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INCORPORATING GREEN BUILDING TECHNIQUES TO THE EXISTING BUILDING

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Abstract - The term "Green Building" isn't just applicable to products, but also to the development strategies, building design, orientation, landscaping, building operations, maintenance etc. Lesser the impact of a building on human health and environment, the more green it is.

Application of Green concepts to Existing Building is introduced in this report. Affordable buildings next to the level of performance with more comfortable buildings that cost less to operate, last longer, and keep occupants healthy. Conservation of energy and water are most important issues now days. To make Existing Building more efficient, maximum use of natural resources, and to reduce effect of conventional construction on environment, green concepts are applied to Existing building.

In the present study, the existing construction of our institute has been studied in terms of efficient use of resources and energy. The overall consumption of electricity and water has been determined and the energy and water that will be saved after the additional inputs (like ground water harvesting system, grass pavers, vermicomposite plant, aluminium based paints and extra cross ventilators) to enhance the efficiency of the building are also computed. The construction and installation charges have also been computed. The study concentrates on the advantageous outcomes once the building is converted to "green building".

***Key Words*: green building, Energy conservation, rainwater harvesting, water conservation, energy saving, green building, natural ventilation etc.**

1. INTRODUCTION

A green building may be understood as an outcome of the design philosophy focusing on increasing the efficiency of the resources used - i.e.: energy, water and material – along with reduced hazards on environment and human health during the entire building life. This can be achieved through better design, construction, operation, maintenance etc.

The green building should be designed and operated in such a manner that it reduces the impact on human health and environment by:

•Use of energy, water and other resources in an efficient manner,
•Minimizing health hazards of the occupants,
•Minimizing pollution, wast and environmental degradation. The green building concept is gradually gaining momentum in India. A green building typically applies practices like harvesting energy and water and using environmentally friendly materials in its design, construction, operation and maintenance and sustains the environment. Development of green buildings has many monetary benefits such as low energy, waste disposal, water cost, and low environmental and emission costs.

The advantages and benefits of the green buildings are spread out over the life span of the building and should be looked at in the long run and not on the initial cost.

Green Buildings also called sustainable buildings are responsive to the environment and to lowering energy consumption and its resources. Green Buildings also promote productivity through environmentally healthy buildings.

Finally, initial costs are slightly higher but throughout the life of the building, operational and maintenance cost are greatly reduced. In a broader context, Green Buildings addresses such issues as global warming and recharging the ground water table.

1.1 Why Make your Building Green?

Conservation of energy is one of the important issues to be addressed today. Construction of energy efficient buildings not only helps in reduction of energy demand globally, but also generates savings in terms of reduced operational and maintenance costs. Energy conservation is one of the biggest challenges today. The world today is facing one of the major energy crises; global warming and climate change. The melt-ing snowcaps in the north and south poles, reduction in the level of water in the seas and oceans and depletion of ozone layer through carbon emissions in the atmosphere are one of the indications for the climate change and global warming.

The government, researchers and practitioners have been trying on innovative ways to control these problems. By reducing the energy consumption in residential, commercial, industrial and transportation sectors is one of the solutions to control the energy consumption. Also, another better solution to help reduction of the energy consumption is by creating awareness among the people about the climate change.

We have heard of climate change. The air is getting warmer - summer comes sooner in most continents including Europe and America. Sea level is rising, - Maldives is sinking. Rivers like the Amazon, the Nile, the Danube, etc., are drying or recede several meters every year. But it's not just happening elsewhere but also happening in India. The glaciers feeding water for the Ganga are melting faster than it should. It means the Ganga could dry up in another about 60 years or so. This would leave over 50 million people thirsty who live on the banks. Mangrove forests of Sunder ban are the world's most prosperous group of 104 Rainforest Islands. However, it appears that these very unique islands are likely to be wiped out from earth's map very soon or over the period of time. In fact, 15% of Indian side sunders ban and 17% of Bangladesh side of Sunder ban Island are already submerged in the ocean.

A third of all Carbon Dioxide emissions produced are absorbed in the oceans. Carbon dioxide dissolved in ocean water becomes a corrosive acid which kills sea life. Thus fish catches are falling, that might leave many coastal communities hungry.

2. OBJECTIVES

2.1 Review Stage

The objectives of this study are:

- To determine the annual water consumption of SOE BUILDING.
- To determine the annual average water harvested by the rain water harvesting system.
- To determine the additional suitable cross ventilations in SOE BUILDING.
- To suggest a suitable method for solid waste decomposition.
- Provision of vermicomposting plants.
- Provision of grass pavers
- Provision of ground water recharging system.
- Provision of aluminium based paints.
- To use maximum renewable energy resources like solar, LED lights, natural ventilation.
- To provide heat island effect.
- Providing storm water management by collecting rainwater and diverting it to the gardens etc.
- Providing effective construction waste management
- Improving the indoor air quality level by considering various precautions like environmental tobacco smoke control (ETS)
- And make a maximum official resources reuse such as paper etc.

