

## **ANALYSIS OF ASSESSMENT CRITERIAS AND CREDITS BY VARIOUS ACCREDITATION AGENCIES FOR THE GREEN BUILDING**

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*Abstract: Buildings are found to be both, one of the biggest consumer of energy and producer of greenhouse gases. The construction sector poses a major challenges to the environment .globally, buildings are responsible for at least 40% of energy use. An estimate says that 42% of global water consumption and 50% of the global utilization of raw materials is consumed by building when taking into account the manufacture, construction and operational period of building. It has become a global issue. Since buildings are accountable for this scenario, it has imposed an immediate requirement to not only think of, but implement sustainability in every new construction instantly. Green Buildings are buildings that subscribe to the principle of conscientious handling of natural resources, which means causing as little environmental interference as possible, using environment friendly materials, requires low operational energy, utilizes renewable sources of energy to fulfill its requirements, follows high-quality and longevity as a guideline for construction and last but not least, must be economically viable. It endeavors to present some environmental and physical design approaches for green buildings in promptly developing countries chiefly India. The best option to meet to energy demand and supply requirements is to “GO GREEN”. In this paper discussed various accreditation agencies, factor consideration, rating system and comparative analysis of dragging factors for some famous agencies.*

### **INTRODUCTION**

Green Building, also known as Sustainable Building, is the practice of creating structures and using processes that are environmentally responsible and resource efficient. It encompasses factors such as site selection, design, construction, operation, maintenance, renovation, and deconstruction. Using green building materials and products promotes conservation of dwindling nonrenewable resources internationally. In addition, integrating green building materials into building projects can help reduce the environmental impacts associated with the extraction, transport, processing, fabrication, installation, reuse, recycling, and disposal of these building industry source materials.

The aim of designing a Green Building is to reduce the overall impact of the built environment on human health and the natural environment through

- Reduction Waste, pollution and environmental degradation

- **Protection of occupant health and improvement of employee productivity**
- **Efficient usage of energy, water and other resources**

**In short Green building is a design and construction practice that promotes the economic health and well-being of your family, the community and the environment. A smart step toward personal economic rewards, Green Building has positive social and environmental effect on our commitment to the future and the way we live for years to come.**

## **BENEFITS OF BUILDING RATING**

The following benefits of a green design to a building owner, user and the society as a whole are as follows:

- Reduced energy consumption without sacrificing the comfort levels
- Reduced water consumption
- Reduced system sizes
- Reduced Investment
- Reduced destruction of natural areas, habitats, biodiversity, reduced soil loss from erosion etc.
- Reduced air and water pollution
- Limited waste generation due to recycling and reuse
- Reduced pollution loads
- Increased user productivity
- Enhanced image and marketability

## **AGENCIES AND ASSESSMENT CRITERIA**

### **1) GRIHA, or Green Rating for Integrated Habitat Assessment**

GRIHA, or Green Rating for Integrated Habitat Assessment, is the national rating system of India for any completed construction. It is an assessment tool to measure and rate a building's environmental performance. GRIHA endeavors to calculate facets, for instance, energy consumption, waste generation, renewable energy adoption, among other points, in an attempt to manage, control and reduce the same to the finest achievable degree.

Green Rating for Integrated Habitat Assessment-GRIHA, the national green building rating system, was developed by TERI after a thorough study and understanding of the current internationally accepted green building rating system and the prevailing building practices in India. The rating system was developed by the Centre for research on Sustainable Building science, TERI in the year 2005.

The primary objective of the rating system is to help design green building and, in turn help evaluate the greenness of building. The rating system follows best practices along with national/ international codes that are applicable to the green design of buildings. Codes include are Bureau Of energy Efficiency & BIS.

GRIHA has been adopted as a NRS (National Rating System) under the MNRE, Government of India, as of 1 Nov. 2007

## **EVALUATION SYSTEM OF GRIHA**

GRIHA has 100 points system consisting of some core points, which are mandatory to be met while the rest are non mandatory or optional points, which can be earned by complying with the commitment of the criterion for which point is allocated.

Different levels of certifications are awarded based on percentage of points earned. The minimum percentage for certifications is 50. In all there are 34 criteria with weighted points, as tabulated below.

TABLE 1# Evaluation system of griha

Criteria Number	Description	Points
1	Site Selection	1 Partly Mandatory
2	Preserve and Protect landscape during construction	5 Partly Mandatory
3	Soil Conservation	2
4	Design to Include existing site features	4
5	Reduce air pollution during const.	2 Partly Mandatory
6	Enhance outdoor light system	3
7	Plan Utilities efficiency	3
8	Sanitary facility for construction workers	2 Mandatory
9	Reduce air pollution during const.	2 Mandatory
10	Reduce landscape water Requirement	3
11	Reduce building water Use	2
12	Efficient water use during construction	1
13	Reduce conventional energy demand	8 Mandatory
14	Optimize energy performance	16 Partly Mandatory
15	Utilizing fly ash in building	6
16	Reduce volume , weight and time of construction	4
17	Use low energy material in interiors	4
18	Renewable energy utilization	5 Partly Mandatory
19	Renewable energy based hot water system	3
20	Waste water treatment	2
21	Water recycle and reuse	5
22	Reduction in waste during construction	1
23	Efficient waste generation	1
24	Storage and disposal of waste	1
25	Resource recovery from waste	2
26	Use of low VOC paints	3
27	Minimize ozone depleting substance	1 Mandatory
28	Ensure water quality	2 Mandatory
29	Outdoor and indoor noise pollution	2
30	Tobacco and smoke control	1 Mandatory
31	Universal accessibility	1
32	Energy audit and validation	Mandatory
33	Operation and maintenance of equipment	2 Mandatory
34	Innovation (beyond 100) – bonus	4
	<b>Total</b>	<b>104</b>
	<b>Different Levels</b>	
Sr. No.	% Point scored	Rating
1	50-60	One Stare
2	61-70	Two Stare
3	71-80	Three Stare
4	81-90	Four Stare

