

Architect

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GREEN BUILDINGS RATING SYSTEMS

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Preface

Today as the building industry, in Kurdistan Region and throughout the country, is increasingly growing, a serious consideration should be given to the buildings to be designed so as to reduce the overall impact of the built environment on human health and the natural environment.

Buildings have a significant impact on the environment, consuming 32% of the world's resources, including 12% of its water and up to 40% of its energy. Buildings also produce 40% of waste going to landfill and 40% of air emissions. (1)

Green building which means to be environmentally friendly. is one of the fastest growing building & design concepts, architects, designers, and homeowners are becoming infatuated with the energy saving emphasis, modern look, cost saving possibilities, and the relationship with nature that green buildings possess.

In the industrial countries thousands of buildings were certified to be green since the last 2 decades, many organizations and laws has been founded to assess and certify the green buildings.

In this research I will summarize the green building history & definition and review the important rating systems, concentrating on the LEED for homes rating system.

I wish that this research will serve as an inspiration to architects and builders who are interested in planning more Earth-friendly green homes and communities and add some introduction to the understanding of green buildings.

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(1)- Green Building Council Australia

<http://www.gbca.org.au/green-star/green-star-overview/background/2140.htm>

Definition

Green building (also known as green construction or sustainable building or high performance 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. (2)

Impacts of the built environment:

Aspects of Built Environment:	Consumption:	Environmental Effects:	Ultimate Effects :
Siting Design Construction Operation Maintenance Renovation Deconstruction	Energy Water Materials Natural Resources	Waste Air pollution Water pollution Indoor pollution Stormwater Noise	Harm to Human Health Environment Degradation Loss of Resources

Green buildings are designed to reduce the overall impact of the built environment on human health and the natural environment by:

- Efficiently using energy, water, and other resources
- Protecting occupant health and improving employee productivity
- Reducing waste, pollution and environmental degradation

For example, green buildings may incorporate sustainable materials in their construction (e.g., reused, recycled-content, or made from renewable resources); create healthy indoor environments with minimal pollutants (e.g., reduced product emissions); and/or feature landscaping that reduces water usage (e.g., by using native plants that survive without extra watering).

History of Green Buildings

Green building design may be a relatively new concept, but the first green homes were constructed thousands of years ago. The U.S. Anasazi Indians created apartment-style green homes as early as 700 A.D.

some of their green home designs included passive solar heating and cooling with natural ventilation; the collection and use of rainwater for irrigation and the use of natural, non-toxic materials such as stone, mud, and wood.(3).

In Egypt , we find that the ancient Egyptian used local materials such as brick, wood and papyrus in their private homes while they used natural stones, carved in the mountains for sacred architecture such as temples.

In Iraq there were many environmental treatments such as the use of Badgers, domes, vaults and interior spaces as well as local natural materials .. All this was in the adaptation of human to his environment. This trend was prevalent throughout the ages and times, it was not going to ignore the human environment at all, but tried in various ways to adapt with its elements. Until the Industrial Revolution .



**Badgers used for catching air and cooling
with natural ventilation in Islamic architecture**

[3-Eric Freed ; Green Building and Remodelling for Dummies \(Wiley Publishing, 2008\),](#)

Green Building Rating Systems

Since the harmful effects of construction practices on the natural environment were highlighted, the performance of the buildings has become a major concern for occupants and built environment professionals. In response to this concern of reducing environmental impact of the design and operation of buildings, many researchers have developed methods for measuring environmental performance of buildings with the intention of creating a sustainable built environment

Below is an overview of some prominent green building rating tools;

1- BREEAM

BREEAM (Building Research Establishment Environmental Assessment Method) sets the standard for best practice in sustainable design. BREEAM was first developed in the UK in the years 1990 and was a pioneer in providing the first-ever building assessment methodology. Addressing wide-ranging environmental and sustainability issues, BREEAM enables developers and designers to prove the environmental credentials of their buildings to planners and clients.

A BREEAM assessment uses recognised measures of performance, which are set against established benchmarks, to evaluate a building's specification, design, construction and use. The measures used represent a broad range of categories and criteria from energy to ecology. They include aspects related to energy and water use, the internal environment (health and well-being), pollution, transport, materials, waste, ecology and management processes.(4)

2-LEED

LEED, or Leadership in Energy and Environmental Design, is an internationally-recognized green building certification system, developed by the U.S. Green Building Council (USGBC) in March 2000. (5)

LEED provides building owners and operators with a framework for identifying and implementing practical and measurable green building design, construction, operations and maintenance solutions

(4)<http://www.breeam.org/page.jsp?id=66>

(5) <http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1988>

3-CASBEE

Research and development of CASBEE have been carried out as a cooperative project between industry, government and academia with the assistance of Japanese Ministry of Land, Infrastructure and Transport.

