Journal of Energy Research and Environmental Technology (JERET)
p-ISSN: 2394-1561; e-ISSN: 2394-157X; Volume 3, Issue 2; April-June, 2016; pp. 73-75

http://www.krishisanskriti.org/Publication.html

Review of Green Building Material in India

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Abstract—*The concept of Green Building or sustainable building incorporates and integrates a variety of strategies during the design, construction and operation of building projects. The use of green Building Material is used to control the pollution level also & it makes our Environment Pollution Free. Green Building material helps to reduced the maintenance cost of the building & also helps for the conservation of Energy. It is the practice of increasing efficiency with which buildings use resources- energy, water and materials-while reducing building impacts on human health and the environment. The Paper covers about definition, Scope of Green Building Materials & uses of natural resources in the Construction.*

Keywords*: Green Building or sustainable building Material, Merits & Demerits of Green Building Material, Energy*

1. INTRODUCTION

Green Building Material is an ecofriendly material which generally used to reducing building impacts on Human Health & Environment by using Natural Resources. Green Building Concept is adopting in various countries. In this waste has been minimized at every stage during Construction time. These Technologies are very beneficial and includes uses of natural resources like Solar Energy, Rain Water Harvesting, recycling of waste Products & can be further used in Buildings & energy Efficient Products.

The concept of Green Building or sustainable building incorporates and integrates a variety of strategies during the design, construction and operation of building projects. Green building brings together a vast array of practices, techniques, and skills to reduce and ultimately eliminate the impacts of buildings on the environment and human health. It often emphasizes taking advantage of renewable resources, e.g., using sunlight through solar , and photovoltaic equipment, and using plants and trees through green roofs, rain gardens, and reduction of rainwater run-off..

2. GREEN BUILDING MATERIALS USED IN INDIA

Plastic: The term plastics covers a range of synthetic or semi-synthetic organic condensation or polymerization products that can be molded or extruded into objects or films or fibers. Their name is derived from the fact that in their semi-liquid state they are malleable, or have the property of plasticity. Plastics vary immensely in heat tolerance, hardness, and resiliency. Combined with this adaptability, the general uniformity of composition and lightness of plastics ensures their use in almost all industrial applications today.

Glass: Glass making is considered an art form as well as an industrial process or material. Clear windows have been used since the invention of glass to cover small openings in a building. They provided humans with the ability to both let light into rooms while at the same time keeping inclement weather outside. Glass is generally made from mixtures of sand and silicates, in a very hot fire stove called a kiln and is very brittle. Very often additives are added to the mixture when making to produce glass with shades of colors or various characteristics .The use of glass in architectural buildings has become very popular in the modern culture. Glass “curtain walls” can be used to cover the entire facade of a building, or it can be used to span over a wide roof structure in a “space frame”.

Steel: Steel requires the mining of iron ore, coal, limestone, magnesium, and other trace elements. To produce steel, iron must first be refined from raw ore. The iron ore, together with limestone and coke (heat-distilled coal) are loaded into a blast furnace. Hot air and flames are used to melt the materials into pig iron, with the impurities (slag) floating to the top of the molten metal. Steel is produced by controlling the amount of carbon in iron through further smelting.

Fly Ash: Fly ash offers environmental advantages, it also improve the performance and quality of concrete. Fly ash affects the plastic properties of concrete by concrete by improving workability, reducing water demand, reducing segregation and bleeding, and lowering heat of hydration. Fly ash increases strength, reduces permeability, reduces corrosion of reinforcing steel, increases sulphate resistance, and reduces alkali-aggregate reaction. Provide higher strength, fly ash continues to combine with free lime, increasing compressive strength over time

WOOD Wood is a product of trees, and sometimes other fibrous plants, used for construction purposes when cut or pressed into lumber and timber, such as boards, planks and similar materials. It is a generic building material and is used in building just about any type of structure in most climates.

