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Review Article

"AMENDMENTS REQUIRED IN GREEN BUILDING RATING SYSTEMS"

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ABSTRACT

In modern days the infrastructure of a country defines its true development, thus making construction sector more prominent. Countries like India are thus solemnly dependent on its construction sector for its rapid development. World-wide there are various building evaluation tools that focus on different areas of sustainable development and are designed for different types of projects. This research attempts to understand the various Green building rating system assessment criteria that need to be considered during comparison. Finally based on comparative study an attempt is made to recommend one unique rating system which will cover each and every aspect required for assessment and certification for any green building. This system would be comparatively less complex and able to provide the necessary perception about the project with ease. The construction industries are known to be the pioneer of a country's development. In 21st century, one of the major challenges faced by mankind is that of global climate change, which has highly alerted to the concern for conservation of nature. In a way, making environmental sustainability to be of much more importance in actual execution of work is the focus.

INTRODUCTION

The national Energy Conservation Building Code (ECBC) and green building rating systems such as Leadership in Energy and Environment Design (LEED-India) and Green Rating for Integrated Habitat Assessment (GRIHA) have further fueled this surge in interest. The Indian building sector has witnessed huge interest in the field of energy performance in the last decade These codes and rating systems are based on design intent rather than actual performance during building occupancy. They are not designed primarily to rate energy performance of existing buildings and to reward their performance through a systematic evaluation and award scheme. Further, they do not provide defendable energy consumption targets for new buildings based on contextual data. . The primary aim of this initiative is to improve the design, construction, maintenance and operation of buildings by measuring energy performance against established benchmarks, and recognize and reward exemplary performing buildings through a credible certification system (Hicks and Von Neida, 2005).This has serious performance, market and policy implications. Buildings, along with other consumers must continuously monitor and improve their performance in order to transit to an energy efficient economy. It is important to measure this performance against established benchmarks.

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AN OVERVIEW

BREEAM -2011 NC Rating System

The BREEAM (Building Research Establishment's Environmental Assessment Method) was first launched in 1990 and was the first green building performance assessment method. This method was developed in the UK. The BREEAM-2011 NC assesses the performance of the building. This rating system is divided in the following areas: management-12%, energy use-19%, health and well-being-15%, pollution-12%, transport-8%, land use and ecology-10%, materials-13%, waste - 7.5% water-6% and innovation where the percentage values represent the weights given to the respective parameter in the rating system. The BREEAM rating system is designed for courts, eco homes, education, industrial, healthcare, multi-residential, offices and new construction. Building life cycle stages covered by the BREEAM-2011 NC are design stage and post construction stage. A certificate of the assessment result is awarded to the individual building based on single rating scheme of outstanding, excellent, very good, good, pass, unclassified with percentage score 85, 70, 55, 45, 30, less than 30 respectively.
The BREEAM rating system has made an impact worldwide, with Canada, Australia, Hong Kong, Netherland and other countries using the BREEAM methodology in developing their own environmental building assessment methods.

The assessment methods and tools are all designed to help construction professionals understand and mitigate the environmental impacts of the developments they design and build. As BREEAM is predominately a design-stage assessment, it is important to incorporate details into the design as early as possible. By doing this, it will be easier to obtain a higher rating and a more cost-effective result. The methods and tools cover different scales of construction activity. The BREEAM development is useful at the master planning stage for large development sites like new settlements and communities.

LEED-2011 for India NC Rating System

The LEED (Leadership in Energy and Environmental Design) rating system has been developed by the U.S. Green Building Council (USGBC) in 2000. The LEED India green building rating system was developed by IGBC (Indian Green Building Council) in October 2006. The LEED-2011 for India NC rating system is categorized into sustainable sites-23.63%, water efficiency- 9.1%, energy and atmosphere-31.82%, materials and resources-12.73%, indoor environmental quality-13.63%, innovation in design -5.45% and regional priority -3.64 %. The LEED assessment tool is developed for new construction, existing buildings, commercial interiors, core and shell, homes, neighborhood development, school, and retail. This system awards rating of buildings as certified, silver, gold, and platinum. It uses simple checklist format to rate building performance.

