

DESIGN OF ENERGY EFFICIENT BUILDING-SURVEY

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ABSTRACT - A green building, which is also known as a sustainable building is designed to meet some objectives such as occupant health; using energy, water, and other resources more efficiently; and reducing the overall impact to the environment. It is an opportunity to use the resources efficiently while creating healthier buildings that improve human health, build a better environment, and provide cost savings. All the development projects lead to over-consumption of natural resources.

Green building has been highlighted in the paper in a view to save our planet and sustain life the studies and the research work in these countries is also way far behind as compared to the developed nations in the world. This paper presents the need of sustainable development all over the globe especially in the developing countries like India and China which have a huge land mass and also developing rapidly and heading towards becoming the new super powers of the world soon in the future. Also, it includes the sustainable and economic studies with references to the Indian contexts with a supporting live recent case study of a newly designed and constructed luxurious residential bungalow in a small town in India. The case study is specially selected as a residential bungalow which is designed and constructed as a sustainable and a green structure in a small town in the state of Maharashtra in India as India is also known as a country of villages with a second Largest population in the world

This paper will help Indian villages and their residential buildings developed sustainable and green by implementing easy, simple and economic techniques.

Key words: Buildings, energy efficiency, insulation, sun, energy consumption, monitoring,

1. INTRODUCTION

Green building also known as green construction or sustainable building. It is a way of enhancing the environment. It benefits humans, the community, and the environment in order to reduce resource consumption while enhancing quality of life. This ultimately results in reduction of green house gases which will help to reduce green house effect. This paper presents an overview of application of modern green infrastructure construction technology which makes a

significant impact on conservation/proper utilization of resources like land, water, energy, air, material thereby reducing the overall cost of construction as well as adverse impacts of climate change. Energy efficient building is best way to reduce in some extent of these damages although new technologies are constantly being developed to complement current practice in eco-friendly structure; the common objective of green built environment on human health and the natural environment.

A green building, also known as a sustainable building, is a structure that is designed, built, renovated, operated, or reused in an ecological and resource-efficient manner. Green buildings are designed to meet certain objectives such as protecting occupant health; improving employee productivity; using energy, water, and other resources more efficiently; and reducing the overall impact to the environment

Green Building practices promote construction of buildings that are healthier for the occupants and healthier for the environment Sustainable or "green" building practices can reduce the tremendous impact that building design, construction and maintenance has on both people and nature Energy and material consumption in buildings can contribute significantly to global climate change.

1.1 LITERATURE REVIEW:-

Gul Mehreen S. Patidar Sandhya [1] (2014), Understanding the energy consumption and occupancy of a multi-purpose academic building

A.C. Menezes et-al (2013), this paper has detailed the development and validation of two models for predicting electricity consumption and power demand profiles for small power equipment.

Timilehin Labeodan et-al (2014), this paper, it was shown that obtaining this information for use building controls.

Dakwale Vaidehi A., Mandavgane Sachin (2011), in this paper it was shown that to energy consumption of material

Joshi Ram, Singh Anupam K. (2014), the presented research work focuses on the utilization of alternative sources of

renewable energy, mainly solar energy to satisfying energy demand in buildings.

M. Samer (2013) Buildings and their related activities are responsible for a large portion of the consumed energy

Parikh Priyanka (2016) developing green building in India

1.2 BENEFITS OF GREEN BUILDING

Various benefits from green buildings are discussed below

ENVIRONMENTAL BENEFITS

Protect bio diversity and eco systems, improve air and water quality, reduce waste streams, conserve natural resources.

ECONOMIC BENEFITS

Reduce operating cost, create, expand, and shape markets for green product and services, improve occupant productivity. building is to reduce the overall impact of the

SOCIAL BENEFITS

Enhance occupant comfort and health, heighten aesthetic qualities, minimize strain on local infrastructure, Improve overall quality life.

1.3 BENEFITS FOR BUILDING OWNERS

1. Potential higher occupancy rates.
2. Higher future capital value.
3. Less need for refurbishment in the future.
4. Reduced risk of obsolescence.
5. Ability to command higher lease rates.
6. Higher demand from institutional investors.
7. Mandatory for government tenants.
8. Lower tenant turnover.

1.4. OBJECTIVES OF GREEN BUILDING:-

Green Buildings are designed to reduce the overall impact on human health and the natural environment by the following ways using energy, water and other resources efficiently. By reducing waste, pollution, and environmental degradation.

- i. Identify the design technique for energy efficient building.
- ii. Modify the structure and reduce the cost and make it environment friendly.
- iii. Improve occupant health and comfort.
- iv. Improve air and water quality.
- v. Conserve the natural resources.
- vi. Improve occupant productivity.

1.5. GREEN BUILDING PRODUCT AND MATERIALS:-

Green building materials are composed of renewable, rather than nonrenewable resources. Green materials are environmentally responsible because impacts are considered over the life of the product. Depending upon project-specific goals, an assessment of green materials may involve an evaluation of one or more of the criteria listed below.

1. Resource efficiency
2. Indoor air quality
3. Energy efficiency
4. Water conservation
5. Affordability

1.6. METHODOLOGY:-

As the energy required for manufacturing of cement and other construction material is more so it is major contributor to the consumption of our total energy source. Using such materials described below with their benefits towards environment.

