

BEYOND

SMART CITIES

ENERGY SIMULATION OF HIGH PERFORMANCE GREEN BUILDINGS

FOR ENERGY AND GREEN BUILDING SPECIALISTS

KRISHNAJI PAWAR, LEED AP BD+C, GSAS CGP, ISO 14001:2015, GCP

ENERGY SPECIALIST CURRICULUM

ENERGY MODELING SPECIALIST

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GREEN BUILDING RATING SYSTEM

FOR ENERGY AND GREEN BUILDING PROFESSIONALS

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LEARNING OBJECTIVES



Why GREEN Building Rating System

Green Building Rating Systems

LEED - Green Building Rating System

Green Building Principles

What is Sustainable Building ?

How can we make our buildings green?

Economic Benefits of Sustainability

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WHAT IS A GREEN BUILDING RATING SYSTEM?



SUSTAINABLE
GREEN BUILDING

✓ A Quantitative System to evaluate and measure the environmental impact of a building on the environment.

- ✓ Site
- ✓ Water
- ✓ Materials
- ✓ Energy
- ✓ Indoor Environment

✓ It evaluates the "whole building"

- ✓ Integration of systems is crucial to achieving Green

✓ The Most Widely Used Rating System is LEED

GREEN BUILDING RATING SYSTEMS

- ✓ Reduce energy consumption
- ✓ Reduce water consumption
- ✓ Reduce materials waste
- ✓ Reduce heat island effect
- ✓ Improve indoor air quality
- ✓ Reduce absenteeism
- ✓ Reduce Toxins in environment
- ✓ Improve productivity
- ✓ Preserve open space
- ✓ Preserve species habitat
- ✓ Improve asset value
- ✓ Increase infrastructure vitality

LEED GREEN BUILDING RATING SYSTEM

LEED (Leadership in Energy and Environmental Design) is the most widely used green building rating system in the world.

Developed by the U.S. Green Building Council

www.usgbc.org



TOP 12 GREEN BUILDING RATING SYSTEMS

LEED, or Leadership in Energy and Environmental Design, is a green building certification used in the United States. Managed by the U.S. Green Building Council, this building rating system is completed by on-site or third-party verification.

WELL is a building certification program managed by the International WELL Building Institute (IWBI). WELL focuses mostly on building design attributes that impact occupant health and well-being. WELL evaluates buildings on 11 concepts: air, water, nourishment, light, movement, thermal comfort, sound, materials, mind, community, and innovation.

Fitwel fitwel logo in color Like WELL, Fitwel focuses on the health and wellbeing of the building occupants as well as the surrounding community. However, FitWel does not have any prerequisites for completing this green building certification program.

Green Globes is a building rating system used in the US and Canada. Green Globes is structured so that it can be done as a self-assessment in-house with the project manager and design team. It uses a questionnaire that is aimed at helping the user make changes to complete the certification.

TOP 12 GREEN BUILDING RATING SYSTEMS

BREEM, or the Building Research Establishment Environmental Assessment Method, is the oldest green building rating system. Created in 1990, it has since certified projects in over 50 countries, has over 560,000 certified projects, and over 2 million registered.

DCNB, a green building certification program created by the German Sustainable Building Council, focuses on promoting sustainable building practices across Europe. DCNB uses a holistic approach with an emphasis on performance.

Green Star is an international sustainability reporting and rating system, that is popular particularly in Australia and South Africa. All Green Star categories include an innovation category that rewards projects for creating and utilizing new approaches to sustainability.

BCA (Building and Construction Authority) Green Mark Scheme is a green certification program that focuses on the development of sustainable buildings in Singapore. This certification program focuses on innovation and governance to create a community of care and a more sustainable environment.

TOP 12 GREEN BUILDING RATING SYSTEMS

ASBEE, or Comprehensive Assessment System for Build Energy Environment Efficiency, was launched in 2015 and can be used for both new construction and existing buildings throughout Japan. Starting in 2005, earning a CASBEE certification became mandatory in 24 Japanese municipalities.

GORD, or Gulf Organization for Research and Development, aims to encourage sustainable economic development and environmental leadership through sustainable building design.

Green Star is an international sustainability reporting and rating system, that is popular particularly in Australia and South Africa. All Green Star categories include an innovation category that rewards projects for creating and utilizing new approaches to sustainability.

