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Research Paper

Advantages of Green Building

Engineering

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ABSTRACT

Global warming is a serious problem facing the world today as well the world in the future. In order to stop or reverse this problem, society must change, learning to alter what they use in order to be less harmful to the environment. Making buildings "Green" would greatly impact this problem. There are many ways for this to be done and more ways are being developed rapidly. As these new developments arise, the cost reward for green building becomes more logical for the consumer. The Global warning is the effects of climate change are felled across the world both government and individuals are beginning to take task of building green houses much more seriously. Green building is an opportunity to use the resources efficiently while creating healthier building that improve human health, build a better environmental problems .

INTRODUCTION :

Green building concept deals with the optimum use of natural resources for the development beneficial or non-harmful to the environment. In other words green building is a building which utilizes very less amount of manmade energy and is capable of producing ample amount of energy without causing any harm to the environment. The term 'Green' environmentally friendly from building to the landscaping choices it also. It also encompasses energy use, water use, and storm water and wastewater reuse.

Similarly use of recycled plastic, recycled aggregates and wastes for the construction. And another method of construction of low carbon building which uses sustainable materials like blended cement, fly ash bricks, low energy intensity floor and roofing system, mud blocks etc.

Goals of Green Building:

The concept of sustainable development can be traced to the energy (especially fossil oil) crisis and the environment pollution concern in the 1970s.The green building movement in the U.S. originated from the need and desire for more energy efficient and environmentally friendly construction practices. There are a number of motives for building green, including environmental, economic, and social benefits. However, modern sustainability initiatives call for an integrated and synergistic design to both new construction and in the retrofitting of existing structures. Also known as sustainable design , this approach integrates the building life-cycle with each green practice employed with a design-purpose to create a synergy among the practices used.

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 passive solar, active solar and photovoltaic techniques and using plants and trees through green roofs, rain gardens, and reduction of rainwater run-off. Many other techniques are used, such as using wood as a building material, or using packed gravel or permeable concrete instead of conventional concrete or asphalt to enhance replenishment of ground water.

While the practices, or technologies, employed in green building are constantly evolving and may differ from region to region, fundamental principles persist from which the method is derived as follows

- Ø Sitting and structure Design Efficiency
- Ø Energy Efficiency
- Ø Water Efficiency
- Ø Materials Efficiency
- Ø Indoor Environmental And Quality Enhancement
- Ø Operations and Maintenance Optimization
- Ø Waste and Toxics Reduction

The essence of green building is an optimization of one or more of these principles. Also, with the proper synergistic design, individual green building technologies may work together to produce a greater cumulative effect.

On the aesthetic side of green architecture or sustainable design is the philosophy of designing a building that is in harmony with the natural features and resources surrounding the site. There are several key steps in designing sustainable buildings: specify 'green' building materials from local sources, reduce loads, optimize systems, and generate on-site renewable energy.

TYPICAL FEATURES OF GREEN BUILDINGS

- · Eco-friendly building Materials
- · Environmental friendly construction
- · Green Power
- · Water use efficiency
- · Energy efficient and Eco-friendly equipment
- · Gray water gardening
- · Plantation

1] Eco-friendly building Materials: At present, generation of fly ash in India is more than 60 million tons per annum. Fly ash as such is a pollutant but when used as building Material is Eco-friendly. Fly ash can be used for making a verity of building products some using simple low cost processes and other high investment processes producing high quality products. The present state of manufacture of fly ash products is below.

i) Clay Fly ash bricks: Twenty to fifty per cent fly ash depending upon the quality of the soil can be mixed it to produce burnt clay fly ash bricks by conventional or mechanized processes.

ii) Stabilized Mud fly ash bricks : Compacted mud fly ash bricks stabilized with lime, cement or other chemicals can be easily made. The problem of getting dry fly ash at the site, makes adoption of this technology somewhat difficult.

iii) Calcium silicate bricks: This is a variety of the commonly known sand-lime bricks using fly ash in place of quartz sand. The process involves low or high pressure compaction followed by a) Low pressure steam curing b) Autoclaving under elevated hydrothermal conditions. The bricks produced with high pressure technology are much superior.

iv) Mixing with cement : Ten to Twenty per cent dry fly ash can be mixed with clinker during manufacture of cement or blended with finished ordinary Portland cement (OPC) to produce Portland pozzolana cement (PPC) strength is comparable with it.

v) Autoclaved Aerated Concrete: Autoclaved Aerated Concrete can be manufactured by a process involving mixing of fly ash, quick lime or cement and gypsum in a high speed mixer to form a thin slurry. These are considered excellent products for walling blocks and prefab floor slabs.