CASBEE is composed of four assessment tools corresponding to the building lifecycle. "CASBEE Family" is the collective name for these four tools and the expanded tools for specific purposes, which are listed below. The CASBEE assessment tools are CASBEE for Pre-design, CASBEE for New Construction, CASBEE for Existing Building and CASBEE for Renovation, to serve at each stage of the design process. Each tool is intended for a separate purpose and target user, and is designed to accommodate a wide range of uses (offices, schools, apartments, etc.) in the evaluated buildings.(6)

4-GB TOOL

GBTool can handle both new building and renovation projects within the three types of buildings it assesses: Multi-unit residential; Office and School. The GB process is managed by IISBE , the International Initiative for a Sustainable Built Environment.

GBTool provides approximate assessments of a broad range of potential environmental performance parameters, all related to performance benchmarks that are relevant to the region and building occupancy. Although GBTool performs various internal calculations, it is primarily designed to act as a framework for scoring and weighting, using data generated in external models to perform detailed studies. GBTool is implemented in Excel . (7)

In GBTool, scores are assigned in a range of -2 to +5, where:

- 2 and -1 are levels of performance below the acceptable level in your region, for occupancies specified;

0 is the minimum level of acceptable performance in your region for occupancies specified;
3 is Best Practise; and

5 is the best technically achievable, without consideration of cost

(6) <http://www.ibec.or.jp/CASBEE/english/overviewE.htm>

(7) <http://www.petus.eu.com/left.php?sct=6&sbsct=2&pageid=155&pagesect=0&pagelang=en>

5- HQE

(High Quality Environmental standard) is a standard for green building in France, based on the principles of sustainable development . launched in 1996, the HQE® (High Environmental Quality) programme is gaining increasing support among developers and project owners and ultimately will promote the eco-design of products and buildings. It enables them to adopt the construction options most suited to sustainable development, at all stages of a building's life cycle (manufacture, construction, use, maintenance, conversion and end of life).

The HQE Association has defined 14 targets specifying the particular environmental requirements that a building, whether new or rehabilitated, must satisfy.

6- DGNB

The DGNB is an independent non-profit organization that was founded in 2007 by representatives from throughout the construction and real estate sector.

The German Sustainable Building Certification was developed by the German Sustainable Building Council (DGNB) together with the Federal Ministry of Transport, Building, and Urban Affairs (BMVBS) to be used as a tool for the planning and evaluation of buildings in this comprehensive perspective on quality. As a clearly arranged and easy to understand rating system, the German Sustainable Building Certification covers all relevant topics of sustainable construction, and awards outstanding buildings in the categories bronze, silver, and gold. Six subjects affect the evaluation: ecology, economy, social-cultural and functional topics, techniques, processes, and location.

The certificate is based on the concept of integral planning that defines, at an early stage, the aims of sustainable construction. In this way, sustainable buildings can be designed based on the current state of technology, – and they can communicate their quality with this new certificate. (8)

7-Green Globes

It is an environmental assessment, education and rating system that is promoted in the United States by the Green Building Initiative.

Canada's federal government has been using the Green Globes suite of tools for several years under the Green Globes name and it has been the basis for the Building Owners and Manufacturer's Association of Canada's Go Green Plus program. Adopted by Building Owners and Managers Association (BOMA) Canada in 2004, Go Green Plus was chosen by Canada's Department of Public Works and Government Services, which has an estimated 300 buildings in its existing portfolio.

(8) <http://www.greenbuildingcouncil.me/index>

The system, which is an online interactive software tool, competes with the Leadership in Energy and Environmental Design (LEED) system from the U.S. Green Building Council (another non-profit based in Washington, DC).

Green Globes helps both with the new construction of commercial buildings and with the maintenance and improvement of existing buildings. (9)

Overview of LEED Rating System

Today, LEED consists of a suite of nine rating systems for the design, construction and operation of buildings, homes and neighbourhoods. That suite currently consists of:(10)

- New Construction and Major Renovations

The LEED for New Construction Rating System is designed to guide and distinguish high-performance commercial and institutional projects, including office buildings, high-rise residential buildings, government buildings, recreational facilities, manufacturing plants and laboratories.

- Existing Buildings: Operations & Maintenance

The LEED for Existing Buildings Rating System helps building owners and operators measure operations, improvements and maintenance on a consistent scale, with the goal of maximizing operational efficiency while minimizing environmental impacts. LEED for Existing Buildings addresses whole-building cleaning and maintenance issues (including chemical use), recycling programs, exterior maintenance programs, and systems upgrades. It can be applied both to existing buildings seeking LEED certification for the first time and to projects previously certified under LEED for New Construction, Schools, or Core & Shell.

-Commercial Interiors

LEED for Commercial Interiors is the green benchmark for the tenant improvement market. It is the recognized system for certifying high-performance green interiors that are healthy, productive places to work; are less costly to operate and maintain; and have a reduced environmental footprint. LEED for Commercial Interiors gives the power to make sustainable choices to tenants and designers, who do not always have control over whole building operations.