The rating system contains one element, indoor air quality (IAQ) management during construction that explicitly addresses construction worker safety and health. The intent of this element is to protect the construction workers and building occupants from potential air quality problems during the construction or renovation process. On successful implementation of an IAQ management plan, the project receives one LEED-NC credit, which is almost negligible and thus underscores the minimal consideration that the rating system gives to construction worker safety and health. It should be noted, however, that other elements within the rating system which are aimed to improve the safety and health of the end-user, such as the use of low-emitting materials, may benefit the safety and health of construction workers as well.

DGNB Rating System

The DGNB (GeSBC- German Sustainable Building Certificate) rating system was founded in June 2007 by German Federal Ministry of Transport, Construction and Urban Development. The certification was introduced to the real estate market in January 2009. The DGNB rating system is divided into process quality-22.5%, technical quality-22.5%, ecological quality-22.5%, economical quality-22.5%, and social quality- 10%. Purpose of the DGNB certificate is the application for buildings of any kind like offices, high-rises, detached residential homes, infra-structure buildings etc. Level of certification in the DGNB is bronze, silver and gold. The goal of rating system is to create living environments that are environmentally compatible, resource-friendly, and economical and that safeguards the health, comfort and performance of their users.

Green Star Rating System

Green Star rating system has been built on existing systems and tools in overseas markets, including the British BREEAM (Building Research Establishment Environmental Assessment Method) system and the North American LEED (Leadership in Energy and Environmental Design) system, by establishing individual environmental measurement criteria relevant to the Australian marketplace and environmental context. Green Star certification identifies projects that have demonstrated a commitment to sustainability by designing, constructing, or owning a building to a determined standard. The rating standard is divided under management, indoor environment quality, energy, transport, water, material, land consumption and use, emission and innovation. Level of certification for this system is from 0 to 6 stars.

Review of the above three major sustainable rating systems reveals an absence of construction worker safety and health consideration. This indicates that the building industry's current perspective of sustainability is based on the principles of resource efficiency and the health and productivity of the building's occupants.

GRIHA Rating System

GRIHA (Green Rating for Integrated Habitat Assessment) is the Indian national green building rating system. It was developed by TERI (The Energy and Resources Institute) in 2007. This rating system is divided into: sustainable site planning-21.2%, health and well being- 9.6%, building planning and construction-7.7%, energy: end use-36.5%, energy: renewable- 7.7%, recycle, recharge and reuse of water-6.7%, waste management-4.8%, building operation and maintenance-1.9%, and innovation points-3.9%. The GRIHA rates the buildings from 50-60 one star, 61-70 two stars, 71-80 three stars, 81-90 four stars, and above 90 % five stars. A building is assessed based on its predicted performance over its entire life cycle — from inception to operation. The stages of the life cycle that have been identified for evaluation are: pre-construction, building design, and construction, and building O & M (operation and maintenance). The issues that are addressed in these stages are as follows.

- Pre-construction stage (intra- and inter-site issues)
- Building planning and construction stages (issues of resource conservation and reduction in resource demand resource utilization efficiency, resource recovery and reuse, and provisions for occupant health and well-being). The prime resources that are considered in this section are land, water, energy, air, and green cover.
- Building O&M stage (issues of O&M of building systems and processes, monitoring and recording of consumption, and occupant health and well-being, and also issues that affect the global and local environment).

National Priorities Addressed in the Rating System

The Green New Buildings rating system addresses the most important national priorities which include water conservation, handling waste, energy efficiency, reduced use of fossil fuels, lesser dependence on usage of virgin materials and health & well-being of occupants.

The rating system requires the application of National standards and codes such as the NBC, ECBC, MoEF guidelines, CPCB guidelines, and several others. The overarching objective is to be better than the national standards so as to create new benchmarks.

Reduced Dependency on Virgin Materials

The rating system encourages projects to use recycled & reused material and discourages the use of virgin materials, thereby, addressing environmental impacts associated with extraction and processing of scare natural resources.

Water Conservation

There are many ways to save water i.e. through conservation, passive rainwater catchment, onsite recycling (i.e., greywater), active rainwater catchment and through ground water recharging techniques. All of these methods actively manage the use of water use.