2.2 Scope of Study

Construction has been accused of causing a spread of environmental problems starting from excessive consumption of worldwide resources, both in terms of construction and building operation to the pollution of the surrounding environment. Research on green building design and materials is already well established and different organizations and research groups have contributed to the development of separate green building assessment standards to evaluate the environmental friendliness of the building facilities. This study aims at com- paring the scope of prominent and developing green building assessment standards to analyze any gaps and to identify the future trends. The comparison will help planners make in- formed decisions during the design and certification stage of the Existing green building project.

Against this background, the Indian Green Building Council (IGBC) has launched 'IGBC Green Existing Building O&M Rating System' to deal with the National priorities. By applying IGBC Green Existing Building O&M criteria, existing buildings can be sustainable over the life cycle of the building. This rating program enables the building owner / developer to apply green concepts and criteria, so as to reduce the environmental impacts, which are measurable. The program covers methodologies to cover diverse climatic zones and changing lifestyles. IGBC Green Existing Building O&M is the first rating program developed in India, exclusively for existing building stock. It is supported accepted environmental principles and strikes a balance between known established practices and emerging concepts. The system is meant to be comprehensive in scope, yet simple operational.

3. METHODOLOGY

This study is aimed at research, study and development of the green building construction techniques in order to save our planet from pollution and global temperature rise. Also, it aims at spreading awareness among the people all over the world, about the advantages and also the long term cost savings from green buildings.

The work is to carry out to accomplished the objective of the study, for the study I have followed the following methodology:

a) Selection of Existing sample buildings as a case study.
b) Finding out the annual energy consumption and water consumption for Existing sample buildings. And compare energy and water consumption of same buildings after applying green concepts.
c) Application of Green Building Products and Materials to Existing sample buildings.
d) Comparsion between the sustainability obtained after the applying Green Building concepts to the Existing building.

3.1 Adopted Parameters:

- Material efficiency
- Energy Efficiency

- Water Efficiency
- Indoor air quality
- Improved Health
- Return on Investment

Table -1: Materials to Be Replaced In Green Building

ITEM	CONVENTIONAL BUILDING	GREEN BUILDING
Windows and Openings	Aluminum Paneled Plain Glasses	Insulated Glass
Lighting Fixtures	Tube Lights & CFLs	Low Watt LED Tube Lights & Bulbs
Plumbing Fixtures	Conventional Fixtures	Special Green Fixtures
Flooring	Vitrified & Glazed Tiles and China Mosaic	PVC Flooring, Glazed Tiles and China Mosaic
Doors	Pine Wood	Engineering Wood
Paints	Plastic VOC	Plastic Non VOC
Bricks	Clay Bricks	Flyash Bricks
Cement	OPC	PPC
Rain Water Harvesting	Not Provided	Provided
Solar Panels	Not Provided	Provided

According to our survey we have find out the Problem that, the cost of Green building construction is higher than conventional building because of material rates, the following table shows the comparative study.

Table -2: Approximate cost analysis and comparison of materials on the basis of present market rates between conventional and green building

ITEM	MARKET RATES (RS)		QUANTITY	NO. S	RATES (Rs)		DIFFRENCE
	CB	GB			CB	GB	
Cement	277	348	Per bag	100	27700	34800	7100
Brick	6	36	Per piece	100	600	3600	3000
Paint	152	210	Per liter	100	15200	2100	5800
Glass	370	1005	Per sq.m	100	75000	100500	25500
Flooring	50	390	Per sq.ft	100	5000	12000	7000
Plumbing	1450	2150	No.s	10	14500	12500	7000
Electric Fitting	400	760	No.s	100	4000	7600	3600
Wood	1260	2100	Per cu.ft	100	126000	210000	84000
TOTAL					263500	411000	147500

3.2. Applied Green Building Techniques:

- **Provision for ground water recharging system:** In the present scenario, the total consumption of water in SOE Bldg. is and the fulfilment of this quantity is done by tube wells which are leading to the depletion of ground water level. Hence there is an urgent need for provision of ground water harvesting system.

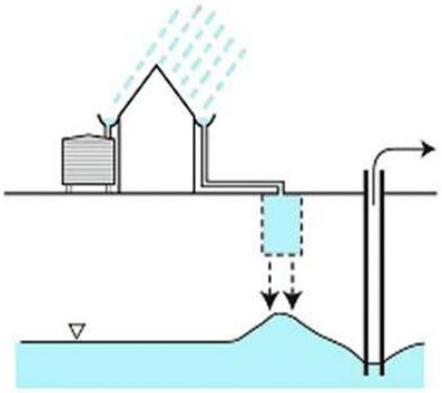

Fig. 1 Rain Water Harvesting

- **Provision for cross ventilation**: Natural ventilation is that the movement of outside air into an area without mechanical assistance. This can be controlled by additionally providing doors, windows and non powered ventilators. In A – Block the rear side of the building is facing North direction and windows are provided. But still there is a lot of space which can be converted to non-powered ventilators.