-Core and Shell

LEED for Core & Shell is a green building rating system for designers, builders, developers and new building owners who want to address sustainable design for new core and shell construction. Core and shell covers base building elements such as structure, envelope and the HVAC system. LEED for Core & Shell is designed to be complementary to the LEED for Commercial Interiors rating system, as both rating systems establish green building criteria for developers, owners and tenant.

(9) http://en.wikipedia.org/wiki/Green_Globes

(10) <http://www.usgbc.org>

-Schools

The LEED for Schools Rating System recognizes the unique nature of the design and construction of K-12 schools. Based on the LEED for New Construction rating system, it addresses issues such as classroom acoustics, master planning, and environmental site assessment. By addressing the uniqueness of school spaces and children's health issues, LEED for Schools provides a unique, comprehensive tool for schools that wish to build green, with measurable results.

-Retail

LEED for Retail is comprised of two unique rating systems, LEED 2009 for Retail: New Construction & Major Renovations and the LEED 2009 for Retail: Commercial Interiors Rating Systems. LEED for Retail is designed to guide and distinguish high-performance retail projects, including banks, restaurants, apparel, electronics, big box and everything in between.

-LEED for Healthcare

The full suite of resources for the LEED for Healthcare rating system, including certification functionality in LEED Online, is now available! Project teams have been able to register for USGBC's latest green building rating system since November 2010. LEED for Healthcare guides the design and construction of both new buildings and major renovations of existing buildings, and can be applied to inpatient, outpatient and licensed long-term care facilities, medical offices, assisted living facilities and medical education and research centers.

Starting on January 1, 2012 projects that meet the requirements outlined in the [Rating System Selection Guide](#) must use LEED for Healthcare.

-LEED for Ho

A LEED-certified home is designed and constructed in accordance with the rigorous guidelines of the LEED for Homes green building certification program. LEED for Homes is a consensus-developed, third party-verified, voluntary rating system which promotes the design and construction of high-performance green homes.

LEED for Nei

The LEED for Neighborhood Development Rating System integrates the principles of smart growth, urbanism and green building into the first national system for neighborhood design. LEED for Neighborhood Development is a collaboration among USGBC, [Congress for the New Urbanism](#), and the [Natural Resources Defense Council](#).

LEED Home Rating System

LEED for Homes Rating System is part of the comprehensive suite of LEED assessment tools offered by USGBC to promote sustainable design, construction, and operations practices in buildings.

The LEED for Homes Rating System measures the overall performance of a home in eight categories:(11)

1. Innovation & Design Process (ID). Special design methods, unique regional credits, measures not currently addressed in the Rating System, and exemplary performance levels.

2. Location & Linkages (LL). The placement of homes in socially and environmentally responsible ways in relation to the larger community.

3. Sustainable Sites (SS). The use of the entire property so as to minimize the project's impact on the site.

4. Water Efficiency (WE). Water-efficient practices, both indoor and outdoor.

5. Energy & Atmosphere (EA). Energy efficiency, particularly in the building envelope and heating and cooling design.

6. Materials & Resources (MR). Efficient utilization of materials, selection of environmentally preferable materials, and minimization of waste during construction.

7. Indoor Environmental Quality (EQ). Improvement of indoor air quality by reducing the creation of and exposure to pollutants.

8. Awareness & Education (AE). The education of homeowner, tenant, and/or building manager about the operation and maintenance of the green features of a LEED home.

The LEED for Homes Rating System works by requiring a minimum level of performance through prerequisites, and rewarding improved performance in each of the above categories. The level of performances indicated by four performance tiers – Certified, Silver, Gold and Platinum – according to the number of points earned

Exhibit 1: LEED for Homes Certification Levels

LEED for Homes Certification Levels	Number of LEED for Homes points Required
Certified	45-59
Silver	60-74
Gold	75-89
Platinum	90-136
Total available points	136

(10) <http://www.usgbc.org>



Bahrain World Trade Center

Built in 2008, its first skyscraper in the world to integrate wind turbines into its design. The Bahrain WTC consists of two sail shaped towers designed to funnel wind to three sky bridges each holding a 225KW wind turbine, capable of generating 11% to 15% of the towers' total power consumption. The turbines operate approximately 50% of the time on an average day.

Front cover

The Swiss Re Building-London

Designed by Norman Foster and Arup Engineers, the building uses energy – saving methods which allow it to use half the power a similar tower would typically consumes.

Rear cover

The Bank of America Tower-Manhattan-New work city

The design of the building uses technologies such as floor-to-ceiling insulating glass to contain heat and maximize natural light, and an automatic daylight dimming system. The tower also features a grey water system, which captures rainwater for reuse. The building is made largely of recycled and recyclable materials. Air entering the building is filtered, as is common, but the air exhausted is cleaned as well. Bank of America Tower is the first skyscraper designed to attain a Platinum LEED Certification.