Reduced Use of Fossil Fuels

The rating system encourages the use of alternate fuel vehicles for transportation. Fossil fuel is a slowly depleting resource, the world over. The use of fossil fuel for transportation has been a major source of pollution.

Recommended Practices for Reducing Water Consumption indoors include

- Install high-efficiency toilet (HET) or dual –flush toilets that use less than 1.3 gallons on average per flush, as compare to 1.6 gallons per flush for current models.
- Install shower heads and faucets that use less water than current federal standards.
- Use locally provided reclaimed water for landscaping. Consider providing separate supply lines to toilets for reclaimed water use in toilet flushing.
- Install flow restrictors between the supply line and the kitchen and bathroom faucets to limit water waste.

Energy Efficiency

Green buildings are around 25–30% more energy efficient, with gold-rated buildings as much as 37% efficient. On an average, green buildings obtain 2% of their energy from renewable or green sources.

This energy efficiency proves beneficial during peak periods, when energy costs rise due to higher demand. This reduces the demand for fossil fuel-generated electricity and reducespollution and the emission of GHGs.

Health and Well-being of Occupants

Health and well-being of occupants are the most important aspect of IGBC Green New Buildings rating system. The rating system ensures adequate ventilation, daylight and occupant well-being facilities which are essential in a building. The rating system also recognises measures to minimise indoor air pollutants. Reduced energy consumption without sacrificing the comfort levels

Waste Reduction

Green buildings emphasise waste reduction. Construction wastes and demolition debris are

List of criteria and points for GRIHA

CRITERIA	POINTS
Criteria 1 Site Selection	1 Partly mandatory
Criteria 2 Preserve and protect landscape during construction /compensatory depository forestation.	5 Partly mandatory
Criteria 3 Soil conservation (post construction)	4
Criteria 4 Design to include existing site features	2 Mandatory
Criteria 5 Reduce hard paving on site	2 Partly mandatory
Criteria 6 Enhance outdoor lighting system efficiency and use RE system for meeting outdoor lighting requirement.	3
Criteria 7 Plan utilities efficiently and optimise on site circulation efficiency	3
Criteria 8 Provide ,at least, minimum level of sanitation/safety facilities for construction workers.	2 Mandatory
Criteria 9 Reduce air pollution during construction	2 Mandatory
Criteria 10 Reduce landscape water requirement	3
Criteria 11 Reduce building water use	2
Criteria 12 Efficient water use during construction	1
Criteria 13 Optimise building design to reduce conventional energy demand	6 Mandatory
Criteria 14 Optimise energy performance of building within specified comfort	12
Criteria 15 Utilisation of fly ash in building structure	6
Criteria 16 Reduce volume, weight and time of construction by adopting efficient technology (pre-cast systems, ready-mix concrete, etc.)	4
Criteria 17 Use low-energy material in interiors	4
Criteria 18 Renewable energy utilization	5 Partly mandatory
Criteria 19 Renewable energy based hot water system	3
Criteria 20 Waste water treatment	2
Criteria 21 Water re-cycle and re-use (including rainwater)	5
Criteria 22 Reduction in waste during construction	2
Criteria 23 Efficient waste segregation	2
Criteria 24 Storage and disposal of waste	2
Criteria 25 Resource recovery from waste	2
Criteria 26 Use of low VOC paints/ adhesives/ sealants.	4
Criteria 27 Minimize Ozone depleting substances	3 Mandatory
Criteria 28 Ensure water quality	2 Mandatory
Criteria 29 Acceptable outdoor and indoor noise levels	2
Criteria 30 Tobacco and smoke control	1
Criteria 31 Universal Accessibility	1
Criteria 32 Energy audit and validation	Mandatory
Criteria 33 Operations and Maintenance protocol for electrical and mechanical equipment	2 Mandatory
Total score	100
Criteria 34 Innovation(beyond 100)	4
	104