Wood can be very flexible under loads, keeping strength while bending, and is incredibly strong when compressed vertically. There are many differing qualities to the different types of wood, even among same tree species. This means specific species are better for various uses than others. And growing conditions are important for deciding quality. Historically, wood for building large structures was used in its unprocessed form as logs. The trees were just cut to the needed length, sometimes stripped of bark, and then notched or lashed into place. In earlier times, and in some parts of the world, many country homes or communities had a personal wood-lot from which the family or community would grow and harvest trees to build with. These lots would be tended to like a garden

Fly ash-Stone Powder-Cement Bricks: Fly ash-Stone Powder-Cement Bricksare manufactured by mixing weighed amount of fly ash, cement and size stone powder in a mixer and moulded in bricks making machine.Fly Ash can be used in the range of 40-70%. The other ingredients are lime, gypsum (/cement), sand, stone dust/chips etc. Minimum compressive strength (28 days) of 70 kg/cm^2 can easily be achieved and this can go upto 250 Kg/cm^2 (in autoclaved type).

Advantage of these bricks over burnt clay bricks:

- Lower requirement of mortar in construction
- Plastering over brick can be avoided
- Controlled dimensions, edges, smooth and fine finish and can be in different colours using pigments
- Cost effective, energy-efficient and environment friendly (as avoids the use of fertile clay)

Land Fill and Landscape: Fly ash can be used as land fill by city authorities. It can also be used for crating mounts topped with soil growing grass in landscaping.

Green paint: Paints may have a negative impact on the indoor air quality of a building because they may contain chemicals called volatile organic compounds (VOC) other toxic components that evaporate into the air and are harmful to the health of occupants. VOC react with sunlight and nitrogen oxide to form ground level ozone, a chemical that has detrimental effects on human health. These problems can be eliminated by using low VOC paints healthy occupants are more productive and have few illness related absenteeism.

Bamboo : Bamboo is one of the most amazingly versatile and sustainable building materials available. It grows remarkably fast and in a wide range of climates. It is exceedingly strong for its weight and can be used both structurally and as a finish material. There is a long vernacular tradition to the use of bamboo in structures in many parts of the world, especially in more tropical climates, where it grows into larger diameter canes One tricky aspect to the use of bamboo is in the joinery; since its strength comes from its integral structure, it cannot be joined with many of the traditional techniques used with wood.

3. IMPORTANCE OF GREEN BUILDING MATERIAL

As we all are aware that the utilizations of natural resources is not properly & the level of pollution has been increasing day by day. Renewable resources can be replaces by the Non renewable Resources due this the resources gets expensive everyday. So these green Building Material not only help to decrease the Pollution level but it also helps the proper utilization of natural resources & make pollution free Construction & consume energy efficient products .Adaptation of Green Building Material is very useful for Environment & for public health also. This techniques helps in reducing the cost of the project & easily available material which reduce the pollution level during the time of Construction.

Merits & Demerits of Green Building Material

Merits

1- Cost:

The construction costs are the same as a standard building and sometime they cost a little bit more as they require special materials to be built. However, a regular building costs won't stop after its construction since money will always be spent on maintenance, renovation, operation or even demolition.

This doesn't mean that green buildings won't need maintenance, renovation, operation or even demolition as well, but being built of natural resources all that re-doing stuff will take ages till done as they are not damaged that fast hence, investing in green building is 10 times more profitable than standard ones.

2- Efficiency:

This here is divided to the following:-

A- Water efficiency:

Green buildings don't know the meaning of "wasted", they recycle rain water and grey water and use them for toilet flushing for instance.

B- Energy Efficiency:

These buildings save energy more than those built out of bricks. They only depend on all renewable energy resources such solar power, hydro-power and wind power which are used for heat and electricity and help improve the **indoor air quality**

C- Material Efficiency:

Green buildings are built from natural, non-toxic and recycled materials that don't cost much and Eco-friendly such as bamboo, straw, recycled metal or concrete..etc.

Demerits

1- Location:

Since these buildings depend on sun for energy, they need to be located in position that will have the best sun exposure which may demand placing them opposite to other neighborhood homes.

2- Availability:

The materials to build such buildings can be hard to find especially in urban areas where preserving the environment is not the people's first option.

So shipping these materials can then cost a lot than a standard building.

3- No air cooling features:

These buildings run on heat to generate power, so they are not designed for hot areas as they do not have any ventilation systems, so air conditioners will be required which will make these buildings anything but Eco-friendly.

4. GREEN BUILDING POLICIES & CODE

- Ministry of Environmental & Forest (MOEF)
- Environmental Impact Assesment (EIA)
- Energy Conservation Building Code(ECBC)
- National Building Codes (NBC)

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[2] Environmental Impact Assesment (EIA)