GREEN COMPUTING PROJECT

INDIAN Green building council

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WHAT IS GREEN BUILDING COUNCIL

A **Green Building Council (GBC)** is national non-profit, non-government organization that is part of a global network recognized by the world green building council.

GBCs are "transparent, consensus-based, not-for-profit coalition-based organizations with no private ownership and diverse and integrated representation from all sectors of the property industry;" and their overarching goal is promote a transformation of the built environment towards one that is sustainable (buildings and cities that are environmentally sensitive, economically viable, socially just and culturally significant)

DIFFERENT GREEN BUILDING COUNCILS ACROSS THE WORLD

As of October 2012, there are at least 20 nations with established GBCs, seven recognized as "emerging" members, and dozens more in the development process.

The 20 established councils are

Argentina Green Building Council

Green building council Australia

Green Building Council Brasil

Peru Green Building Council

Canada green building council

Dutch Green Building Council

Emirates Green Building Council

France Green Building Council (this NGO - in 2016 - merged with the French HQE Association, to form a new NGO called 'HQE Association-France GBC "' 'which brings together mid-2016 more than 200 members)

German Sustainable Building Council

Indian green building council

Italy Green Building Council

Japan Green Building Consortium

Korea green building council

Mexico Green Building Council

New Zealand Green Building Council

Pakistan Green Building Council

Panama Green Building Council

Green Building Council of South Africa

Sweden Green Building Council

Singapore Green Building Council

Taiwan Green Building Council

Romania Green Building Council

United kingdom green building council

Us green building council

Vietnam Green Building Council

1] Argentina Green Building Council

2] Green Building Council Australia

3] Green Building Council Brasil

4] Pakistan Green Building Council

5]Canada green building council

6] Dutch Green Building Council

7] Emirates Green Building Council

8] German Sustainable Building Council

9] Indian Green Building Council

10] Italy Green Building Council

11] Japan Green Building Consortium

12] Korea Green Building Council

13] Mexico Green Building Council

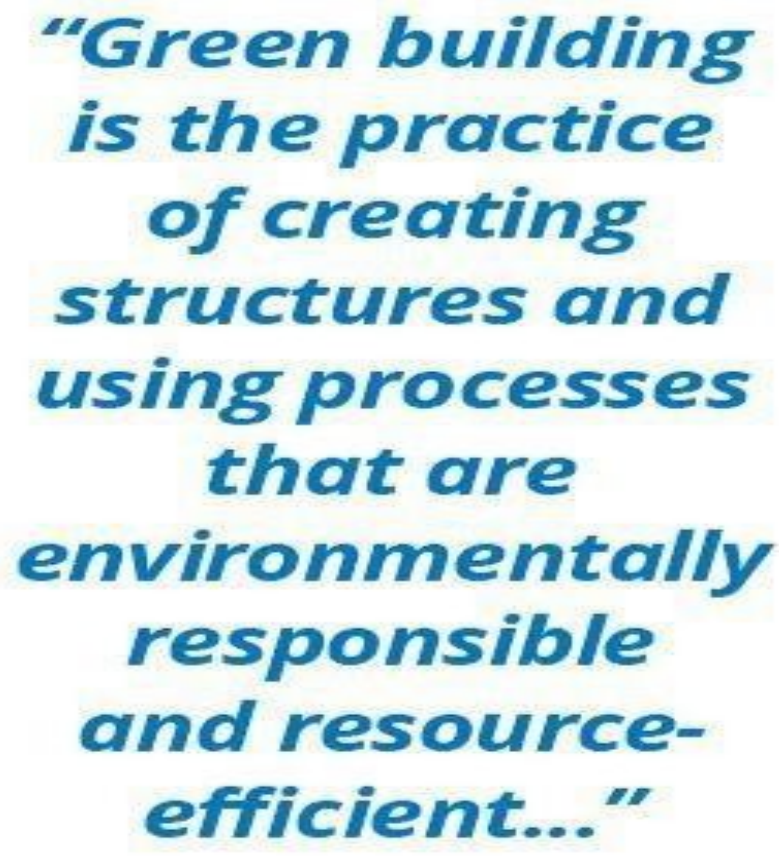
14] New Zealand Green Building Council

15]United Kingdom Green Building Council

16]U.S. Green Building Council

DEFINING A GREEN BUILDING

First, we will take a look at what a green building is. Some people may think of a green, or sustainable building as just a building that doesn‘t really have as bad of an as another _average‘ building.Other people may find it to be the type of building, and the actual surroundings of the building.



The ideal green building would be a building project that would allow you to preserve most of the natural environment around the project site, while still being able to produce a building that is going to serve a purpose.

The construction and operation will promote a healthy environment for all involved, and it will not disrupt the land, water, resources and energy in and around the building.This is the actual definition of a green building.

The U.S. EPA says ―Green building 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.

This practice expands and complements the classical building design concerns of economy, utility, durability, and comfort.Green building is also known as a sustainable or high performance building.‖

There are a number of features which can make a building ‗green‘. These include:

1]Efficient use of energy, water and other resources

2]Use of renewable energy, such as solar energy

3]Pollution and waste reduction measures, and the enabling of re-use and recycling

4]Good indoor environmental air quality

5]Use of materials that are non-toxic, ethical and sustainable

6]Consideration of the environment in design, construction and operation

7]Consideration of the quality of life of occupants in design, construction and operation

8]A design that enables adaptation to a changing environment

Any building can be a green building, whether it‘s a home, an office, a school, a hospital, a community centre, or any other type of structure, provided it includes features listed above.However, it is worth noting that not all green buildings are – and need to be - the same.

Different countries and regions have a variety of characteristics such as distinctive climatic conditions, unique cultures and traditions, diverse building types and ages, or wide-ranging environmental, economic and social priorities – all of which shape their approach to green building.

This is why WorldGBC supports its member Green Building Councils and their member companies in individual countries and across regions, to pursue green buildings that are best suited to their own markets.

Components of Green Building

- **Energy** Efficiency and Renewable **Energy**.
- **Water** Efficiency.
- Environmentally Preferable Building **Materials** and Specifications.
- Waste Reduction.
- Toxics Reduction.
- Indoor Air Quality.
- Smart Growth and Sustainable Development.

Elements or Components of Green Building-Material, Water, Energy Health

A green building has four main elements or components on which it is designed: materials, energy, water and health to make green building more sustainable.

