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Research Paper

Green Buildings- Need of Today

Engineering

KEYWORDS : green buildings, case study

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ABSTRACT

The Conventional energy of the world is vanishing day by day at the exponential rate. So it's the time for man to think about preserving it by moving on using non-conventional energy. As everything starts from oneself, one should start it from ones house itself by building something that does not use much of the energies that are depleting rather using natural energies i.e. is to switch on to green houses. We often think of "green" building as environmentally friendly. But to really understand the term, let's examine it in the context of the full construction market — from the supply chain of product manufacturers and material suppliers, to the design professionals, contractors and installers, to maintenance personnel.

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 on the environment.

In this paper a brief introduction to Green building in given and various basic criteria's to obtain green building certificate laid by Indian Green Building Council are also discussed. At the end one case study for a residential project as a green building is also presented herewith.

INTRODUCTION

A green building depletes the natural resources to the minimum during its construction and operation. The aim of a green building design is to minimize the demand on non-renewable resources, maximize the utilization efficiency of these resources, when in use, and maximize the reuse, recycling, and utilization of renewable resources. It maximizes the use of efficient building materials and construction practices; optimizes the use of on-site sources and sinks by bio-climatic architectural practices; uses minimum energy to power itself; uses efficient equipment to meet its lighting, air-conditioning, and other needs; maximizes the use of renewable sources of energy; uses efficient waste and water management practices; and provides comfortable and hygienic indoor working conditions. It is evolved through a design process that requires all concerned architect; landscape designer; the air conditioning, electrical, plumbing, and energy consultants, to work as a team to address all aspects of building and system planning, design, construction, and operation. They critically evaluate the impacts of each design decision on the environment and arrive at viable design solutions to minimize the negative impacts and enhance the positive impacts on the environment.

Green buildings can also be "regenerative" which applies to buildings that give back more than they take. For example, a building outfitted with solar photovoltaic panels could be a net energy producer, exporting power to the grid when incoming solar energy exceeds the demand of the building. Typically, the sun is most intense during the peak of the day when electrical power demand is high. This photovoltaic electrical production could reduce the peak load on the electrical grid and thus offset the need for constructing an equivalent power plant capacity.

IMPORTANCE OF GREEN HOMES

General Benefits of Green Homes

A Green Home can have tremendous benefits, both tangible and intangible. The immediate and most tangible benefit is in the reduction in water and operating energy costs right from day one, during the entire life cycle of the building. Intangible benefits includes enhanced air quality, excellent day lighting , health & well being of the occupants , conservation of scarce national resources and enhance marketability for the project.

Economic Benefits of Green Buildings

A green building may cost more initially, but saves through lower operating costs over the life of the building. The green building approach applies a project life cycle cost analysis for determining the appropriate up-front expenditure. This analytical method calculates costs over the useful life of the asset. These and other cost savings can only be fully realized when they are incorporated at the project's conceptual design phase with the assistance of an integrated team of professionals. The integrated systems approach ensures that the building is designed as one system rather than a collection of stand-alone systems.

Some benefits, such as improving occupant health, comfort, productivity, reducing pollution and landfill waste are not easily quantified. Consequently, they are not adequately considered in cost analysis. For this reason, consider setting aside a small portion of the building budget to cover differential costs associated with less tangible green building benefits or to cover the cost of researching and analyzing green building options. Even with a tight budget, many green building measures can be incorporated with minimal or zero increased up-front costs and they can yield enormous savings.

INDIAN GREEN BUILDING COUNCIL

Indian Green Building Council (IGBC) Green Homes is the first rating program developed in India, exclusively for the residential sector. It is based on accepted energy and environmental principles and strikes a balance between known established practices and emerging concepts. The system is designed to be comprehensive in scope, yet simple in operation. Green building certificates are given, after third party verification to residential projects which meets the highest performance standards

IGBC Green Homes Certification Levels

The rating system caters to both individual homes and multi-dwelling units. By and large, the context for both the types is similar. However, the applicability of a few of the green homes features may vary for each of these types of dwelling units. Hence the threshold criteria for certification level are different for these types:

TABLE – 1
GENERAL DETAILS

Certification Level	Projects with Interiors	Projects without Interiors
	Points	Points
Certified	32-39	30-46

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Silver	40-47	37-44
Gold	48-59	45-55
Platinum	60-80	56-75

Source:https://2cl4223.files.wordpress.com/2013/06/igbcgreen-homessver-1-0-apr09.pdf.

