

## LITERATURE REVIEW ON DESIGN TECHNIQUE OF GREEN BUILDING

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*Abstract: Buildings are found to be both, one of the biggest consumer of energy and producer of greenhouse gases. It has become a global issue. According to the National Institute of Building Sciences (USA), buildings generate 35 per of the carbon dioxide (the primary greenhouse gas associated with climate change), 49 per of the sulphur dioxide, and 25percent of the nitrogen oxide found in the air. Since buildings are accountable for this scenario, it has imposed an immediate requirement to not only think of, but implement sustainability in every new construction instantly. Green Buildings are buildings that subscribe to the principle of conscientious handling of natural resources, which means causing as little environmental interference as possible, using environment friendly materials, requires low operational energy, utilizes renewable sources of energy to fulfil its requirements, follows high-quality and longevity as a guideline for construction and last but not least, must be economically viable. The paper focuses on green design as a vital transformation of contemporary architecture practiced in developing nations. It endeavours to present some environmental and physical design approaches for green buildings in promptly developing countries chiefly India In this regard, the study presents hands on analysis of basics and principles of green architecture, theories and viewpoints outlined in the field and also the analysis of efficacious cases of environment friendly buildings in India.*

**Key words**-Greenhouse gases, Sustainability, Ecosystem, Green Buildings, Renewable, Green Design

### INTRODUCTION

Buildings account for more than 40% of all global carbon dioxide emission, one of the main culprits implicated in the phenomenon of global warming in which India comes on 144<sup>th</sup> position (1.4 metric ton) in carbon emission rating in the world. Green building is the practice of constructing or modifying structures to be environmentally responsible, sustainable and resource-efficient throughout their life cycle. This includes efficiently using energy, water and other natural resources, protecting occupant health, improving employee productivity and reducing waste, pollution and environmental degradation [1].Green buildings accounts for improving environmental footprint by reducing energy use by 30-5-%, CO<sub>2</sub> emissions by 35%, waste output by 70% and water usage by 40%. The pressure that man exerts upon nature for fulfilment of his needs is greater than ever and is escalating at an alarming rate. Whether one considers the availability of

fresh water, resources, or ecological balance, the MEA (Millennium Ecosystem Assessment) study of 2005 has found that there has been a 62% decline over the last four decade, which in turn has brought about the undeniable realization that the system is under the risk of destructive and possibly irreversible changes. Another possible consequence of all this is the escalation of poverty on countries that rely on the resources produced by the collapsing eco systems. According to the reports published by MEA (millennium ecosystem assessment), the ability of the global ecosystem to nurture future generations can no longer be counted upon.

From the environmental viewpoint, buildings account for nearly half of all energy consumption and raw material use around the globe. The 2008 Building Energy Data book (USDE 2008) says that commercial and residential buildings are held responsible for 39.7 per of the energy consumed (residential 21.5 per and commercial 18.2 per) globally and 76 per of the electricity used and 15 per of the total water consumed (Architecture 2030 2009). Building and Construction sector takes up the lion share of resources for land use and material extraction, 50 per of the world's raw material wealth – many of which are non-renewable resources – and are responsible for 36 per of all waste generated worldwide [2]. Some of the non-recyclable materials such as lead-based paints, asbestos, mould, wastes containing mercury, fluorescent bulbs, batteries pose serious environmental and health problems[3].

#### **Objective -**

- Identify the design technique for green building
- Modify the structure and reduce the cost and make it environment friendly
- Focuses on green design as a vital transformation of contemporary architecture practiced in developing nations.

#### **Technical datasheets-**

The selection of the materials to be used in the building is usually made on the basis of their 'technical datasheets', provided by the manufacturers and reporting the main features and properties of materials and components. This document should provide accurate and reliable information about materials: in Italy general guidelines for technical datasheets preparation are reported in the Italian standard UNI 9038 . Despite such effort, the datasheets are often regarded as an advertising tool and hence they report vague, inaccurate or even misleading information. A wide survey on several building materials (both structural and finishing) available on the Italian market showed that an exhaustive description of the material's formulation in terms of components is often lacking, or it's inconsistent with the data reported in the datasheet itself. Concerning the environmental 'quality' of materials: • the possible contribution to indoor pollution is seldom considered. The main exceptions are paints, whose datasheets usually report the VOC amount in the material. The datasheets of composite wood in some limited cases report the formaldehyde content according to EN 120:1992 (Wood based panels - Determination of formaldehyde content - Extraction method called the perforator method), while in sporadic cases datasheets of ceramic tiles and bricks report data on radon emission. However, when not directly reported in the technical datasheet, indirect information on the formulation of the investigated materials and on the presence of hazardous components can be found in the 'safety datasheet', separately

reporting the safety and health information and usually provided by the manufacturer on request rather than directly downloadable in the relevant website. Safety datasheets are mandatory whenever hazardous substances are present and thus they must fulfil a well defined format, where information are ordered and exhaustive, and represent a valuable tool for building designers.

Thus, a more widespread use of EPD must be regarded as the most practicable way toward a sensitive choice of materials at the working plan and construction stages, otherwise designers have no access to the necessary information for whatever environmental evaluation. However, a 'sustainability' perspective on materials' selection (according to the LCA principles recalled in ISO 14025), although fundamental, is only partial for the achievement of the 'Green Buildings' target, as the aspects of environmental impact and contribution to indoor air quality should be always jointly considered.

## **BUILDING DESIGN**

### **Building Design – Daylight Modeling**



- Daylight simulation coupled with window location/design to minimise lighting load.
- Interiors designed to keep high lighting-load areas close to daylight span.
- Window design to include light shelves.

## **DESIGN TECHNIQUES VIA CASE STUDY**

### **Centre for Environmental Sciences & Engineering Building, IIT, Kanpur, India**

#### **Introduction**

The CESE is a 5 star green rating building by GRIHA(India) and research facility at the IIT (Indian Institute of Technology), Kanpur on a plot area of 175, 000 square metre . It has been designed in an environment friendly manner and conceptualized and constructed as a "building in the garden" that is sustainable.

## Key Sustainable Features

- The building is fully compliant with the ECBC (Energy Conservation Building Code).
- Sustainable site planning has been integrated to maintain favourable microclimate.
- The architectural design has been optimized as per climate and sun path analysis.
- The building has energy-efficient artificial lighting design and daylight integration.
- Water body to cool the micro climate.
- Orientation of building: North – South.
- It also has energy-efficient air conditioning design with controls integrated to reduce annual energy consumption.
- Passive strategies such as an earth air tunnel have been incorporated in the HVAC design to reduce the cooling load.
- Optimized window design by selection of Low E glass and external shading.

## CONCLUSIONS

Green building is today the most widely used form of architecture. Creating green buildings is an important focus of building owners and even governments worldwide. In India some world class Green Buildings have constructed in past few years, but still the concept of green buildings for general masses is infancy stage. Present work is an attempt in the direction to make people, communities and general public aware about the advantages of green buildings for sustainable environmental development and management. Despite the wide range of building environmental assessment tools recently developed (which give a valuable aid in the early design stage), architects and engineers are presently left nearly alone in this selection, with particular reference to the Italian case.

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