1.6.1. Sand Lime Bricks:- The main constituents of sand lime bricks are sand, lime, fly ash, water. Using sand we can achieve the adhesiveness to hold the particles together. Its brittleness helps us to recycled it and reuse in other works.



Fig.1. Sand lime bricks

1.6.2. Eco-Friendly Tiles:

An Eco-friendly tile replaces the conventional flooring and uses less energy in their production. This tile improves performance of indoor environment quality.



Fig.2. Eco -friendly tiles

1.6.3. Colored Lime Plaster:

Though low VOC (Volatile Organic Compounds) paints are available but by using colored lime plaster as paint it reduces the painting for whole structural life. It is maintenance free, washable and water proof. Its shine and glossiness increases as the time passes. It gives better aesthetics look than conventional painting work.



Fig.3. Color Lime Plaster

1.6.4. Reflectasol Glass:

Reflectasol glass gives better indoor quality than the normal clear glass. It keeps the inner temperature cool in hotter summers which reduce the energy consumption.

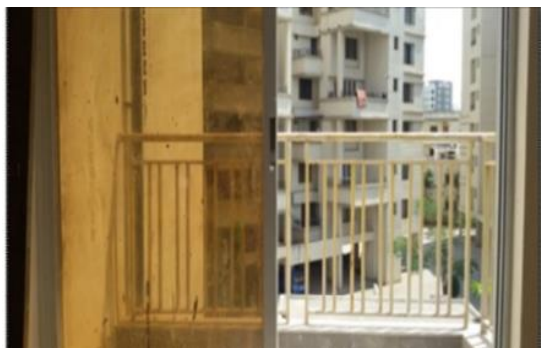


Fig.4. Reflectasol glass

1.6.5. Rainwater Harvesting



Fig.5. rainwater harvesting

Rainwater harvesting system we are collect rainwater from roof and then storing it is storing it in a tank. The collected water can then be used for other purposes such as toilet and sprinkler system. The rain barrels are one of the most common methods of Rainwater harvesting is being frequently used this day

2. SOLAR SYSTEM



Fig.6. Solar Panel

Solar energy is clean and renewable source energy. Solar panels are an emerging and hot technology for peoples who want to utilize the natural power all around us. Solar power brings down the energy consumption and supply excess energy to your utility company

3. SOLAR ROOF TOP SYSTEM:-

Industrial, institutional and house hold needs continuous and regular access to power for various needs, solar roof top system are designed to provide electricity to office homes with intermittent or no greed electricity.

4. USE SOLAR WATER HEATER:-

A solar water heater is a device that uses heat energy of the sun to provide hot water for various applications. In homes, it is useful for bathing, washing, cleaning, and other chores.



Fig.7. Solar water heater

5. USE OF SOLAR WATER PUMP:-

Each solar array has a number of solar modulus connected in parallel and series. Every solar PV panels generates current by

SCOPE OF GREEN BUILDING-

- This will be beneficial for the people who are really conscious about the environmental impact of the building and believe in energy conservation.
- Advance day light system and lighting performance
- Indoor environmental quality, health thermal comfort and human precipitation
- Modeling and optimization of building performance

Table-1: calculation of material

Sr no	Content	Conventional Building	Energy Efficient Building
1	Earthwork	21178	21178
2	Brickwork	195705	544647
3	Plain Cement Concrete	19375	27350
4	RCC work	303377	303377
5	Painting	659968	801276
6	Lighting	220000	176000

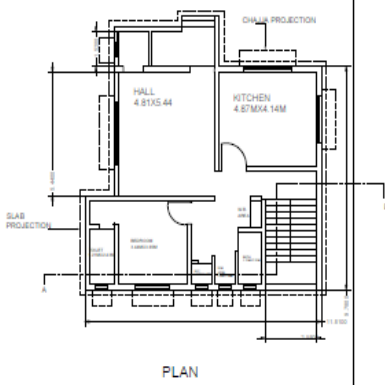
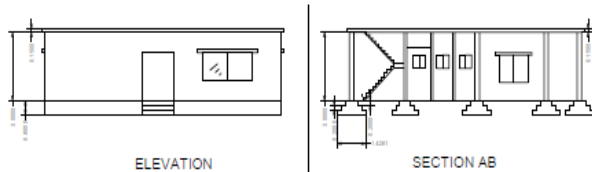


Fig.1 Plan of design of energy efficient building

Comparison of Conventional and energy efficient building

Table-2 comparison

Conventional Building	Energy Efficient Building
<ul style="list-style-type: none"> • In Conventional Building, there will be different room conditions depending on the changes in the environmental conditions. • The cost of construction of Conventional Building is comparatively lower than energy efficient building . • But in case of Conventional Building, a building service engineer and an architect is enough. • Energy Consumption is more as compared to energy efficient Building. • Salvage value is less. 	<ul style="list-style-type: none"> • Energy efficient Building adjusts the inside functional aspects such as lighting, ventilation, air conditioning, etc. automatically with the changes in environmental conditions controlled by computer. • In a energy efficient building the security system, communication system, etc. are coordinated and automatically controlled by computer work station whereas in Conventional Building there is no work station. • While planning Energy efficient Building a building service engineer, an architect and hardware engineer is required. • Salvage value is more as many of the electronic devices are reusable

CONCLUSION

- Architectural design; green technologies and intelligence in combination may be a pragmatic approach towards the sustainability aspect.
- Intelligent buildings have been a positive impact there is still a wide scope for enhancement.

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