Elements of Green Building Design

Following are the components of a Green Building to make it sustainable:

1. Materials for Green Building

Materials for a green building are obtained from natural, renewable sources that have been managed and harvested in a sustainable way; or they are obtained locally to reduce the embedded energy costs of transportation; or salvaged from reclaimed materials at nearby sites.

Materials are assessed using green specifications that look at their Life Cycle Analysis (LCA) in terms of their embodied energy, durability, recycled content, waste minimisation, and their ability to be reused or recycled.

2 Energy Systems in Green Buildings

Passive solar design will dramatically reduce the heating and cooling costs of a building, as will high levels of insulation and energy-efficient windows. Natural daylight design reduces a building‘s electricity needs, and improves people‘s health and productivity.

Green buildings also incorporate energy-efficient lighting, low energy appliances, and renewable energy technologies such as wind turbines and solar panels.

2.1 Passive Solar Design

Passive solar design uses sunshine to heat, cool and light homes and other buildings without mechanical or electrical devices. It is usually part of the design of the building itself, using certain materials and placement of windows or skylights.

2.1a) Rules Of Passive Solar Systems

- The building should be elongated on an east-west axis.
- The building‘s south face should receive sunlight between the hours of 9:00 A.M. and 3:00 P.M. (sun time) during the heating season.
- Interior spaces requiring the most light and heating and cooling should be along the south face of the building. Less used spaces should be located on the north.

2.1b) The Advantages Of Passive Solar Design

- **H**igh energy performance: lower energy bills all year round.
- **I**nvestment: independent from future rises in fuel costs, continues to save money long after initial cost recovery.
- **V**alue: high owner satisfaction, high resale value.
- **A**ttractive living environment: large windows and views, sunny interiors, open floor plans.
- **L**ow Maintenance: durable, reduced operation and repair.
- **U**nwavering comfort: quiet (no operating noise), warmer in winter, cooler in summer (even during a power failure).
- **E**nvironmentally friendly : clean, renewable energy doesn‘t contribute to global warming, acid rain or air pollution.

2.2 Passive Solar Heating

The goal of all passive solar heating systems is to capture the sun‘s heat within the building‘s elements and release that heat during periods when the sun is not shining. At the same time that the building‘s elements (or materials) is absorbing heat for later use, solar heat is available for keeping the space comfortable (not overheated).

2.2a) Two primary elements of passive solar heating are required:

- South facing glass
- Thermal mass to absorb, store, and distribute heat.

2.2b) There are three approaches to passive systems

1. Direct Gain: Sunlight shines into and warms the living space.
2. Indirect Gain: Sunlight warms thermal storage, which then warms the living space.
3. Isolated Gain: Sunlight warms another room (sunroom) and convection brings the warmed air into the living space.

3. Water Management in Green Building

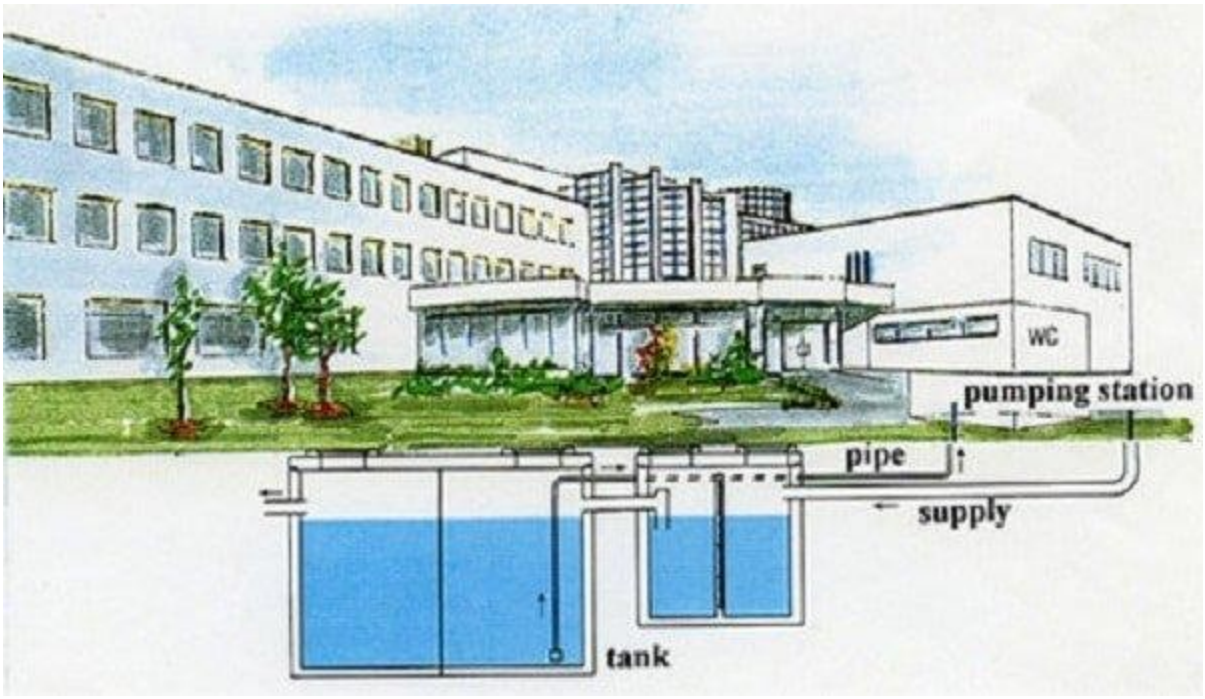
Minimising water use is achieved by installing greywater and rainwater catchment systems that recycle water for irrigation or toilet flushing; water-efficient appliances, such as low flow showerheads, self-closing or spray taps; low-flush toilets, or waterless composting toilets. Installing point of use hot water systems and lagging pipes saves on water heating.

3.1) Rainwater Harvesting in Green Building

Rainwater harvesting is the principle of collecting and using precipitation from a catchments surface.

An old technology is gaining popularity in a new way. Rain water harvesting is enjoying a renaissance of sorts in the world, but it traces its history to biblical times.

Extensive rainwater harvesting apparatus existed 4000 years ago in the Palestine and Greece. In ancient Rome, residences were built with individual cisterns and paved courtyards to capture rain water to augment water from city‘s aqueducts.



3.2) Rainwater harvesting is essential

Surface water is inadequate to meet our demand and we have to depend on groundwater. Due to rapid urbanization, infiltration of rainwater into the subsoil has decreased drastically and recharging of groundwater has diminished.

