# GREEN BUILDINGS-THE ENVIRONMENT SAVIOUR

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## ABSTRACT

*Green buildings is the practice of creating structures and using processes that are environmentally responsible and resource efficient throughout a building's life-cycle from siting to design, construction, operation, maintenance, renovation and deconstruction. For certification of Green building LEED (Leadership in Energy and Environmental Design) is established.*

*It is assumed that the Green Buildings can be utilise for residential, office, school or industrial purpose. The construction of building should be done in such a way that they don't harm the environment as well as human beings. The design parameters not only reduce energy, water, and material resource but also it improves the indoor environmental quality, including reducing indoor pollution, improving thermal comfort, and improving lighting and acoustic environments that affect occupant health and productivity.*

*Green building is a possibility to create harmless, energy efficient and environmentally friendly buildings. Conventional building consumes too much natural sources, like energy, water, woods etc. while green building uses renewable resources as sunlight, plants, rainwater. The green building have more advantage over conventional building in the field such as Cost, Higher Property Value ,Energy efficiency , Water efficiency ,Material efficiency ,Maintenance.etcGreen Building are the steps towards the healthy and green future.*

***Keywords: Construction, Eco Friendly, Energy, Environmental Design And Green Building***

## I. INTRODUCTION

The term "green" refers to environmentally friendly practices from building design to the landscaping choices. It also encompasses energy use, water use, and storm water and wastewater reuse. The terms "green" and "green building" apply not just to products, but to construction strategies, building design and orientation, landscaping, building operations, maintenance, and more. The less impact a building has on human health and the environment,

The more green it is. A green building may cost more up front but, in the long run, will save money through lower operating costs over the life of the building. The green building approach applies a project lifecycle cost analysis to determining the appropriate up-front expenditure. This analytical method calculates costs over the useful life of the asset. A green building is not an assemblage of "environmental" components or a piecemeal modification of an already-designed, standard building. True green building takes a holistic approach to programming, planning, designing, and construction (or renovating) buildings and sites. It involves connecting often-interlinked issues such as site and climate, building orientation and form, lighting and thermal comfort, materials, etc., and optimizing all these aspects in concert.

## II. METHODOLOGY INDULGE IN MAKING GREEN BUILDING

The methodology indulge in the making of green building is as follows:

### 2.1. Setting Green Goals and Objective

In the making of green building first steps is the establishment of firm environmental goals for the project. During this session, it is important to set specific measurable goals for things like energy efficiency, water conservation, on-site treatment of rain water and storm water, material and resource management, construction waste management, and to assign responsibility for meeting these goals to specific members of the design team. If the building is to be built in accordance with the United States Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED) green building rating system, it will be helpful to review the requirements of LEED as part of the green project goal setting session, begin targeting which elements of LEED are going to be pursued, and establish firm criteria for meeting those goals.

### 2.2. Building a Green Team

Hiring a design team with prior green design experience is highly desirable, but not essential provided that the design team is augmented with architects or engineering consultants who do have experience in green building and site design principles and technologies. The collective knowledge, experience, and dedication of the design team will determine the overall success of the green project. Once the goal setting process has been completed it may become obvious that meeting certain goals may require expertise that lies outside the current design team. Specialized consultants may need to be engaged for specific elements of the design and construction process or to oversee all elements of the green design program. These specialists will be able to bring new ideas and solutions to the table for consideration and should be included in the project as early as possible.

### 2.3. Integrated Design Process

Building a green building is not just a matter of assembling a collection of the latest green technologies or materials. Rather, it is a process in which every element of the design is first optimized and then the impact and interrelationship of various different elements and systems within the building and site are re-evaluated, integrated, and optimized as part of a whole building solution. For example, interrelationships between the building site, site features, the path of the sun, and the location and orientation of the building and elements such as windows and external shading devices have a significant impact on the quality and effectiveness of natural daylighting. These elements also affect direct solar loads and overall energy performance for the life of the building. Without considering these issues early in the design process, the design is not fully optimized and the result is likely to be a very inefficient building. This same emphasis on integrated and optimized design is inherent in nearly every aspect of the building from site planning and use of on-site storm water management strategies to envelope design and detailing and provisions for natural ventilation of the building.

## III.THE DESIGN AND BUILDING SPECIFICATION FOR GREEN BUILDINGS

Green buildings are structures that are built in an environmentally responsible manner by maximizing use of materials, minimizing use of resources and ensuring the health and well-being of occupants and the surrounding built environment both today and for generations to come.

With respect to the LEED guidelines there are seven topics that should be addressed in the designing and building of new environmentally friendly buildings.