Beyond Sustainability Assessment System (BSAS) is a unique project to reduce the carbon footprint of the India, showcasing the world the commitment we have made to save the planet earth from the impact of climate change. India will be a pioneer in using technology to deliver sustainability. Beyond Sustainability Assessment System (BSAS) is a rating tool that helps people assess the performance of their building against certain internationally acceptable benchmarks.

HOW CAN WE MAKE OUR BUILDINGS GREEN?

Taking an intelligent approach to energy :

- ✓ Minimising energy use in all stages of a building's life-cycle, making new and renovated buildings more comfortable and less expensive to run, and helping building users learn to be efficient too.
- ✓ Integrating renewable and low-carbon technologies to supply buildings' energy needs, once their design has maximised inbuilt and natural efficiencies.

Safeguarding water resources :

- ✓ Exploring ways to improve drinking and waste water efficiency and management, harvesting water for safe indoor use in innovative ways, and generally minimising water use in buildings.
- ✓ Considering the impact of buildings and their surroundings on stormwater and drainage infrastructure, ensuring these are not put under undue stress or prevented from doing their job.

HOW CAN WE MAKE OUR BUILDINGS GREEN? +

Promoting health and wellbeing :

- ✓ Bringing fresh air inside, delivering good indoor air quality through ventilation, and avoiding materials and chemicals that create harmful or toxic emissions.
- ✓ Incorporating natural light and views to ensure building users' comfort and enjoyment of their surroundings, and reducing lighting energy needs in the process.
- ✓ Designing for ears as well as eyes. Acoustics and proper sound insulation play important roles in helping concentration, recuperation, and peaceful enjoyment of a building in educational, health and residential buildings.
- ✓ Ensuring people are comfortable in their everyday environments, creating the right indoor temperature through passive design or building management and monitoring systems.

HOW CAN WE MAKE OUR BUILDINGS GREEN?+

Keeping our environment green :

- ✓ Recognising that our urban environment should preserve nature, and ensuring diverse wildlife and land quality are protected or enhanced, by, for example, remediating and building on polluted land or creating new green spaces.
- ✓ Looking for ways we can make our urban areas more productive, bringing agriculture into our cities.

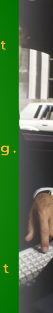
Creating resilient and flexible structures :

- ✓ Adapting to our changing climate, ensuring resilience to events such as flooding, earthquakes or fires so that our buildings stand the test of time and keep people and their belongings safe.
- ✓ Designing flexible and dynamic spaces, anticipating changes in their use over time, and avoiding the need to demolish, rebuild or significantly renovate buildings to prevent them becoming obsolete.

HOW CAN WE MAKE OUR BUILDINGS GREEN?+

Connecting communities and people :

- ✓ Creating diverse environments that connect and enhance communities, asking what a building will add to its context in terms of positive economic and social effects, and engaging local communities in planning.
- ✓ Ensuring transport and distance to amenities are considered in design, reducing the impact of personal transport on the environment, and encouraging environmentally friendly options such as walking or cycling.
- ✓ Ensuring transport and distance to amenities are considered in design, reducing the impact of personal transport on the environment, and encouraging environmentally friendly options such as walking or cycling. Exploring the potential of both 'smart' and information communications technologies to communicate better with the world around us, for example through smart electricity grids that understand how to transport energy where and when it is needed.



HOW CAN WE MAKE OUR BUILDINGS GREEN?+

Considering all stages of a building's life-cycle :

- ✓ Seeking to lower environmental impacts and maximise social and economic value over a building's whole life-cycle (from design, construction, operation and maintenance, through to renovation and eventual demolition). Ensuring transport and distance to amenities are considered in design, reducing the impact of personal transport on the environment, and encouraging environmentally friendly options such as walking or cycling.
- ✓ Ensuring that embodied resources, such as the energy or water used to produce and transport the materials in the building are minimised so that buildings are truly low impact.



U.S. GREEN BUILDING COUNCIL



The U.S. Green Building Council (USGBC), co-founded by Mike Italiano, David Gottfried and Rick Fedrizzi in 1993, is a private 501(c)3, membership-based non-profit organization that promotes sustainability in building design, construction, and operation.

- ✓ Non-profit organization with 6,000+ members.
- ✓ Voluntary, diverse membership that operates on consensus principles
- ✓ Developer and administrative authority of the LEED Green Building Rating System



LEED PRINCIPALS



LEED Primary Objective

"Transform existing building markets so that sustainable design, construction, and operations practices are mainstreamed."