Appeal Submittals

Those projects which seek certification needs to submit the following documentation:

i. Design Calculations, wherever appropriate.
ii. Drawings (in pdf/ jpeg format only) as appropriate
iii. Filled in templates wherever applicable
iv. Manufacturers cut sheets, brochures where ever applicable.

For each credit, a narrative on how the project would m

Precertification

This is an option provided only for developers and for projects aspiring to get precertified at the design stage. Precertification gives the owner/developer a unique advantage to market the project to potential buyers.

Credit Checklist provided by IGBC for 'Green Homes':

TABLE – 2

SITE SELECTION & PLANNING

Checklist for Green Homes Projects with Interior		Points Available	
		Projects With Interior	Projects Without Interior
Mandatory Requirement 1	Local Regulations	Required	Required
Mandatory Requirement 2	Soil Erosion	Required	Required
Site Credit 1.0	Basic Amenities	1	1
Site Credit 2.0	Natural Topography or Landscape : 15%, 25%	2	2
Site Credit 3.0	Heat Island Effect - Roof: 50%, 75%	2	2
Site Credit 4.0	Parking Facilities for Visitors	1	1
Site Credit 5.0	Electric charging Facility for Vehicles	1	1
Site Credit 6.0	Design for Differently Abled	1	1
Site Credit 7.0	Green Home Guidelines - Design & Post Occupancy	NA	1

Source:https://2cl4223.files.wordpress.com/2013/06/igbcgreen-homessver-1-0-apr09.pdf.

TABLE – 3

WATER EFFICIENCY

Checklist for Green Homes Projects with Interior		Points Available	
		Projects With Interior	Projects Without Interior
Mandatory Requirement 1	Rainwater Harvesting, 50%	Required	Required
Mandatory Requirement 2	Water Efficient Fixtures	Required	Required
Water Credit 1.0	Turf Design: 20%, 40%	2	2
Water Credit 2.0	Drought Tolerant Species	1 i	1
Water Credit 3.0	Management of Irrigation Systems	2	2
Water Credit 4.0	Rainwater Harvesting : 75%,95%	2	2
Water Credit 5.0	Grey Water Treatment	3	3
Water Credit 6.0	Treated Grey Water for Landscaping : 50%, 75%, 95%	3	3
Water Credit 7.0	Treated Grey Water for Flushing : 50%, 75%, 95%	3	3
Water Credit 8.0	Water Efficient Fixtures : 20%, 30%	3	3
Water Credit 9.0	Water Metering	1	1

Source:https://2cl4223.files.wordpress.com/2013/06/igbcgreen-homessver-1-0-apr09.pdf.

TABLE – 4

ENERGY EFFICIENCY

Checklist for Green Homes Projects with Interior		Points Available	
		Projects With Interior	Projects Without Interior
Mandatory Requirement 1	CFC Free Equipment	Required	Required
Mandatory Requirement 2	Minimum Energy Performance	Required	Required
Energy Credit 1.0	Energy Performance	10	1
Energy Credit 2.0	Energy Metering	1	1
Energy Credit 3.0	Refrigerators	1	NA
Energy Credit 4.0	Solar Water Heating Systems : 50%, 75%, 95%	3	3
Energy Credit 5.0	Captive Power Generation	1	1
Energy Credit 6.0	On-site Renewable Energy : 2.5%, 5.0%, 7.5%, 10%	4	4
Energy Credit 7.0	Efficient luminaries & Lighting power density: 20%	1	1

Source:https://2cl4223.files.wordpress.com/2013/06/igbcgreen-homessver-1-0-apr09.pdf.

TABLE – 5

MATERIALS

Checklist for Green Homes Projects with Interior		Points Available	
		Projects With Interior	Projects Without Interior
Mandatory Requirement 1	Separation of Waste	Required	Required
Material Credit 1.0	Waste Reduction During Construction : 75%	1	1
Material Credit 2.0	Organic Waste Management, Post Occupancy	2	2
Material Credit 3.0	Materials with Recycled Content : 10%, 20%	2	2
Material Credit 4.0	Rapidly Renewable Materials : 2.5%, 5%	2	1
Material Credit 5.0	Local Materials : 50%, 75%	2	2
Material Credit 6.0	Reuse of Salvaged Materials : 2.5%, 5%	2	2

Material Credit 7.0	Certified Wood Based Materials and Furniture	2	2

Source:https://2cl4223.files.wordpress.com/2013/06/igbcgreen-homessver-1-0-apr09.pdf.