IGBC Green New Buildings Rating System

CHECK LIST		POINTS
Modules		100
Sustainable Architecture and Design		5
SA Credit 1	Integrated Design Approach	1
SA Credit 2	Site Preservation	2
SA Credit 3	Passive Architecture	2
Site Selection and Planning		14
SSP Mandatory Requirement 1	Local Building Regulations	Required
SSP Mandatory Requirement 2	Soil Erosion Control	Required
SSP Credit 1	Basic Amenities	1
SSP Credit 2	Proximity to Public Transport	1
SSP Credit 3	Low-emitting Vehicles	1
SSP Credit 4	Natural Topography or vegetation	2
SSP Credit 5	Preservation or Transplantation of Trees	1
SSP Credit 6	Heat Island Reduction, Non-roof	2
SSP Credit 7	Heat Island Reduction, Roof	2
SSP Credit 8	Outdoor Light Pollution Reduction	1
SSP Credit 9	Universal Design	1
SSP Credit 10	Basic Facilities for Construction work force	1
SSP Credit 11	Green Building Guidelines	1
Water Conservation		18
WC Mandatory Requirement 1	Rainwater Harvesting, Roof & Non-roof	Required
WC Mandatory Requirement 2	Water Efficient Plumbing Fixtures	Required
WC Credit 1	Landscape Design	2
WC Credit 2	Management of Irrigation Systems	1
WC Credit 3	Rainwater Harvesting, Roof & Non-roof	4
WC Credit 4	Water Efficient Plumbing Fixtures	5
WC Credit 5	Wastewater Treatment and Reuse	5
WC Credit 6	Water Metering	1
Energy Efficiency		28
EE Mandatory Requirement 1	Ozone Depleting Substances	Required
EE Mandatory Requirement 2	Minimum Energy Efficiency	Required
EE Mandatory Requirement 3	Commissioning Plan for Building Equipment & systems	Required
EE Credit 1	Eco-friendly Refrigerants	1
EE Credit 2	Enhanced Energy Efficiency	15
EE Credit 3	On-site Renewable Energy	6
EE Credit 4	Off-site Renewable Energy	2
EE Credit 5	Commissioning, Post-installation of equipment & system	2
EE Credit 6	Energy Metering and Management	2
Building Materials and Resources		16
BMR Mandatory Requirement 1	Segregation of Waste, Post-occupancy	Required
BMR Credit 1	Sustainable Building Materials	8
BMR Credit 2	Organic Waste Management, Post-occupancy	2
BMR Credit 3	Handling of Waste Materials, During Construction	1
BMR Credit 4	Use of Certified Green Building Materials, Products & Equipment	5
Indoor Environmental Quality		12
IEQ Credit 1	CO2 Monitoring	1
IEQ Credit 2	Day lighting	2
IEQ Credit 3	Outdoor Views	1
IEQ Credit 4	Minimize Indoor and Outdoor Pollutants	1
IEQ Credit 5	Low-emitting Materials	3
IEQ Credit 6	Occupant Well-being Facilities	1
IEQ Credit 7	Indoor Air Quality Testing, After Construction and Before Occupancy	2
IEQ Credit 8	Indoor Air Quality Management, During Construction	1
Innovation and Development		7
ID Credit 1	Innovation in Design Process	4
ID Credit 2	Optimisation in Structural Design	1
ID Credit 3	Waste Water Reuse, During Construction	1
ID Credit 4	IGBC Accredited Professional	1