As you read this guide, seriously consider conserving water by harvesting and managing this natural resource by artificially recharging the system.

3.3) Rainwater Harvesting Techniques For Green Buildings

There are two main techniques of rainwater harvestings.

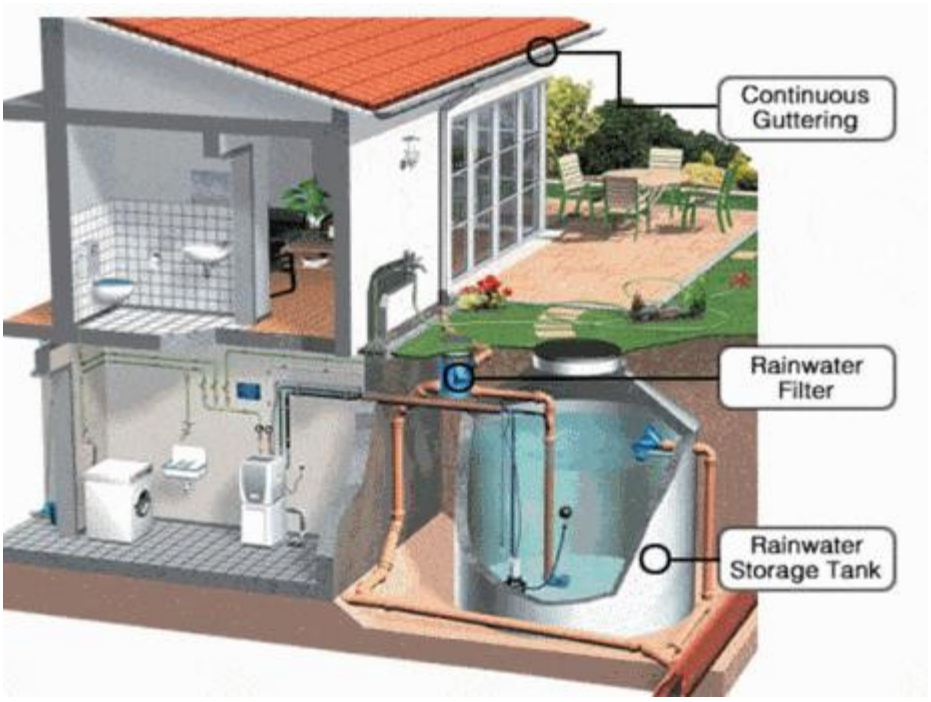
1. Storage of rainwater on surface for future use.
2. Recharge to groundwater

3.3. A) Storage of rainwater on surface for future use.

The storage of rainwater on surface is a traditional techniques and structures used were underground tanks, ponds, check dams, weirs etc.

3.3. b) Recharge to groundwater

Recharge to groundwater is a new concept of rainwater harvesting and the structures generally used are **Pits ,Trenches, Dug wells, Hand pumps, etc.**



4. Health Components of Green Building

Using non-toxic materials and products will improve indoor air quality, and reduce the rate of asthma, allergy and sick building syndrome. These materials are emission-free, have low or no VOC content, and are moisture resistant to deter moulds, spores and other microbes.

Indoor air quality is also addressed through ventilation systems and materials that control humidity and allow a building to breathe.

In addition to addressing the above areas, a green building should provide cost savings to the builder and occupants, and meet the broader needs of the community, by using local labour, providing affordable housing, and ensuring the building is sited appropriately for community needs

WHY TO GO GREEN

Now, let us take a look at why it is so important to go green.

Most people will find when going green that they are able to reduce their carbon footprint and actually lend a helping hand to the environment.

You can go green in a variety of different ways, but builders and construction workers must do their part as well.

If you haven‘t begun going green, then you will find that there are a variety of different things that you can do to help you get started.

You don‘t have to jump in head first, and you can actually take some baby steps along the way. Green buildings are designed in such a way to reduce overall impact on environment and human health by:

1. Reducing trash, pollution and degradation of environment.

2. Efficiently using energy, water and other resources.

3. Protecting occupant health and improving productivity.

DOES GOING GREEN REALLY COST MORE

Some people feel that they just can‘t go green because it will cost them more money, but that is really a common misconception

While it may cost you a bit more to get started when you are going green, because green materials and products can be more costly, you really have to consider the type of savings that you will be able to reap.

You will be able to save on energy costs, because going green also means conserving energy. You should really look at the green building as more of an investment than anything else.

An investment that will be able to save you money, as well as an investment that will be able to help the environment! It is a win-win situation for everyone!

BENEFITS OF GREEN BUILDING

With new technologies constantly being developed to complement current practices in creating greener structures, the benefits of green building can range from environmental to economic to social.

By adopting greener practices, we can take maximum advantage of environmental and economic performance.

Green construction methods when integrated while design and construction provide most significant benefits. Benefits of green building include:

Environmental benefits:

- Reduce wastage of water
- Conserve natural resources
- Improve air and water quality
- Protect biodiversity and ecosystems

Economic benefits:

- Reduce operating costs
- Improve occupant productivity
- Create market for green product and services

Social benefits:

- Improve quality of life
- Minimize strain on local infrastructure
- Improve occupant health and comfort

GOAL OF GREEN BUILDING

Now, we should consider the goals of green building. Of course, one of the main goals is to make the earth more sustainable, but it really does go deeper than that. When you decide to go green, your goal will be to actually help to sustain the environment without disrupting the natural habitats around it.

When you start a building project, and you disrupt the natural habitats around it, you can actually make an impact in the wildlife and environment that will be much like a butterfly effect.

Even the smallest changes that you can make will help to promote a better planet earth, and a better place for us all to live- not just us humans, but also the plants and wildlife that take up their residence here on earth as well.

As you can see, green building is something that everyone should really jump on to. If you don‘t plan to rebuild your home, then you may just want to make a few green changes within your home to ensure that you are able to get the goals that you want out of it.

You can cut down on your energy usage, save money, and make a big impact on the environment. You will find that it isn‘t as hard as people make it out to be, and you will feel better about yourself when you go green too!

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 equipment, and using plants and trees through green roofs, rain gardens, and reduction of rainwater run-off.

Many other techniques are used, such as using low-impact building materials 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:

siting and structure design efficiency, energy efficiency, water efficiency, materials efficiency, indoor environmental quality enhancement, operations and maintenance optimization and 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.