TABLE – 6
INDOOR ENVIRONMENTAL QUALITY

Checklist for Green Homes Projects with Interior		Points Available	
		Projects With Interior	Projects Without Interior
Mandatory Requirement 1	Tobacco Smoke Control	Required	Required
Mandatory Requirement 2	Day lighting: 50%	Required	Required
Mandatory Requirement 3	Fresh Air Ventilation	Required	Required
IEQ Credit 1.0	Exhaust Systems	2	NA
IEQ Credit 2.0	Enhanced Fresh Air Ventilation: 30%	2	2
IEQ Credit 3.0	Low VOC Materials	2	2
IEQ Credit 4.0	Carpets: 5%	1	NA
IEQ Credit 5.0	Building Flush Out	1	NA
IEQ Credit 6.0	Day lighting : 75%, 85%, 95%	3	3
IEQ Credit 7.0	Cross Ventilation	2	2

Source:https://2cl4223.files.wordpress.com/2013/06/igbcgreen-homessver-1-0-apr09.pdf.

TABLE – 7
INNOVATION & DESIGN PROCESS

Checklist for Green Homes Projects with Interior		Points Available	
		Projects With Interior	Projects Without Interior
INN Credit 1.1	Innovation and Design Process	1	1
INN Credit 1.2	Innovation and Design Process	1	1
INN Credit 1.3	Innovation and Design Process	1	1
INN Credit 2.0	IGBC AP	1	1

Source:https://2cl4223.files.wordpress.com/2013/06/igbcgreen-homessver-1-0-apr09.pdf.

CASE STUDY

Case study is done on a residential project located in Bangalore City named " Aquila Rights". This residential project includes three towers each or 27, 32 and 29 stories and this residential project is the tallest residential building of Bangalore.

Aquila heights already achieved gold rating at precertification. Anticipated points for this residential project were 47.

The rating system was divided into the following categories, based on the credits of which the final tally of points was arrived at are site efficiency, water efficiency, energy efficiency, materials, indoor air quality and innovation in design.

Keys beneficial points with regards to impact on environment that had been incorporated in the project are:

1. Site efficiency: Soil erosion and sedimentation control plan had been adopted, 22.78% of natural landscape had been maintained. About 76% roof area is covered, preventing the temperature differential that causes the heat island effect; thus saving energy ultimately. Non-fossil fueling facility for vehicles is being provided in the form of 15nos. of electrical charging points for 4 wheelers and 5nos. charging points for 2 wheelers.

2. Water efficiency: About 79% of rainwater is captured and utilized. Entire quantity of grey water generated is treated and reused.

3. Energy efficiency: All HVAC equipments are CFC free. Automatic timer based control are installed for lawn sprinklers. Dimmer controls for daylight sensors in external areas are installed. Efficient lighting fixtures are installed, giving lower lighting power density.

4. Materials: Scrap metal generated was given for recycling. Construction debris were used for backfilling purposes. About 10% of materials used in the project is of recycled nature.

5. Indoor air quality: About 80% of the occupied areas are daylit.

POINTS TO REMEMBER

There are some of the recent innovations or say general points which one should follow to make his home green, those are listed below-

i. Insulated Daylighting Panels
ii. Integrated Photovoltaic Technology (BIPV)
iii. Light-Emitting Diodes (LEDs)
iv. Rain Collection and Grey Water Systems
v. Electro chromic Windows
vi. Energy Monitoring Devices
vii. Sunlight Transport
viii. Structural Insulated Panels (SIPs)
ix. Living Roofs and Facades

CONCLUSIONS

In this scenario when the need of the hour is to go green, green buildings are the wonderful concept to save environment and save our mother earth from the verge of destruction. People are keep on making concrete jungles, green buildings are the concept to make the concrete go green.

REFERENCES:

1. IGBC Green Homes; Rating System Version 1.0, Abridged Reference Guide, April 2009. Available at https://2cl4223.files.wordpress.com/2013/06/igbcgreen-homessver-1-0-apr09.pdf.
2. https://igbc.in/igbc/.