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vi) Cellular Light weight Concrete : Cellular Light weight Concrete(CLC) can be manufactured by a process involving the mixing of fly ash, cement. These blocks are especially useful in high-rise construction reducing the dead weight of the structure.
vii) Sintered light weight aggregate: Sintered light weight aggregate substitutes stone chips in concrete reducing dead weight . It can also be used for various purposes such as structural light weight concrete building units for use as load and non-load bearing elements. It has got good potential in places where fly ash is locally available and stone aggregates are costly.
viii) Cast-in-situ fly ash walls : Using high fly ash mix Cast-in-situ walls can be built. By using this system we can achieve 20 % economy, quicker construction , good finish o both the sides of the wall (which eliminates plastering) and more carpet area etc. Similar walls can be cast using Fal- G Cement.
ix) Fly ash – stone powder-cement bricks: Fly ash – stone powder-cement bricks are manufactured by mixing weighed amount of fly ash, cement ad size stone powder in a mixer and mounded and pressed in bricks making machine.
x) Other Materials : Bamboo, ply board, Bamboo matting, Gypsum board, laminated wood plastic and Eco- friendly construction chemicals etc. water, polyurethane and acrylic based chemical admixtures for corrosion removal, rust prevention water proofing.

2]Environmental friendly construction: Cavity wall construction consist of two skins separated by a hollow space (Cavity). The skins are commonly masonry such as brick or concrete block. Masonry is an absorbent material, and therefore will slowly draw rainwater or even humidity into the wall.

Cavity wall construction is that it provides the ability to more adequately insulate the building. A continuous layer of rigid insulation is easily fitted between the cavity and the inner skin of the wall. It can reduce heating costs as more of the heat is used effectively.

3]Green Power: Optimum use of available solar energy and other forms of ambient energy in building designs and construction achieve energy- efficiency in green building. Whatever combination of solar, wind and utility power is available, the entire power system would be greatly enhanced by a reliable, zero maintenance , ultra- long life, and lower life cycle cost power storage and management system. Even for urban building, solar power can compete with central utility power. and RPMs UPS (which makes PV power available 24 hours / day) will cost less than existing UPS. Comparisons for solar are even more favorable when buildings are remote, in areas not served by utilities, and especially if environmental costs are included.

India , dealing with its energy crunch ,being a tropical country ,the idea that solar energy and wind energy can be turned into electricity is appealing .photovoltaic panels, small wind turbines, and fuel cells can be installed in existing structures or incorporated into new construction. Implementation of energy efficient systems and effective utilization of renewable energy to reduce the pressure on grid power installed in existing structures or incorporated into new construction. Implementation of energy efficient systems and effective utilization of renewable energy to reduce the pressure on grid power.

Building Integrated PV: An increasing common application of photovoltaic's in Europe and USA is to integrate photovoltaic panels into the roof or façade of a building. The panels function as building mat and also gene rate electricity during the day time. Which is used to meet a part of the electrical energy needs in the building. The environment friendly application is commonly referred to as building integrated photovoltaic (BIPV) It is feasible to construct energy and aesthetically appealing building using this concept. BIPV has significant pot in India where a large number of building are constructed every year for different purposes and where energy consumption in building is growing at a rapid rate. The PV panels function as building materials and also generate electricity during the day time, which is used to meet a part of the initial costs of a BIPV system are high. There could be long tern savings through reduction in electricity consumption. A typical BIPV system consist of special PV modules in capacities of tens of kilowatts. Such modules are normally different from the modules used in order applications. A battery bank to store the energy generated during day time. A inverter power conditioning system which will deliver steady AC power for different purposes in the building. There is not enough experience in the country in this field. In oder to encourage this application and prepare manufactures and users. It is proposed to support BIPV projects during 2002-0 in demonstration mode, beginning with the building of the ministry and its institutions and some prestigious projects. It is proposed to meet 80% of the cost of the PV modules actually used in such projects by way of grant to the building organizations. If the grant is channeled through a state renewable energy agency. A small service charge of 2% of the MNES assistance will be given to the state agency for work connected with developing the project. Processing it and monitoring the per of the system the balance 20% of the cost of the modules as well as the expenditure on batteries. Inverter structures, transportation installation will have to be borne by the user organization.

Lighting: Solar home light system
Home lighting system are powered by solar energy using solar cells that convert solar energy (Sunlight) directly to electricity. The electricity is stored in batteries and used for the purpose of lighting whenever required. These systems are useful in non-electrified rural areas and as reliable emergency lighting system for important domestic, commercial and industrial applications. The SPV systems have found important application in the dairy industry for lighting milk collection / chilling centers mostly located in rural areas.