	CATEGORY	LEED	BREEAM	GREEN STAR	GREEN MARK	HK- BEAM
1	MANAGEMENT/ SUSTAINABLE SITE/ SITE & PROJECT MGMT/ SITE ASPECT					
a	Site selection/ Brownfield redevelopment/ Reuse of land/ Reclaimed land/	●	●	●	●	●
b	Erosion & Sedimentation control/ Topsoil & Fill Removal from site	●	○	●	○	○
c	Urban redevelopment/ Reduced site disturbance/ Ecological value of site & protection of ecological features/ Mitigating ecological impact/ Enhancing site ecology/ Ecological value of site/ Greenery provision/ construction site impact/ Long term impact on biodiversity	●	●	●	●	○
d	Hard Landscaping & Boundary protection/ Environmental mgmt./ Environmental mgmt. practices/ Landscaping& Planters/ Microclimatic around building/ Health, Safety & Environmental mgmt./ Environmental purchasing practices/ User guidance	○	●	●	●	●
e	Responsible construction practices/ Maintainability/ Commissioning clauses/ Commissioning building Tuning/ Environmental mgmt. Practices (CONQUAS)/ Building & Site Operation &Maintenance	○	●	●	●	●
2	ENERGY/ ENERGY EFFICIENCY/ ENERGY USE					
a	Fundamental building system commissioning/ Measurement & verification/ Energy monitoring/ Energy conditional requirement/ Electrical sub-metering/ Testing & commissioning / Metering & monitoring	●	●	●	○	●
b	Minimum energy performance/ Optimize energy performance/ Energy efficient cold storage/ Energy eff. Lab system/ Energy eff. Transportation system/ Energy eff. Equipment/ Peak energy demand Reduction/ Eff. External lighting/ Lighting zoning & control/ Centralized energy system/ Thermal performance of building envelope/ Natural ventilated design & A/c system/ Energy eff. Features/ Annual energy use in building/ Ventilation system in mechanically ventilated building/ Lighting system in mechanically ventilated building/ Energy eff. Lighting in public areas/ Energy eff. applications/ Energy mgmt./ A/c units.	●	●	●	●	●
c	Renewable energy/ Green power/ Energy improvement/ renewable energy system	●	○	●	●	●
3	**WATER EFFICIENCY**					
a	Water consumption/ Water monitoring/ Water meter/ Water usage monitoring/ Monitoring & Control	○	●	●	●	●
b	Water use reduction/ Water eff. Landscaping/ Water leak detection & prevention/ Water eff. Equipment/ Occupant amenity potable water efficiency/ Landscaping irrigation water eff./ Heat rejection water consumption/ Fire system water consumption/ Potable water use in lab/ Water eff. fitting/ Irrigation system & landscaping/ Water consumption of cooling tower/ Annual water use/ Water eff. Irrigation	●	●	●	●	●
c	Innovative waste water technologies/ Storm water mgmt./ Water recycling effluent discharge to foul sewers	●	○	○	●	●

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4	**MATERIALS**					
a	Building reuse/ Reuse of Façade/ Reuse of structure/ Building Reuse	●	○	●	○	●
b	Storage & collection of recyclables/ construction water mgmt./ Resource reuse/ Recycled content/ Construction waste mgmt./ Recycled aggregates/ Recycled content of concrete/ Recycled content of steel/ Recycled content and Reused products & materials/ Sustainable timber flooring/ Loose furniture/ Deconstruction/ Rapidly renewable materials/ Life cycle impacts/ Sustainable procurement/ Recycling waste storage/ Sustainable construction/ Sustainable Products/ Adaptability & Deconstruction/ Sustainable forest products/ Waste Recycling facilities/ Waste mgmt.	●	●	●	●	●
c	Local or Regional Materials	●	○	○	○	○
5	INDOOR ENVIRONMENTAL QUALITY/ HEALTH AND WELL BEING					
a	Minimum IAQ performance/ Construction IAQ mgmt. plan / Air change effectiveness/ IAQ in wet areas/ Construction IAQ mgmt./ IAQ in car parking/ IAQ in public transport interchanges	●	●	●	●	●
b	Environment tobacco smokes (ETS) control/ CO2 monitoring/ Low-emitting material/ Indoor chemical & pollutant source control/ CO2 & VOC monitoring & control/ Hazardous materials/ Volatile Organic Compounds/ Formaldehyde minimization/ Mould prevention/ Indoor air pollutants/ Biological contaminations/ Integrated pest mgmt./ Indoor source of air Pollution	●	○	●	●	●
c	Reduced heat island effect/ Thermal comfort/ Thermal Insulation/ Thermal performance of building envelope-RETV/ Thermal comfort in centrally A/c premises/ Thermal comfort in A/c or Naturally ventilated premises	●	●	●	●	●
d	Ventilation efficiency/ Ventilation rates/ Naturally ventilated design & A/c system/ Ventilation in A/c premises/ Localised ventilation/ Ventilation in common areas	●	○	●	●	●
e	Day lighting & views/ Visual comfort/ Day lighting/ Day light glare control/ High frequency ballasts/ Electric lighting levels/ External views/ Artificial lighting/ Natural lighting/ Interior lighting in normally occupied areas/ Interior lighting in not occupied areas	●	●	●	●	●
f	Safety and Security/ Fire Safety/ Security	○	●	○	●	●
g	Acoustic Performance/ Internal noise Level/ Noise Level/ Room Acoustics/ Noise Isolation/ Background Noise	○	●	●	●	●
6	TRANSPORTATION					
a	Alternative transportation/ Public transport accessibility/ Commuting mass transport/ Green transport/ Local transport/ Vehicular access	●	●	●	●	●
b	Alternative transportation/ Cyclist facilities/ Green transport	●	●	●	●	○
c	Alternative transportation/ Travel plan/ Fuel eff. Transport/ Green transport	●	●	●	●	○
d	Alternative transportation/ Maximum car parking capacity/ Car park minimization	●	●	●	○	○