The concept of sustainable development can be traced to the energy (especially fossil oil) crisis and environmental pollution concerns of the 1960s and 1970s.

The Rachel Carson book, ―Silent Spring‖, published in 1962, is considered to be one of the first initial efforts to describe sustainable development as related to green building.

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.

INTRODUCTION

INDIAN GREEN BUILDING COUNCIL : [IGBC]

A **green building** is one which uses less water, optimises energy efficiency, conserves natural resources, generates less waste and provides healthier spaces for occupants, as compared to a conventional building.

IGBC is leading green building movement in the country.

The Indian Green Building Council, part of the Confederation of Indian Industry (CII) was formed in the year 2001.

The vision of the council is, "To enable a sustainable built environment for all and facilitate India to be one of the global leaders in the sustainable built environment by 2025".

The council offers a wide array of services which include developing new green building rating programmes, certification services and green building training programmes.

The council also organises Green Building Congress, its annual flagship event on green buildings.

The council is committee-based, member-driven and consensus-focused.

All the stakeholders of the construction industry including architects, developers, product manufacturers, corporate, Government, academia and nodal agencies participate in the council activities through local chapters.

The council also closely works with several State Governments, Central Government, World Green Building Council, bilateral multi-lateral agencies in promoting green building concepts in the country.

GBC Green New Buildings rating system® is designed primarily for new buildings.

New Buildings include (but are not limited to) offices, IT parks, banks, shopping malls, hotels, airports, stadiums, convention centers, libraries, museums, etc.

Building types such as residential, factory buildings, schools will be covered under other IGBC rating programmes.

IGBC Green New Buildings rating system is broadly classified into two types:

1. **Owner-occupied buildings** are those wherein 51% or more of the building's built-up area is occupied by the owner.

2. **Tenant-occupied buildings** are those wherein 51% or more of the building's built-up area is occupied by the tenants.

REVIEW OF LITERATURE

The building sector in India is growing at a rapid pace and contributing immensely to the growth of the economy. This augurs well for the country and now there is an imminent need to introduce green concepts and techniques in this sector, which can aid growth in a sustainable manner.

The green concepts and techniques in the building sector can help address national issues like water efficiency, energy efficiency, reduction in fossil fuel use in commuting, handling of consumer waste and conserving natural resources.

Most importantly, these concepts can enhance occupant health, happiness and well-being.Against this background, the Indian Green Building Council (IGBC) has launched IGBC Green New Buildings rating system to address the National priorities.

This rating programme is a tool which enables the designer to apply green concepts and reduce environmental impacts that are measurable.The rating programme covers methodologies to cover diverse climatic zones and changing lifestyles.

IGBC has set up the Green New Buildings Core Committee under the leadership of Ar. Raghavendran, to develop the rating programme. This committee comprised of key stakeholders including architects, builders, consultants, developers, owners, institutions, manufacturers and industry representatives.

The committee, with a diverse background and knowledge has enriched the rating system, both in its content and process.

NEW DELHI METRO PROJECT

NEW DELHI: Delhi Metro has become the only completely 'green' Metro system in the world for adhering to green building norms for its residential colonies, officials said on Friday.

Delhi Metro has secured the platinum rating for adherence to green building norms for its 10 residential colonies from the Indian Green Building Council (IGBC).

The Delhi Metro Rail Corporation (DMRC) had earlier received the green certificates for its Phase-3 stations, depots, and sub-3 stations, depots, and sub-stations said a statement.

Speaking on the need for energy optimisation, DMRC Managing Director Mangu Singh emphasised the need for 'green transport'.

"Energy consumption has increased by 700 per cent in the last four decades in the country and this will increase further three times by 2030.

One of the major users of energy is the transport sector, that also, urban transport.

Therefore, it is very relevant to focus on Metro systems and talk of green Metro," he said at the third conference on Green Metro Systems held at Metro Bhawan on Friday.

DMRC also announced it is now generating 20 megawatts (MW) of solar power, after adding new solar power facilities that produce 2.6 MW across the Metro network.

Praising the Delhi Metro for its initiatives to reduce carbon-footprints at its premises, Prem C. Jain, Chairman, IGBC, said: "DMRC was the first one to become a green Metro.

The platinum ratings they have got is very hard earned and a lot of toil has gone into the process."

The DMRC also mentioned 'Swachh Chetna - An Eco Club', a joint initiative of the DMRC and Shri Ram School, Gurugram, for its efforts to "encourage "encourage school children to participate in the more environment-friendly projects and activities".

IGBC Green Mass Rapid Transit System (MRTS)

Features

IGBC Green MRTS rating system is a voluntary and consensus based programme. The rating system has been developed with the support of IGBC Green MRTS Steering Committee.

The rating system is a tool to enable new Rail based MRTS to apply green concepts during design & construction, so as to further reduce environmental impacts that are measurable.

The overarching objective of IGBC Green MRTS Rating is to ensure environmental sustainability, while enhancing commuter experience.

Government Incentives to IGBC-rated Green Building Projects

IGBC is very closely working with several Central and State Government agencies to promote the green building movement in the country.

Some of the Central and State Government agencies have given recognition to IGBCs' Green Rating Systems. The list of incentives provided are appended below:

- Government of India, offers fast track environmental clearance for green building projects which are Precertified/ Provisionally Certified by IGBC.

GOVERNMENT OF PUNJAB

- Department of Local Government (Town Planning Wing) offers an additional 5% Floor Area Ratio (FAR) free of charge for projects which are rated Gold or above by IGBC

- Department of Housing and Urban Development, Government of Punjab offers an incentive of additional 5% Floor Area Ratio (FAR) free of charge and 100 % exemption of building scrutiny fee for projects which are rated Gold or above by IGBC

- Urban Development Department, Government of Rajasthan offers additional 7.5%, 10% and 15% FAR free of charge for projects which are rated Silver, Gold and Platinum respectively by IGBC

- GOVERNMENT OF WEST BENGAL

- A. Government of West Bengal (Department of Municipal Affairs - Kolkata Municipal Corporation) additional 10% FAR for projects which are Precertified/ Provisionally Certified as Gold or above by IGBC.

All IGBC rated green building projects in the MSME sector shall be eligible for financial assistance at concessional rates from Small Industries Development Bank of India (SIDBI).

- A.Government of UttarPradesh (Housing and Urban Planning Department): Additional 5% FAR free of charge for projects which are rated as Gold or above by IGBC.