### 3.1 Sustainable Sites

Sites should be selected by determining which site would pose the least environmental threat if construction were to take place. Sites should be closer to urban development where supporting infrastructure is available. There should be use of landscape design to preserve and restore the region's natural habitat and heritage while emphasizing the use of indigenous, hardy, drought resistant trees, shrubs, plants and turf. Make best use of existing mass transit systems and make buildings and sites pedestrian and bike friendly, including provisions for safe storage of bicycles. There should be development of programs and incentives that promote car-pooling including preferred parking for commuters who carpool. Optimize the use of on-site storm water treatment and ground water recharge. There should be minimization in the boundaries of the construction area, avoid needless compaction of existing topsoil, and provide effective sedimentation and silt control during all phases of site development and construction

### 3.2 Water Efficiency

The main goal is to increase water efficiency use within the building, thereby reducing the amount of water needed for operations. Some methods which can be designed in a building include water efficient landscaping to reduce irrigation requirements and the use of innovative wastewater management technologies. The design and location of buildings and site improvements should be done in order to optimize use of low-impact storm water technologies such as bio-retention, rain gardens, open grassy swales etc. Establishment of a water budget for the building and implement a design that minimizes the use of potable water by using low-flow plumbing fixtures and toilets and waterless urinals.

### 3.3 Energy and Atmosphere

Energy systems should be properly installed and calibrated to perform to their intended efficiency levels. Various methods for on-site renewable energy production can reduce the overall footprint of the building and other means of using green power. The Optimization of building orientation, massing, shape, design, and interior colors and finishes should be done in order to maximize the use of controlled natural day lighting which significantly reduces artificial lighting energy. Window frames, sashes and curtain wall systems should also be designed for optimum energy performance including the use of multiple thermal breaks to help reduce energy use. Use state-of-the art, high efficiency, heating, ventilation and air conditioning (HVAC) and plumbing equipment, chillers, boilers, and water heaters, etc. Use variable speed drives on fan and pump motors. Use heat recovery ventilators and geothermal heat pump technology for up to 40% energy savings. The consideration for on-site small-scale wind, solar, and/or fuel cell based energy generation and co-generation should be done and

purchasing of environmentally preferable "green" power from certified renewable and sustainable sources should be preferred.

### 3.4 Indoor Environmental Quality

To enhance the well-being of occupants, design should use low emitting materials in construction including sealants, adhesives, paints, coatings, flooring, wood and agrifibre. Ventilation systems that promote outdoor air ventilation are preferable. Buildings should be designed to maximize the use of natural light for all occupants. Maximum usage of the natural daylighting should be done. Optimize solar orientation and design the building to maximize penetration of natural daylight into interior spaces. Try to provide a smoke free building. Assure that air from smoking areas does not get distributed to other areas of the building does not re-enter the building through doors or vestibules, operable windows, or building fresh air intakes. Prevent contamination of the building during construction and take steps to minimize the creation and spreading of construction dust and dirt. Protect construction materials from the elements so that they do not become damp, moldy or mildewed. Use biodegradable and environmentally friendly cleaning agents that do not release VOCs or other harmful agents and residue.

### 3.5 .Materials and Resources

There should be minimum use of non-renewable construction materials and other resources such as energy and water through efficient engineering, design, planning and construction and effective recycling of construction debris. Maximize the use of recycled content materials, modern resource efficient engineered materials, and resource efficient composite type structural systems wherever possible. Maximize the use of re-usable, renewable, sustainably managed, bio-based materials. Optimize the use of engineered materials which make use of proven engineering principles such as engineered Trusses, composite materials and structural systems (concrete/steel, other…), structural insulated panels (stress skin panels), insulated concrete forms, and frost protected shallow foundations. Identify ways to use high-recycled content materials in the building structure and finishes. Consider everything from blended concrete using fly ash, slag, recycled concrete aggregate, or other admixtures to recycled content materials such as structural steel, ceiling and floor tiles, carpeting, carpet padding, sheathing, and gypsum wallboard. Identify ways to reduce the amount of materials used and reduce the amount of waste generated through the implementation of a construction waste reduction plan. Explore the use of bio-based materials and finishes such as various types of agriboard (sheathing and or insulation board made from agricultural waste and by products, including straw, wheat, barley, soy, sunflower shells, peanut shells, and other materials). The use lumber and wood products from certified forests where the forest is managed and lumber is harvested using sustainable practices. Use resource which are efficient engineered wood products in lieu of full dimension lumber which comes from older growth forests.