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e	Pedestrian route/ Green transport/ Local transport	○	○	●	●	●
f	Proximity to amenities/ Neighbourhood amenities/ Amenities features	○	●	○	○	●
7	POLLUTION					
a	Light pollution reduction/ Reduction of night K=Light pollution/ Light pollution	●	●	●	○	○
b	Ozone protection/ Ozone depletion potential/ Ozone depletion substances/ Impact of refrigerants/ Refrigerant GWP/ Refrigerant leak detection & recovery/ CFC reduction in HVAC & R equipment/ Reduction in CO2 emission/ Low & Zero carbon technology.	●	●	●	○	●
c	No emissions	○	●	○	○	○
	NOTE :					
	CONSIDERED	●				
	NOT CONSIDERED	○				

the main wastes produced during the construction process, and these wastes degrade the quality of
the environment. Green buildings ensure waste reduction by:

- the reuse and minimisation of construction wastes and debris and diverting them to
- recycling units;
- the use of existing building structure and reclaimed building materials in the core and
- shell of a project;
- the increased use of recycled content in construction materials;
- designing the structure to produce less scrap and execute it according to the plan.

Green buildings reduce construction waste by approximately 50% compared with that of similar
conventional buildings, hence accruing all the above-mentioned benefits.

MATERIALS AND METHODS

Scoring of points

GRIHA is a guiding and performance-oriented system where points are earned for meeting the design and performance intent of the criteria. Each criterion has a number of points assigned to it. It means that a project intending to meet the criterion would qualify for the points. Compliances, as specified in the relevant criterion, have to be submitted in the prescribed format.

The points related to these criteria (specified under the relevant sections) are awarded provisionally while certifying and are converted to firm points through monitoring, validation, and documents/photographs to support the award of point. GRIHA has a 100 point system consisting of some core points, which are mandatory to be met while the rest are optional points, which can be earned by complying with the commitment of the criterion for which the point is allocated. The innovation points are available over and above the 100 point system. This means that a project can hypothetically apply for a maximum of 104 points. But the final scoring shall be done out of 100 points. Different levels of certification (one star to five star) are awarded based on the number of points earned. The minimum points required for certification is 50.

Buildings scoring 50 to 60 points, 61 to 70 points, 71 to 80 points, and 81 to 90 points shall get one star, 'two stars', 'three stars' and 'four stars' respectively. A building scoring 91 to 100 points will get the maximum rating viz. five stars.

COMPARATIVE ANALYSIS

A key similarity between the two programs is the use of credit based system with some flexibility for what credits or measures building developers want to pursue, along with mandatory requirements that must be met for certification. In terms of the specific rating systems, LEED has similarities and differences with GRIHA program. For rating new construction design, both LEED and GRIHA also use similar rating criteria's focusing on land, energy, water, indoor environmental quality.

As it reflects from this analysis that there are many assessment criteria considered which have the same meaning but they are denoted by a different wording in respective rating systems, it is clear that there is no appropriate preference given to various assessment criteria. Similarity and dissimilarity of green building rating systems and it also reflects whether respective rating systems have considered or not considered the various criteria while assessmentThere are differences between the two systems in terms of process, popularity, transparency, cost, and criteria.