- B. Additional 5% FAR free of charge is offered by the Greater Noida Industrial Development Authority (GNIDA) in Uttar Pradesh for projects which are rated as Gold or above by IGBC.

- GOVERNMENT OF ANDHRA PRADESH

- The Industries & Commerce Department offers 25% subsidy on total fixed capital investment of the project (excluding cost of land, land development, preliminary and preoperative expenses and consultancy fees) for buildings which obtain green rating from IGBC.

- This incentive is applicable for MSME and large industries.

- Municipal Administration and Urban Development Department offers the following
incentives to projects obtaining the rating from IGBC:

- 20% Reduction on Permit Fees

- If the property is sold within three years, one-time reduction of 20% on Duty on Transfer of Property (Surcharge on Stamp Duty) on the submission of Occupancy Certificate issued by the Local Authority.

- Government of Himachal Pradesh (Town & Country Planning Deptt) offers an
additional 10% FAR for projects which are granted Gold / Platinum rating by IGBC.

- Urban Development and Housing Department, Government of Jharkhand offers an additional FAR of 3%, 5% and 7% for Green Buildings rated by IGBC as Silver, Gold and Platinum respectively.

- Government of Haryana (Town & Country Planning Department), as per amendment in chapter 6 of the Haryana Building Code 2017 on 8 May 2018, offers an additional FAR (Floor Area Ratio) of 9%, 12% and 15% for Green Buildings rated as Silver, Gold and Platinum respectively by IGBC.

- GOVERNMENT OF MAHARASHTRA

- Urban Development Department offers an additional FAR of 3%, 5% and 7% for Green Buildings rated by IGBC as Silver, Gold and Platinum respectively.

- Pune Municipal Corporation (PMC) and Pune Metropolitan Region Development Authority (PMRDA), Government of Maharashtra offers an additional FAR of 3%, 5% and 7% for Green Buildings rated as Silver, Gold and Platinum respectively by IGBC.

- Public Works Department (PWD), Government of Maharashtra has mandated that the renovation of existing buildings and the development of all new government buildings in Maharashtra shall be carried out as per the suitable IGBC Green Building Rating system

CII - Sohrabji Godrej Green Business Centre

CII-Sohrabji Godrej Green Business Centre (CII-Godrej GBC) was established in the year 2004, as CII's Developmental Institute on Green Practices & Businesses, aimed at offering world class advisory services on conservation of natural resources.

The Green Business Centre in Hyderabad is housed in one of the greenest buildings in the world and through Indian Green Building Council (IGBC) is spearheading the Green Building movement in the country.

The Green Business Centre was inaugurated by His Excellency Dr. A. P. J. Abdul Kalam, the then President of India on 14 July 2004.

CII - Godrej GBC, offers advisory services to the industry in the areas of:

- Green Buildings (IGBC)
- Energy Management
- Green Companies
- Renewable Energy
- GHG Inventorization
- Green Product Certification

- Waste Management and Cleaner Production Process

CII-Godrej GBC works closely with the stakeholders in facilitating India emerge as one of the global leaders in Green Business by the year 2022.

Green Building Movement in India

Green Building Defined

"A green building is one which uses less water, optimises energy efficiency, conserves natural resources, generates less waste and provides healthier spaces for occupants, as compared to a conventional building."

Green Building Movement in India

The Green Building movement in India was triggered off when CII-Sohrabji Godrej Green Business Centre building in Hyderabad was awarded with the first and the prestigious Platinum rated green building rating in India. Since then, Green Building movement in India has gained tremendous impetus over the years.

With a modest beginning of 20,000 sq.ft. green built-up area in the country in the year 2003, today (as on 31 January 2018) more than 4,452 Green Buildings projects coming up with a footprint of over 4.79 Billion sq.ft are registered with the Indian Green Building Council (IGBC), out of which 1276 Green Building projects are certified and fully functional in India.

This growth has been possible with the participation of all stakeholders in the green building movement.

Today all types of buildings are going the Green way- Government, IT Parks, Offices, Residential, Banks, Airports, Convention Centre, Institutions, Hospitals, Hotels, Factories, SEZs, Townships, Schools, Metros etc.,

GBC Vision

'"To enable a sustainable built environment for all and facilitate India to be one of the global leaders in the sustainable built environment by 2025".

IGBC Green homes

Indian Green Building Council (IGBC) Green Homes is the first rating programme 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

IGBC Green Homes® Rating System is a voluntary and consensus based programme. The rating system has been developed based on materials and technologies that are presently available.

The objective of IGBC Green Homes® is to facilitate the effective use of site resources, water conservation, energy efficiency, handling of house-hold waste, optimum material utilization and design for healthy, comfortable & environmentally friendly homes.

The rating system evaluates certain mandatory requirements & credit points using a prescriptive approach and others on a performance based approach. The rating system is evolved so as to be comprehensive and at the same time user-friendly.

The programme is fundamentally designed to address national priorities and the quality of life for occupants. The rating programme uses well accepted National standards and wherever local or National standards are not available, appropriate international benchmarks have been considered

BENEFITS

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.

Tangible Benefits:

- Energy savings : 20 - 30%

- Water savings : 30 - 50%

Intangible Benefits:

- Enhanced air quality

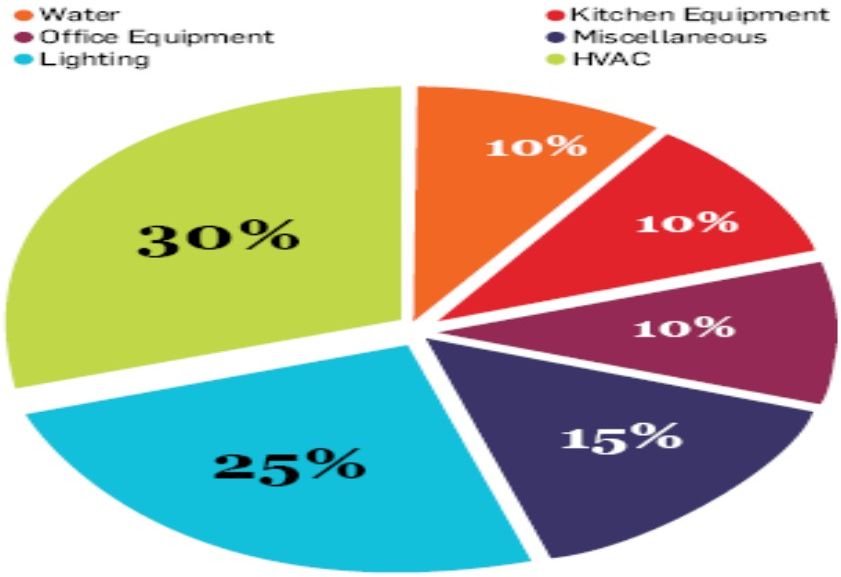
- Excellent day lighting

- Health & wellbeing of the occupants

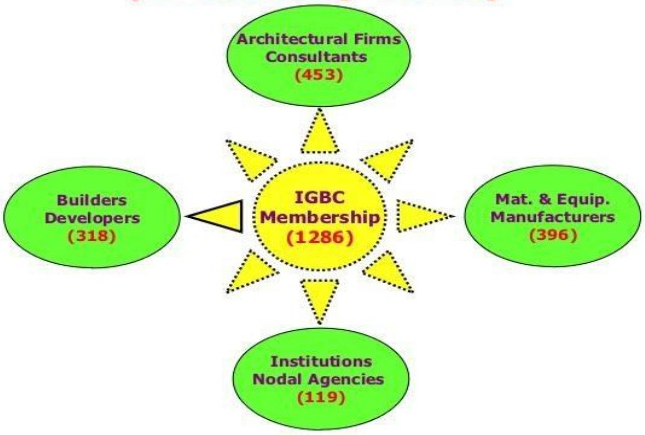
- Conservation of scarce national resources

- Enhance marketability for the project.

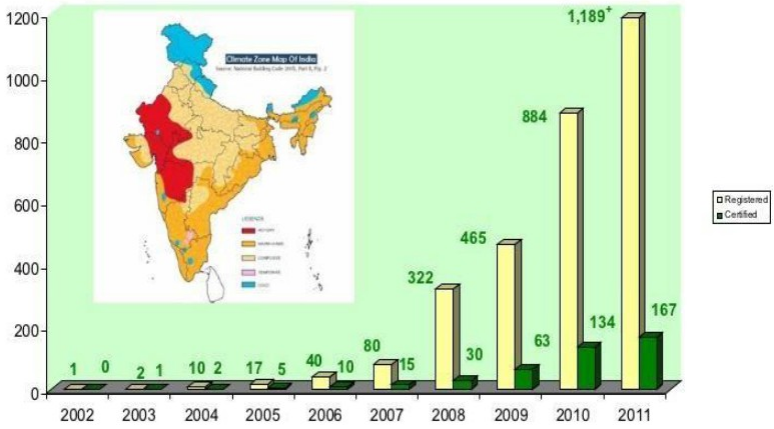
Typical Building Energy Consumption



IGBC Members (as on July 2011)

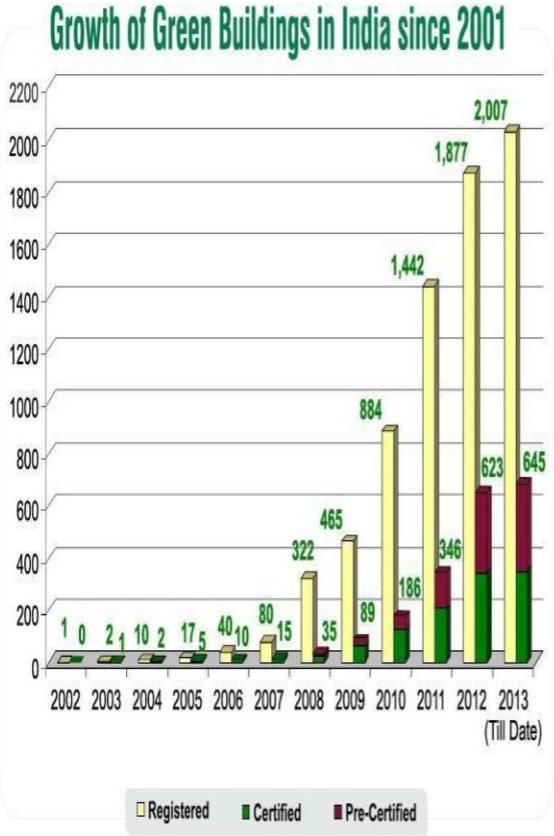


Green Building Movement - Growth



All types of buildings, all over the country :

IT Parks, Offices, Residential, Banks, Airport, Convention Centre, Institutions, Hospitals, Hotels, Factories, SEZs, Townships . . .



METHODOLGY

IGBC Green Homes® Rating System is a measurement system designed for rating new and major renovation of residential buildings which are broadly classified into two construction types:

- Individual residential unit

- Multi-dwelling residential

units o Gated communities.

o High-rise residential apartments.

o Hostels, Service apartments, Resorts, Motels and Guest houses.

IGBC Green Homes® is designed primarily for new residential buildings.

However, it is also applicable for existing buildings designed in accordance with the IGBC Green Homes® criteria.

Different levels of green building certification are awarded based on the total credits earned. However, every Green Home should meet certain mandatory requirements, which are non-negotiable.

The threshold criteria for certification/pre-certification levels are as under:

Certification Level	Individual Units	Multi-dwelling Units	Recognition
Certified	38-44	50-59	Best Practices
Silver	45-51	60-69	Outstanding Performance
Gold	52-59	70-79	National Excellence
Platinum	60-75	80-89	Global Leadership

TRAINING PORGRAMME

A green building is one which uses less water, optimizes energy efficiency, conserves natural resources, generates less waste and provides healthier spaces for occupants, as compared to a conventional building.

Considering the tremendous benefits that it offers, green building concept is gaining major importance in India.

Indian Green Building Council's (IGBC) rating systems launched since 2007 had made rapid strides in the Green Building sector.

These rating systems have been successfully applied in India in as many as 4,452 buildings, till date with a footprint of 4.79 Billion sq.ft. Many Government, corporate, builders & developers in India have taken lead in constructing Green Buildings.

With the growing demand for Green Buildings, there is a need to enhance the knowledge of building professionals on Green Building concepts & equip them on the Green Building rating systems.

Till date, IGBC has conducted several Green Building Training programme across India and trained nearly 21,000 professionals on green building concepts.

Objective

The main objective of this training programme is to impart knowledge on Green Building concepts and share best practices in Green Buildings.