The solar home lighting system is a fixed installation designed for domestic application. The system comprises of solar PV Module (Solar Cells), charge controller, battery and lighting system (lamps &fans). The schematic of the HLS is given below. The Solar module is installed in the open on roof , terrace – exposed to sunlight and the house. The solar module requires periodic dusting for effective performance.

The above systems are designed to give a daily working time of 3-4 hours will a fully charged battery. The system provides for buffer storage for 1-2 non-sunny / cloudy days.

4]water use efficiency :
Rain Water Harvesting : In Green building ,the superstructure is constructed over a cellar which is used to capture the excess rainwater. The basement is below the ground level and stores the water where it is treated and cycled for use. This method has a low maintenance cost and is user friendly. It is highly viable in both Flood prone flood prone and areas to store the water from rainy season for the summer.

Drip Irrigation : Drip irrigation system delivers water to the crop using a network of irrigation equipment like mainlines , sub-mains and lateral lines with emission points spaced along their lengths. Each dripper/

emitter, orifice supplies a measured, precisely controlled uniform application of water, nutrients and required growth substances directly into the root zone of the plant. Water and nutrients enter the soil from the emitters, moving into the root zone of the plants through the combined forces of gravity and capillary. In this way, the plants withdrawal of moisture and nutrients are replenished almost immediately, ensuring that the plant never suffers from water stress, thus enhancing quality, ability to achieve optimum growth and high yield. The result is a totally customized, efficient and long life system which ensures saving in water, bountiful harvest season after season, year after year and early maturity apart from saving in labor and fertilizer cost.

5]energy efficient & eco-friendly equipment :
Zero CFC Base Refrigerant in Refrigeration & AC : The ideal Refrigerant should have the properties of high energy efficiency,

high refrigeration capacity, no flammability, low toxicity, zero ODP, very low global warning potential (GWP) and total equivalent warning impact (TEWI), ability to use existing proven compressors and other components, and low cost.

The following chart is helpful in understanding the traditional refrigerants, the commercialized second generation alternatives and "potential" third generation refrigerants.

6]grey water gardening : Gray water is defined as the wastewater produced from baths and showers, clothes washers , and lavatories. The wastewater generated by toilets, kitchen sinks and dishwashers are called black water. The use of gray water for irrigation requires separate black water and grey water waste lines in the house. This is not a difficult task in new construction but can be problematic in existing building.

BENEFITS OF GREEN BUILDING:

1. High performance green building emerged that will prevent pollution, save energy, natural resources and money.
2. The 60% cost reduction in energy expected.
3. Human performed better with the skylight and windows that bring natural, non-glare light inside the classroom.
4. They can reduce respiratory disease by 10 -20% and healthy occupants in Green building.
5. Improved Indoor Air quality and occupant comfort due to no- VOC emissions from building materials.
6. They increase occupant performance by up to 25 %
7. Their occupants have 15% less absenteeism compared to those in building.
8. To Improved Productivity
9. Green Building have higher market value.
10. Tax benefits for Green Building.
11. To Improved Retail sales.
12. The Lower utility Demands in green buildings.
13. To improved Quality of Life.

FIVE TIPS FOR GREEN DESIGN ON A BUDGET:

Green design has a reputation for being expensive. But designer has a few suggestions on how to create a great green interior design on a budget. Is as follows-

· Plan Your Green Design:

Begin every project with a plan. Write down what you intend to keep and what you think you need. Prioritize your list so that when you actually spend money, you will spend it wisely and not impulsively. It also helps to work out a schedule. Figure out how much time you'll need -- and then add some extra time for any delays. A rush job usually costs more, so give yourself some time for changes.

· Shopping Begins in the Home:

Go shopping in your own home first**.** Creating a "new" piece -- even if it came from your home -- will make a space feel refreshed. Can something that's been in the living room for years be painted, reupholstered, or refreshed with a slip cover? Instead of buying a bunch of new stuff, exercise your creativity before you exercise your wallet.

· Size Matters in Green Design:

Use graph paper to accurately draw the room**.** With measurements of the room you're updating and the existing furniture and accessories, draw the room on a piece of graph paper. Create furniture pieces that you can cut out and move around using another piece of paper. Plan your room arrangement so you know what size furniture or accessories will fit in the space.

· It's Not Used - It's Vintage:

Search consignment stores, thrift shops, flea markets, antique stores and resale shops. This is not only a great way to save money while going green, but it's a lot of fun, too. Spending an afternoon haunting the dark aisles of old stores can yield some amazing bargains and one-of-a-kind pieces that your friends who shop at IKEA will never discover.

· Green Design: Color Your World

Add a fresh coat of paint in a new color**.** Choose paint that is low/no VOC (volatile organic compounds). Look on the paint can for the VOC content and choose paint with fewer than 100 grams/liter VOC

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