort.

LIFE CYCLE ASSESSMENT (LCA)

A life-cycle assessment (LCA, also known as life-cycle analysis, ecobalance) is a technique to assess environmental impacts associated with all the stages of a product's life

An LCA considers the following aspects:

- Extraction, processing and transportation of raw materials;
- Production, transport and distribution of resulting products;
- Use, re-use, repair and maintenance;
- Recycling and final disposal

In terms of green building, the last few years have seen a shift away from a prescriptive approach, which assumes that certain prescribed practices are better for the environment, toward the scientific evaluation of actual performance through LCA.

LCA takes into account a full range of environmental impact indicators—including embodied energy, air and water pollution (including greenhouse gases), potable water consumption, solid waste and recycled content.

WAYS TO FIGHT

1. Planting Trees: Trees are one of our most important sources in the fight against the urban heat, bad environment issues and island effect. Air temperatures directly under trees can be as much as 100C cooler than temperature over unshaded blacktop. Trees can be sited strategically to shade roofs, pavement, walls, and other surfaces, keeping them cooler and reducing energy bills. Trees also provided a cooling effect through evapotranspiration. Other vegetation, including grass etc. also provides cooling effects, though not usually as significant as trees.

2. Orientation of buildings: For a building to be a green building, it must be well oriented with respect to the principle directions so that maximum benefits like adequate sunlight, wind and protection from wind are obtained. Orientation involves the utilization of the gift of nature to achieve maximum functional comfort of building. If the orientation of the building is defective the working and living conditions inside the building will not be comfortable.

3. Green Roofs: Green roofs are roofs planted with grasses, flowers, or other vegetation. Like trees planted at ground level, the vegetation shades the surface, keeping it cooler.

4. Building Walls: The walls of building should be painted with solar reflective paints.

5. Roofs: The new and very convenient method is to paint the roof surface white with solar reflective paint/coating. Solar reflective coating is an acrylic based coating which provides weather proofing and heat insulation to the exposed roof. . With such coating temperature may be lower upto 100C thus giving cooling comfort to the occupants of house and also reduces the load on Air Conditioner.

6. Cavity walls: Cavity walls are very useful in energy consumption, as in making of cavity walls a cavity is created such that the outer heat does not come inside home directly hence it would be helpful in maintaining low temperature. It comes to be noted has 10% energy saving.

7. Low level windows: This concept says, if windows are located at low level (height) in comparison to their actual level, then the more cool air get inside the room because as the height increases air gets hotter and at the opposite side of the wall another window must be located at high level such that that hotter air get away from that window.

8. Natural coolers: Air towers can be constructed such that the air comes with pressure and duct are made over the walls with cools the interior portion of rooms.

9. Thermal chimney: This can be used for excavation of heat.

10. Green concrete: Concrete using fly ash or slag is known internationally as green concrete. Such green concrete is being used in many projects in India and due credit should be given to such projects.

11. Use of water reducers: we can save our environment by the use of Water Reducers in the production of concrete. 100% concrete produces in Japan and Canada contains Water Reducers/Air-entraining admixtures, where as in India about 2% of its concrete contains Water Reducers. If it is increases to 25%, the results will be as given below:

“50 million tonnes cement in making concrete uses water reducers 7500000 tonnes of cement can be saved. 3750000 KL of potable water will be saved and the saving of Rs. 3300 crores per year to construction industry. This amount is worked out after adjusting the cost of water reducers. Less cement used means less cement required to be produce by the cement factories resulting 6975000 tonnes of CO₂ will be prevented to be emitted to the atmosphere. This may also help in earnings carbon credits. These are worked out with an average saving of 15% cement and 15% water”

GREEN BUILDING INITIATIVE IN INDIA

In 2006, Green Building Council was formed. The council is represented by all stakeholders of the construction industry – corporate bodies, governmental agencies, architects, material manufacturers, relevant research bodies and academia, etc. The vision of the council is to serve as a nodal point to facilitate green building activities in India. The council has reportedly set the following tasks :

- Catalyse 100 green building per year by end 2012.
- Set on stream 10,000 committed building professionals by 2012 to help realize green building concept.
- Develop a robust green building rating system.
- Help achieve at least 4-5 per cent cost reduction in making green buildings as compared to similar conventional buildings.

CONCLUSION

The concept of 'green' varies with individual, educational and socio-economic backgrounds.

As the above given problems shows a great loss to Indian economy, environment, creates pollution and rise in prices of materials. So, we all have to expect the green building concept as shown by the above facts it is very much beneficial for the environment point of view. Our Indian Government should encourage it by framing proactive provisions and it must be followed by the citizens. If such guidelines are implemented in the right manner, then the concept of green buildings would spread across the nation just like the IT revolution.

REFERENCES

1. Narendra D. Patel and Nikesh P. Shah. Green housing – Review, rating systems and implementation, The Indian Concrete Journal, 2009, point of view,54
2. Anjan K. Chatterjee. Sustainable construction and green buildings on the foundation of building ecology, The Indian Concrete Journal,2009, point of view,30
3. M.S Shetty “Concrete Technology”.S.Chand Publications. 2011
4. Shushil Kumar “Building Construction”. Standard publications.1985
5. Karthik H. Obla. What is Green Concrete? The Indian Concrete Journal, 2009, point of view,28
6. Concrete CO₂ Fact Sheet, 2PCO₂, 13 pp., June 2008, National Ready Mixed Concrete Association, Silver Spring, MD, www.nrmca.org
7. http://www.builditsolar.com/Projects/Cooling/passive_cooling.htm

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