Coverage

- Introduction to Green Buildings
- Sustainable Architecture & Design
- Site Selection & Planning
- Water Conservation
- Energy EfficiencyBuilding
- Materials & Resources
- Indoor Environmental Quality
- Innovation and DevelopmentGreen
- Building Case Study
- Discussion on documentation
- Exercises on Templates

Benefits to Participants

- Exposure to Green Building Design Strategies
- Exposure to Green Building Case Studies
- Acquire Knowledge on IGBC Green Building Rating Systems
- Get equipped for facilitating green building certification

- Get equipped to appear for IGBC AP Exam
- Hands-on training on Green Building documentation

IGBC GREEN LEAGUE-LEARN LEVERAGE AND LEAD

About IGL:

A unique learning experience for stakeholders in construction industries through tutorials which culminates into a quiz competition on sustainability and Green concepts.

The league would be a good platform for the capacity development of participants in enhancing their skills & knowledge on subjects related to Sustainable Built Environment.

The league aims at providing detailed insights on methodology and emerging green trends.

About 20 to 30 participant teams shall be trained over a span of 1.5 months through tutorial classes to participate in the quiz competition.

The trainers and faculty would be experts from the industries having hands on experience on the topics related to the subject.

These tutorials shall be followed by 20 minutes relative technical presentations on latest technologies

Objective:

The core objective of this league is to disseminate the knowledge on optimizing the built environment performance.

It will also establish a common understanding on the conceptual framework of sustainable strategies and their applications.

WORKSHOP SET UP BY IGBC AT SURAT

IGBC Membership

IGBC now offers you an unique opportunity to join the green building movement through membership.

The membership is open to all stakeholders involved in construction activities.

Membership provides you certain unique reach and access to resources, thereby providing you a competitive edge.

By becoming a member of IGBC you are in a community of professionals who would charter the green building path for India

FINDINGS

IGBC GREEN EXISTING BUILDING O&M

IGBC Green Existing Building O&M is the first rating programme developed in India, exclusively for existing building stock.

It is based on accepted 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.

FEATURES

IGBC Green Existing Buildings O&M Rating System is a voluntary and consensus based programme.

The rating is focused on sustained performance of buildings with respect to the green features.

The overarching objective of this rating system is to facilitate building owners & facility managers in implementation of green strategies, measure their impacts and sustain the performance in the long run.

IGBC Green Existing Buildings O&M Rating System is fundamentally designed to address national priorities of resource conservation while providing quality of life for occupants.

The rating programme uses well accepted National standards and wherever local or National standards are not available, appropriate international benchmarks have been considered.

BENEFITS

Green Existing Buildings can have tremendous benefits, both tangible and intangible

TANGIBLE BENEFITS

1]Energy savings:15-30%

2]water savings:15-50%

INTANGIBLE BENEFITS

1] enhanced air quality

2] Health & higher satisfaction levels of occupants

Overview

The project team can evaluate all the possible points to apply under the rating system using a suitable checklist.

The project can apply for IGBC Existing Buildings O&M certification if it can meet all mandatory requirements and achieve the minimum required points.

IGBC Green Existing Buildings O&M rating system addresses green features under the following categories:

- Site & Facility Management

- Water Efficiency
- Energy Efficiency
- Health & Comfort
- Innovation

IGBC Green New Buildings

The building sector in India is growing at a rapid pace and contributing immensely to the growth of the economy.

This augurs well for the country and now there is an imminent need to introduce green concepts and techniques in this sector, which can aid growth in a sustainable manner.

The green concepts and techniques in the building sector can help address national issues like water efficiency, energy efficiency, reduction in fossil fuel use in commuting, handling of consumer waste and conserving natural resources.

Most importantly, these concepts can enhance occupant health, happiness and well-being.

Against this background, the Indian Green Building Council (IGBC) has launched IGBC Green New Buildings rating system to address the National priorities.

This rating programme is a tool which enables the designer to apply green concepts and reduce environmental impacts that are measurable.

The rating programme covers methodologies to cover diverse climatic zones and changing lifestyles.

IGBC has set up the Green New Buildings Core Committee under the leadership of Ar. Raghavendran, to develop the rating programme.

This committee comprised of key stakeholders including architects, builders, consultants, developers, owners, institutions, manufacturers and industry representatives.

The committee, with a diverse background and knowledge has enriched the rating system, both in its content and process.

Benefits

Green New buildings can have tremendous benefits, both tangible and intangible.

The most tangible benefits are the reduction in water and energy consumption right from day one of occupancy.

The energy savings could range from 20 - 30 % and water savings around 30 - 50%.

The intangible benefits of green new buildings include enhanced air quality, excellent daylighting, health & well-being of the occupants, safety benefits and conservation of scarce national resources.

Overview

IGBC Green New Buildings rating system addresses green features under the following categories:

1] sustainable architecture and design.

2] site selection and planning.

3] water conservation

4] building materials and resources

5] indoor environmental quality

6] innovation and development

The guidelines detailed under each mandatory requirement & credit enables the design and construction of new buildings of all sizes and types (as defined in scope).

Different levels of green building certification are awarded based on the total credits earned. However, every green new building should meet certain mandatory requirements, which are non-negotiable.

Features

IGBC Green new buildings rating system® is a voluntary and consensus based programme. The rating system has been developed based on materials and technologies that are presently available.

The objective of IGBC Green New Buildings rating system is to facilitate a holisitc approach to create environment friendly buildings, through architectural design, water efficiency, effective handling of waste, energy efficiency, sustainable buildings, and focus on occupant comfort & well-being.

The rating system evaluates certain mandatory requirements & credit points using a prescriptive approach and others on a performance based approach.

The rating system is evolved so as to be comprehensive and at the same time user-friendly. The programme is fundamentally designed to address national priorities and quality of life for occupants. Some of the unique aspects addressed in this rating system are as follows:

• Recognition for architectural excellence through integrated design approach.

• Recognition for passive architectural features.

• Structural design optimisation with regard to steel and cement. This is a developmental credit. Projects are encouraged to attempt this credit, so as to help IGBC in developing baselines for future use.

• Water use reduction for construction. This is also a developmental credit.

• Based on the feedback from green building proponents, use of certified green products will be encouraged. IGBC has launched a new initiative to certify green products to transform markets. Products would be evaluated right from extraction to disposal.

• Handholding from IGBC Counsellors will now be available for the projects.

• A site visit and audit is proposed before award of the rating.