#Source: GRIHA - MANUAL, VOL-1, MNRE & TERI, New Delhi, 2010

2) **LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN**, LEED United States of America soon after forming U.S Green Building council in 1993 stated the framework of new rating agency named LEED. Latest version of it is revised 2009 versions 2.3, in all there are 100 points for various criteria's with additional 6 credits for innovations and 4 for regional priority.

In the year 2008 LEED-India came in existence. It evaluates environmental performance from a whole building perspective over a building life cycle, providing a definitive standard for what constitutes a green building.

The rating system is organized into five environmental categories that are

- Sustainable sites.
- Water efficiency.
- Energy and atmosphere.
- Material and resources.
- Indoor environmental quality.

LEED Rating for

- New Construction & Major Renovation.
- Commercial interior
- Core & shell
- Homes
- Neighborhood development
- Schools
- Retails
- Healthcare

TABLE 2\*\* BRIEF SUMMARY OF LEED – INDIA RATING SYSTEM.

Criteria Number	Description	Points	
		Mandatory Requirements	Maximum Credits
1	Sustainable sites	1	13
2	Water efficiency	0	6
3	Energy and Atmosphere	3	17
4	Material and Resources	1	13
5	Indoor environmental quality	2	15
6	Innovation and design process	0	5
	<b>Total:</b>	<b>7</b>	<b>69</b>
	<b>Different Levels</b>		
1	26-32	Certified	
2	33-38	Silver	
3	39-51	Gold	
4	52-69	Platinum	

Source\*\*: www.lead online.com

3) **THE INDIAN GREEN BUILDING COUNCIL (IGBC)** The Indian Green building council has launched IGBC GREEN HOMES, rating system to address the national priorities. By applying its criteria, homes which are sustainable over life cycle of the building can be constructed. This rating programme is a tool which enables the designer to apply green concept and criteria, so as to reduce the measurable environmental impact. The programme

covers methodologies to cover various climatic zones and changing lifestyles. IGBC is first rating system exclusively for residential sector. In all it has 75 credit points based on various criteria's, presented in table 3.

TABLE 3\* IGBC RATING SYSTEMS

Criteria Number	Description	Points
1	Site Selection and planning	9
2	Water efficiency	11
3	Energy efficiency	22
4	Material and Resources	13
5	Indoor environmental quality	15
6	Innovation and design process	5
	<b>Total:</b>	<b>75</b>
	<b>Different Levels</b>	
1	38-44	Certified
2	45-51	Silver
3	52-59	Gold
4	60-75	Platinum

\*Source: [www.igbc.in](http://www.igbc.in)

### COMPARATIVE ANALYSIS OF CRITERIAS AND CREDITS

While studying various agencies criteria for green building accreditation, summations of points of sub activities belong to main head are considered together and presented in table 4.

Table 4 Relative analysis of criterias and credits of various certification agencies

Criteria Number	Description	GRIHA - TERI	LEED	LEED - India	IGBC Green Homes
1	Sustainable site Planning	17	26	13	9
2	Water Management	13	10	6	11
3	Energy Optimization	35	35	17	22
4	Sustainable Building Material & Resources	14	14	13	13
5	Waste Management	5	--	--	--
6	Health & Well being	14	15	15	15
7	Building Operations and Maintenance	2	--	--	--
8	Innovations	4	6	5	5
9	Pollution	--	--	--	--
10	Regional Priority	--	4	--	--
11	Transport	--	--	--	--
	<b>Total:</b>	<b>104</b>	<b>110</b>	<b>69</b>	<b>75</b>

### CONCLUSION

The purpose of this research is to contribute to a better understanding of the concept of green building assessment tool and its role for achieving sustainable development through development an effective green building rating system for residential units in India according

to the local context. The green building concepts helps to maintain the pollution free environment.

The analysis of the existing assessment tools and design methodologies has shown that green building is a financially, health wise and most important environmentally idea which more people should adopt. Many building materials and renewable energy source exists lessen one's impact upon the environment. The assessment tools are intended to be used as guidelines during the design process and as a more universal sustainability assessment rather than as a specific architectural evaluation tool. The evaluation of housing or residential sector development not only includes the surroundings of the building being developed but also should include the assessment of building performance, since the building's performance will have significant impact on environmental issues. Even though the matter of concern is high installations cost of such construction scheme, the weighted should be more emphasis on durability and long term benefit of structure, which seems to be considered with negligible credentials given. Performance, maintenance, durability, life cycle cost should be included in such assessment list.

Through educating awareness about assessment criteria prove to be guideline to make efficient sustainable structure as well as will mitigate the environmental pollution challenges.

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