### 3.6 Innovation in Design

Design decisions should be made early in the process as good design can greatly reduce the energy consumption of a building; for example, the orientation and location of a building can compromise shading and ventilation decisions.

For innovative design a Low Carbon Design Taskforce should be created and that this taskforce could develop a blueprint that focuses on four levels in design:

• Site selection – transport and integration with other services;

• Orientation – to maximize daylight, shade, and ventilation naturally;

• Thermal issues – shape, density, materials and systems for winter heating and summer cooling

• Use of renewable forms of energy.

3.7 Regional priority

Designs should be maximized to take into account regional priorities. In colder climates buildings could be designed to maximize heating efficiency; in hotter climates, cooling and water usage would gain more importance in the design process.

## IV. LEED- SETTING STANDARD FOR GREEN BUILDING

The Green Buildings can be rated for their environmentally sustainable construction. One such rating system is the LEED (Leadership in Energy and Environmental Design). This building rating system was developed by the U.S. Green Building Council (GBC) and was created to:

• Define "green building" by establishing a common standard of measurement;

• Promote integrated, whole-building design practices

• Recognize environmental leadership in the building industry

• Stimulate green competition;

• Raise consumer awareness of green building benefits

• Transform the standard building market to a green building market.

GBC members, representing every sector of the building industry, developed and continue to refine LEED. The LEED® green building certification programme is a voluntary, consensus-based national rating system for buildings designed, constructed and operated for improved environmental and human health performance. LEED addresses all building types and emphasizes state-of-the-art strategies in six major areas:

1. Sustainable sites
2. Water
3. Energy and atmosphere
4. Materials and resources
5. Indoor environmental quality
6. Innovation and design process

The LEED certifies Green Buildings in the three categories Silver, Gold and Platinum.

Some Excellent Example of Green Building based on LEED certification are:

**1.Vattenfall HAUS** is located in the City Nord, north of the Stadtpark in the city of Hamburg. The City Nord as well as VattenfallHaus are distinctive gemstones within the architectural landscape of the city. the

VattenfallHaus boasts numerous innovative technological and energetic features such as the dual-use of cooling water for ventilation/cooling, the reverse flow heat exchange for the heating system, the use of drainage water for sanitary installations and a highly modern Building automation system (BAS).

Besides getting the LEED certification level Platinum, which was quite a challenge for a building designed and built in 1969, the value of applying LEED to this project was the development of energy efficiency measures and capital improvement.

**2. Pathways School Gurgaon** is the first school serving all grades K-12 in the world to achieve LEED-EB Platinum certification from USGBC. Among all educational facilities worldwide who have achieved this top distinction, which includes only one high school and a small number of university projects, Pathways is the highest rated.

**3. Suzlon Energy Limited** pledged to create the greenest office in India. The building is three levels high and is sited on 10.5 acres. It achieved LEED for New Construction Platinum certification from the India Green Building Council, as well as Five-Star GRIHA (Green Rating for Integrated Habitat Assessment) certification. 5% (154 kilowatts) of its annual energy is generated on-site through conventional and building-integrated photovoltaic panels (20%) and wind turbines (80%). All balance energy required for the campus is generated through Suzlon's off-site wind turbines, making One Earth technically a zero energy project.

**4. Itc Maurya Hotel** in New Delhi, built in 1977, is also Platinum certified under LEED .In India there are total 489 certified green building projects.

## V. ADVANTAGES OF GREEN BUILDING OVER CONVENTIONAL BUILDING

The green buildings are the high-performance building and they have advantage over similar conventional buildings are:

(A) It reduces energy, water, and material resource use.

(B) It improves indoor environmental quality, including reducing indoor pollution, improving thermal comfort, and improving lighting and acoustic environments that affect occupant health and productivity.

(C) It reduces negative impacts on the environment throughout the life-cycle of the building, including air and water pollution and waste generation.

(D) It increases the use of environmentally preferable products, including bio based, recycled content, and nontoxic products with lower life-cycle impacts.

(E) It increases reuse and recycling opportunities.

(F) It integrates systems in the building.

(G) It reduces the environmental and energy impacts of transportation through building location and site design that support a full range of transportation choices for users of the building.

## VI. CONCLUSION

Green Building is a revolutionary step towards energy efficiency programme. For existing buildings as well as new construction, various methods can be adopted to save energy. In India some world class Green Buildings have constructed in past few years, but still the concept of green buildings for general masses is in infancy stage. Present work is an attempt in the direction to make people, communities and general public aware about the advantages of green buildings for sustainable environmental development and management .It is a step towards safeguard of nature and it will pave a way towards healthy and green future.

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