- ✓ **Consensus process involving many stakeholders in the building industry**
- ✓ **To define, promote, and standardize green design**
- ✓ **To promote a whole-building integrated design process**



LEED SCORECARD

- LOCATION AND TRANSPORTATION (0PR/7C/16P)**
- SUSTAINABLE SITES (1PR/6C/10P)**
- WATER EFFICIENCY (3PR/4C/11P)**
- ENERGY AND ATMOSPHERE (4PR/6C/33P)**
- MATERIALS AND RESOURCES (1PR/5C/13P)**
- INDOOR ENVIRONMENTAL QUALITY (2PR/9C/16P)**
- INTEGRATIVE PROCESS(0PR/1C/1P)**
- INNOVATION (0PR/2C/6P)**
- REGIONAL PRIORITY (0PR/1C/4P)**
- TOTAL (11 PRE REQUISITE / 44 CREDIT /110 POINT)**

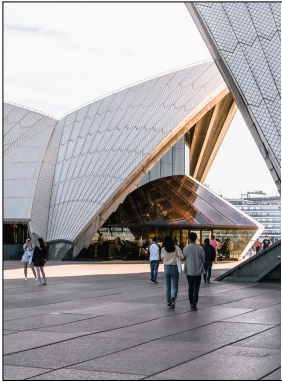
WHAT IS SUSTAINABLE BUILDING?

To build and develop sustainably, one must:

- ✓ **Protect and integrate building with the natural environment**
- ✓ **Increase energy efficiency**
- ✓ **Reduce water consumption**
- ✓ **Promote the reuse and regional use of building materials**
- ✓ **Reduce building waste and pollution**
- ✓ **Protect occupant health and increase wellbeing**

These principles are integrated into the design and construction process by regional and community planners, real estate developers, funding agencies, architects, engineers, contractors, and facility managers to create buildings and communities that benefit all of the stakeholders, including end users, and the environment.

With the proliferation of Sustainable (green) Building practices around the world, this concept is not known throughout the industry. The principles of sustainable building are similar regardless of the system under which they are applied.



BENEFITS OF SUSTAINABLE BUILDING



☑ There are several environmental benefits of sustainable building:

- ☞ Reduce pollution and waste
- ☞ Restoration or preservation of natural resources

☑ Buildings built sustainably have better:

- ☞ Indoor air quality
- ☞ More energy efficient compare to traditional buildings (up to 40% or more)



ECONOMIC BENEFITS OF SUSTAINABLE DEVELOPMENT:



To build and develop sustainably, one must:

- ☑ Increased asset Value
- ☑ Tenant retention and satisfaction
- ☑ Reduce water consumption
- ☑ Shareholder value
- ☑ Employee satisfaction and morale
- ☑ Stakeholder relations
- ☑ Higher return on investment
- ☑ Net operating income (NOI) via lower operating
- ☑ Productivity improvements



REDUCTION OF COSTS

Competitive first costs

☑ Integrated design allows high benefit at low cost by achieving synergies between disciplines and between technologies

☑ Reduce Operating Costs

● Lower utility costs significantly
● LEED EB and NC buildings have an average annual net savings of between 25% to 45%, depending on the extent of compliance to the LEED Credits

☑ Optimize life-cycle economic performance

Integrated design is a comprehensive holistic approach to design which brings together specialisms usually considered separately..... Design of a building which considers whole building design including architecture, structural engineering, passive solar building design and HVAC.



When developing infrastructure, many countries, policymakers, builders, and contractors overlook the city planning aspects. City planning is imperative for the construction of sustainable infrastructure.

INCREASE RETURNS

- Increase building valuation and ROI
 - Increased building value
 - Higher asking rents
 - Higher ROI
- Decrease vacancy, improve retention
 - Marketing advantages
 - Higher occupancy rates
 - Decreased absenteeism
 - Employee performance is better in day lighted office buildings.
 - Providing a healthy workplace
 - Improves employee satisfaction
- Reduce liability
 - Improve risk management





We create world-class brands that accelerate business growth. Your brand is one of the most valuable intangible assets of your business.

CORPORATE INTANGIBLE VALUES

In addition to tangible values, intangible values are:

- Acknowledgment to employees their company is committed to providing them a safe, healthy and efficient building
- Acknowledgement to stakeholders that the corporation is committed to positively impacting the bottom line
- Acknowledgement to the surrounding community that the corporation is committed to sustainability





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THANK YOU

THE WORLD'S 1ST GREEN TECHNOLOGY MARKETPLACE