- **Provision for aluminium based paint**: Aluminium based paint has the capacity to reflect the sunrays falling thereon which ultimately reduces the warmth intake within the building and thereby creates a far better atmosphere to measure in. For the main period of the day the south facing wall is directly exposed to the daylight and it absorbs heat during the entire day then the wall keeps emitting the heat. So by the supply of aluminium based paint on the southern facing wall this effect are often reduced.

- **Provision for grass pavers**: Grass pavers are the paving tiles which have large number of rhombus shaped openings so that water can percolate through ground and thereby help in raising the ground water table. Grass pavers also help in reducing the heat island effect, as if any other material is used for paving such as concrete road or bitumen road, it absorbs heat in the day time and in the night time when the surrounding landscape gets cooled, the paver material acts as a heating island. At present the area in front of the SOE building is paved with the traditional paver tiles. This area can be paved with the grass pavers, and the traditional paver tiles can be reused at the backside of the building which is unpaved.

- **Provision for Vermicomposite Plant**: As there's a multitude present in IIST and an outsized amount of kitchen waste is generated a day. Proper and efficient kitchen waste management necessitates the incorporation of following points:
  1.) Reduction
  2.) Segregation
  3.) Disposal

- **LED Fixtures:**
  In Green buildings, the sole sort of the lighting used is LED (Light Emitting Diode) Fixtures. These types of lightening fixture are somewhat costly but the life of LED fixtures will be more than 17 years. Same way the light of tube light and CFL is about 2 to 5 years. A significant feature of LEDs is that the light is directional, as oppose to conventional bulb, which spread the light more spherically.

  1 LED fixture covers upto 4 Sq.m areas with having capacity of 36 watt but by the tube light, same area will be covers with 56 watt, which goes costly.

- **Provision of Eco friendly Materials:**
  Materials obtain naturally (or) from renewable source in a sustainable way, which can cause less environmental impact. These materials can be used for construction of green building, also it should be noted that the site of these materials should be within the region so the cost of transportation is less & hence it will increase the country's economy These materials are subjected to life cycle analysis (LCA) for their durability, less waste generation, reusable, non toxic recycle

  E.g.: 1) Natural fiber carpet made up of jute felt
  2)Ceramic tiles
  3) Linoleum is a alternative to vinyl with no VOC

- **Indoor Quality Environment:**
  Indoor quality environment is a mixture of air we breathe, the lighting from sun, the noise level produced, even the electromagnetic field produce by electric power consuming devices.

  The basic building materials used should be non toxic, also solar refrigerator should be used as active component which reduces the use of CFC (chloro-fluoro carbon) which in turn reduces the green house gases, reduces the Ozone layer depletion & also reduces the rate of asthma.

  The above provisions will leads to a healthier Occupant life. The provision of lighting by sun will increase in consumption of vitamin D, which will increase their productivity and comfort

4. CONCLUSION

The main objective of this paper is to highlight the long-term benefits of green building. This research will be identical for the person who is associated with this type of work, to construct a Green building rather than constructing a conventional building, bearing some extra initial costs, which will be paid back in some years after starting the use. If the intention is to construct a new building to live in or to work in, it is advisable to go for Green building rather than ordinary conventional building, because the percentage increase of construction about 12 to 15% in the total cost is a negligible amount when the intention is just to gain extra return benefits and to live in better and healthier environment. Optimized energy and water resources will not only decreases the use of natural resources but will also help to reduce direct and indirect cost saving for water and electric bills. Increased property value- Green built properties are in demand for their sustainable that lower maintenance cost so go green and get the higher value in return.

5. REFERENCES

- Vinutha Bai N "ENERGY EFFICIENT AND GREEN TECHNOLOGY CONCEPTS" Vol:03, special issue:06 may- 2016 (IRJET)
- Mohd Yasir Laeeq " GREEN BUILDING: CONCEPTS AND AWARENESS" Vol:04, Issue:07, July-2017 (IRJET)
- Prof. Ghalimath.A.G "GREEN BUILDING" Vol:02, Issue:08, Nov-2015 (IRJET)
- A rooftop rainwater Harvesting (RRWH) At SPSV Campus, Visnagar, Gujrat - A case study. Utsav R. Patel1, Vikrant A. Patel, Manjurali I. Balya, Harshad M. Rajgor, Volume: 03 Issue: 04 | Apr-2014, Available @ http://www.ijret.org

- Zhiwei YU, Chen Lu and Bingbing SAN, "Application of Green Construction Technology in Construction Projects"
- A V Kotkar, H Salunkhe,'' A Review Paper On Green Building Reseach,'' July-2017
- Shristi Khosla and S K Singh, ''Energy Efficient Buildings,'' Vol. 5, 2014
- Some Other Sources Like Wikipedia,Google etc.