• Projects are encouraged to report energy and water consumption data on an annual basis, to facilitate research in this area.

Scope

IGBC Green New Buildings rating system® is designed primarily for new buildings. New Buildings include (but are not limited to) offices, IT parks, banks, shopping malls, hotels, airports, stadiums, convention centers, libraries, museums, etc.,

Building types such as residential, factory buildings, schools will be covered under other IGBC rating programmes. IGBC Green New Buildings rating system is broadly classified into two types:

1. **Owner-occupied buildings** are those wherein 51% or more of the building's built-up area is occupied by the owner.

2. **Tenant-occupied buildings** are those wherein 51% or more of the building's built-up area is occupied by the tenants.

Based on the scope of work, projects can choose any of the above options.

The project team can evaluate all the possible points to apply under the rating system using a suitable checklist (Owner-occupied buildings and Tenant-occupied buildings).

The project can apply for IGBC Green New Buildings rating system® certification, if it can meet all mandatory requirements and achieve the minimum required points.

When to use IGBC Green New Buildings Rating System

IGBC Green New Buildings rating system is designed primarily for New Buildings (owner-occupied and tenant-occupied).

The project team can evaluate all the possible points to apply under the rating system using a suitable checklist (Owner-occupied buildings and Tenant-occupied buildings).

The project can apply for IGBC Green New Buildings rating system certification, if the project can meet all mandatory requirements and achieve the minimum required points.

The Future of IGBC Green New Buildings Rating System

Many new green building materials, equipment and technologies are being introduced in the market. With continuous up-gradation and introduction of new green technologies and products, it is important that the rating programme also keeps pace with current standards and technologies.

Therefore, the rating programme will undergo periodic revisions to incorporate the latest advancement and changes.

It is important to note that project teams applying for IGBC Green New Buildings rating system® should register their projects with the latest version of the rating system.

During the course of implementation, projects have an option to transit to the latest version of the rating system.

CERTIFICATION LEVELS

To achieve the IGBC Green New Buildings rating, the project must satisfy all the mandatory requirements and the minimum number of credit points.

The project team is expected to provide supporting documents at preliminary and final stage of submission, for all the mandatory requirements and the credits attempted.

The project needs to submit the following:

1. General information about project, including

a. Project brief stating project type, different type of spaces, occupancy, number of floors, area statement, etc.,

b. General drawings :

i. Master/ Site plan

ii. Parking plans

iii.Floor plans

iv. Elevations

v. Sections

c. Photographs / Rendered images

2. Filled-in templates

3. Narratives and supporting documentation such as drawings, calculations (in excel sheets), declarations / contract documents, purchase invoices, manufacturer cut-sheets / letters / material test reports, etc., for each mandatory requirement and credit.

The project documentation is submitted in two phases - Preliminary submittal and Final submittal:

- Preliminary phase involves submission of all documents, which shall include the mandatory requirements and the minimum number of credits. After the preliminary submission, review is done by third party assessors and review comments would be provided within 30 days.

- The next phase involves submission of clarifications to preliminary review queries and final submittal. This review will also be provided within 30 days, after which the rating is awarded.

It is important to note that the mandatory requirements and credits earned at the preliminary review are only considered as expected.

These mandatory requirements and credits are not awarded until the final documents are submitted, along with additional documents showing implementation of design features. If there are changes in any ‗expected credits' after preliminary review, these changes need to be documented and resubmitted during the final review.

The threshold criteria for certification/pre-certification levels are as under:

Certification Level	Individual Units	Multi-dwelling Units	Recognition
Certified	38-44	50-59	Best Practices
Silver	45-51	60-69	Outstanding Performance
Gold	52-59	70-79	National Excellence
Platinum	60-75	80-89	Global Leadership

IGBC will recognise Green New Buildings that achieve one of the rating levels with a formal letter of certification and a mountable plaque.

Precertification

Projects (Tenant - occupied Buildings)by developers can register for Precertification. This is an option provided for projects aspiring to get precertified at the design stage. Precertification also gives the developer a unique advantage to market the project to potential buyers.

The documentation submitted for precertification must detail the project design features which will be implemented. The rating awarded under precertification is based on the project‘s intention to conform to the requirements of IGBC Green New Buildings rating system®. It is important to note that the precertification rating awarded need not necessarily correspond to the final rating.

Precertified projects are required to provide the status of the project to IGBC, in relation to the rating, once in every six months until the award of the final rating.

Those projects which seek precertification need to submit the following documentation:

1. General information about project, including

a. Project brief stating project type, different type of spaces, occupancy, number of floors, area statement, etc.,

b. General drawings (in PDF format only):

1. Master/ Site plan

2. Parking plans

3. Floor plans

4. Elevations

5. Sections

c. Photographs/ Rendered views

2. Filled-in templates

3. Narratives and supporting documentation such as conceptual drawings, estimate / tentative calculations (in excel sheets), declarations from the owner, etc., for each of the mandatory requirement and credit.

IGBC would take 30 days to review the first set of precertification documents. On receiving the clarifications posed in the first review, IGBC would take another 30 days to award the precertification.

A certificate and a letter are provided to projects on precertification.

CONCLUSION

Many believe that the goal of green building is to become obsolete. In other words, green building should become so much of a standard practice that LEED and other rating systems are no longer necessary—green building will have become mainstream. As we have pointed out here, this will require more than just a development of green technologies and lower costs for these technologies. We insist that by identifying social and psychological barriers, we can influence changes in social structures, rewards, and incentives. Incremental changes like those proposed here can bring green building practices into the mainstream of business such that they are taken into consideration within every decision in the building process. This transformation cannot happen without structural changes in our organizational systems, concurrent with adjustments to society‘s unconscious value system (Glidden‘s, 1979).This article highlighted a number of ways in which our psychological and

social structures bias our view on green construction and create barriers to its full adoption, often without our knowledge. It is useful to notice that we rarely highlight evil entities. Rather, seemingly benign individuals, organizations, and institutions create harm without realizing their impact. We attempt to clarify the mechanisms behind their negative influence. We also demonstrated how existing cognitions, procedures, and routines have surprising consequence. Finally, we have attempted to use this knowledge to outline the changes that are needed behaviorally to create meaningful change. As we provided merely an overview, we encourage further research in this issue-based area. We believe that the organizational behavior intellectual community can offer valuable insights when engaging with the fields of architecture, engineering, public policy, urban planning, and others in this research domain.

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