PROCESS: The GRIHA rating system uses an offline questionnaire-based approach. Once the questionnaire has been completed, a report is generated that provides ratings, a list of sustainability achievements, and recommendations for improvement. An independent third-party verifier (known as a Green Globes assessor) completes the task, which eliminates the need for binders or templates, and is more adaptable to specific project requirements. LEED, on the other hand, is very documentation-intensive, more complex, time consuming and (ironically) is still a mostly paper based system.

POPULARITY: LEED is very popular in comparison to GRIHA. More than 22 countries have adopted LEED and USGBC has a stated goal of becoming the global standard for green building rating systems. Since its introduction a dozen years ago, more than 12,000 commercial projects have been certified under LEED according to USGBC.

GRIHA was formed in 2006 and indicates that more than 2,000 buildings have been certified under GRIHA in India. Much of the growth in the India has been in the last 2 to 4 years, and they continue to see increasing interest in GRIHA from building owners, design professionals, and governmental agencies.

TRANSPARENCY: GRIHA use prerequisites or minimum performance requirements. However, what some might consider a disadvantage can actually mean that a building could have better all-around performance, even if it is disqualified by LEED for not meeting a minimum requirement. GRIHA awards points for implementing strategies, as well as for outcomes, whereas LEED primarily allocates points for achieving a certain performance level. Additionally, USGBC has come under growing criticism recently for keeping its LEED process more closely held and 'internal' than many stakeholders would like to see, especially when it comes to adoption of LEED by governmental agencies.

COST: GRIHA has free associate membership, no appeal costs, and fewer registration costs. It also reduces the costs of billable hours for LEED consultants on documentation. Therefore, it is possible to certify under GRIHA for a lower cost than under LEED.

CRITERIA: GRIHA better integrates life-cycle thinking into its rating system through sourcing of materials and the durability and adaptability of the building itself. Some categories are emphasized differently in the two systems. For example, GRIHA emphasizes energy use above all other categories while LEED allocates comparatively more points to materials. This difference in emphasis may begin to shift somewhat, since LEED vision (formerly LEED India-NC) incorporates more life cycle thinking than previous versions.
Some important dissimilarity are being shown in table

Recommendations

By this comparison, it can be concluded and recommend the following: Although there is a considerable degree of commonality between different Rating Systems which presented in this paper (BREEMGBCA- GPRS-GRIHA-LEED), in terms of their aims, approach and structure, but there are significant differences in terms of scope of the environmental issues addressed, metrics and performance standards. Thus, it is necessary that the selection of suitable rating system according to its categories which are generally considered the most significant measure in building sustainability assessment, likewise to ensure the sustainable design environmental performance goals are being met when desired ratings are achieved. That related to the special requirements for each country because each one has different needs to achieve sustainability.

It means in a building lifetime perspective, it should be remembered that differences with respect to ―fitness for use‖. In my opinion, more research should be directed into answering the question how a rating system can be selected for different countries. When applied outside of the country of origin, questions on the applicability of the system have to be put, how it achieve its special features and its goals. Review among some sustainability rating systems has established a trend in whole life perspective analysis as the assessment is going to cover the multidimensional aspects of sustainability and to minimize any associated environmental hazards. To figure out how much comply with green architecture.

Conclusion

There are many factors which have to be considered while constructing a green building. It is very necessary to know how effective a particular project is in term of its environment friendliness. This brief comparison would check the building on various points so as to give a fair idea of where it stands in being a green building. Both rating systems are good enough to be used in certain part of the country but they are not unique in nature. Since these two systems are based on different parameters, there is a possibility of the both rating systems rate the same buildings differently.

Also they are quite complex in nature and do not necessarily give a clear idea of the projects effectiveness. Each system has certain strong points and certain weak points and they are not specific on some assessment criteria. Due to this both systems are currently confusing the Indian developers, builders over the certification of their projects and buildings. As from above comparative study of LEED and GRIHA rating system some suitable points for green building which is simple and effective is suggested for small contractors to achieve green agenda simply and economically. This point is an integration of various points such as it carries the advantages of both system where as it overcomes the individual shortcomings.

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