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Utilization of waste material in making a green building

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INTRODUCTION

The components of building block of traditional materials such as brick, stone, natural riversand, Ordinary Portland cement, wood, paints, steel etc. have some environmental effectsduring their life cycle from manufacturing, transportation, uses to demolish for contaminatingair, water, soil and reducing the natural resources day by day. The spiraling cost of such traditional building materials makes the housing unaffordable or a distant dream for anaverage income salaried person in a tier-2 or tier-3 cities, forgetting about the tier-1 and Metros. This leads to have more and more R&D to find out alternative low cost, energy saving, eco-friendly, recyclable solid wastes from industries, agricultures, mines for effective utilization as a partial or full replacement of such components for uses in buildings and infrastructures. Though the research has been well established time and again of the benefitsof these waste materials but it is the mind set and conservative approach of our Planners, Engineers and Architects for coming out with a novel way or making some changes in theirperspective for which the common man or the society is not able to reap the harvest out of these research works. So, it is the high time for all of us to leave aside our traditionalconservative approach to move forward for using such alternative eco-friendly green building materials and
techniques for a sustainable development.

TABLE DEPICTING VARIOUS SOLID WASTES GENERATION IN INDIA

SOLID WASTES	MILLION TONES/ YEAR
CCRs	110
COAL MINES	60
MUNICIPAL	45
RICE HUSK	20
LIMESTONE	20
JUTE FIBRE	18
CONSTRUCTION	15
MARBLE DUST	10
RED MUD	7
HAZARDOUS	5

GREEN BUIDING MATERIALS AND PRACTICES

There is also large quantity of rice husk, coconut coir etc. which need to be utilized effectively for sustainable approach. Buildings account for 33% energy consumption, 12% of all water use, 30% of greenhouse gas emission, 65% of all waste output and 70% of all electricity consumption. Green Building concept and sustainable development has recently emerged as important areas in India and have caught the imagination of builders, planners, environmentalists. Green Building also known as sustainable building is the practice of making structures and using processes that are environmentally responsible and resource-efficient throughout a building's life-cycle: from planning to design, construction, operation, maintenance, renovation and deconstruction. Some common features of green building are:

- Minimize the demand for non-renewable resources and energy.

- Maximize reuse, recycling and utilization of renewable resources like water, energy and other materials.
- Utilize locally available low cost building materials and environment friendly construction practices.
- Use efficient equipment to meet its lighting, air conditioning and other needs.
- Use renewable resources to the maximum extent.
- Recycle waste water and treat it in environment friendly way of using minimum energy.
- Eliminate the use of materialsthat pollute or are toxic during their manufacture, use or reuse.

It has become a major challenge before the green building developers to adopt green construction techniques including recycling of construction debris. This certainly calls for more R & D.

SOME OF THE IDENTIFIED GREEN MATERIALS

Fly ash cement, Recycled aluminum, Recycled tiles, Bamboo based products, Green Roofs, Fly ash block, Recycled steel, Low VOC paints, HFC based high efficiency chillers, recycled wood.

USES OF FLY ASH

Fly ash can be used in mine filling, construction of roads/flyover embankments, hydraulic structures, manufacture of several building components. Use of fly ash for RCC structures with in-fill walls and load bearing structures, mortar, and binders are other uses of fly ash.

USES OF RED MUD

Red mud has been used a substitute for ordinary clay for producing bricks. Several attempts have been made to recycle red mud not only to avoid environmental pollution, but also to use it in developing polymer composites, wood substitute products, bricks, ceramics glazes such as porcelain, tiles and extraction of metals.

UTILIZATION OF RICE HUSK

Rice Husk is available in the state which is basically used as fuel by running it and thus releasing CO2to the atmosphere and causing greenhouse gas emission. Rice husk can be used for manufacturing light weight concrete.

USE OF BAMBOO AS REINFORCEMENT

Bamboo has been used since a long time for reinforced clay roof. Same can be used for reinforcement of thin & light weight Reinforced Concrete Structures.Bamboo tree grows very fast than any other tree and can be very effective for partial replacement of steel reinforcement and thus making it eco-friendly.

CONCLUSION

Use of industrial wastes and by-products as an aggregate or raw material is of great practical significance for developing building raw material components as substitutes for the traditionalmaterials and provides an alternative or supplementary materials to the housing industry in a cost effective manner at the same time converting this poison to nectar. Use of local available agricultural wastes, other low cost materials and techniques will certainly be helpful for cost economy, eco-friendly and affordable durable housing which will bring cheers to the millions of people for getting their green dream houses.