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Review of Green Building Guidelines: A Comparison between LEED 2011& LEED 2014

Rachna Dhingra*

The construction industry is one of the largest economic activities contributing to India's development. But, due to this growth and development at a rapid pace an enormous pressure is seen on the resource demand - like energy, water, materials etc. A lot of turbulence is seen in the environment and it is getting impacted to a very large extent. To resolve the environmental problems one way is to adopt a path towards sustainability and green buildings. Green building practices aim to reduce the environmental impact of buildings through environmentally friendly construction practices. The idea of green rating of buildings has taken roots in India. The design and construction industry has gradually accepted LEED (Leadership in Energy and Environmental Design) rating system in mainstream practice as evidenced through growth of LEED-New Construction (NC) certified projects over the past few years (LEED, 2005). This paper is an attempt to identify the major differences between LEED NC 2011(INDIA) and LEED New Building Rating System 2014.

Keywords : Sustainability, Green Buildings, Green Building guidelines, LEED rating system

INTRODUCTION

The construction industry is one of the largest economic activities contributing to India's development. India has been witnessing tremendous growth in building and construction sector in the past recent years. But, due to this growth and development at a rapid pace an enormous pressure is seen on the resource demand - like energy, water, materials etc. A lot of turbulence is seen in the environment and it is getting impacted to a very large extent. To resolve the environmental problems one way is to adopt a path towards sustainability and green buildings.

A sustainable building, or green building is an outcome of a design philosophy which focuses on increasing the efficiency of resource use energy, water, and materials while reducing building impacts on human health and environment during the building's lifecycle, through better sitting, design, construction, operation, maintenance, and removal. (U.S. Environmental Protection Agency, 2009)

"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." (IGBC, 2008)

The related concepts of sustainable development and sustainability are integral to green building. Effective green building can lead to: reduced operating costs by increasing productivity and using less energy and water, improved public and occupant health due to improved indoor air quality and reduced environmental impacts. Green building practices aim to reduce the environmental impact of buildings through environmentally friendly construction practices.

Green Building Guidelines are developed to provide a series of guidelines and benchmarks to those interested in construction of a sustainable and green building. It was understood that in order to develop a proper understanding of the elements of a green building and to then construct it, a comprehensive set of guidelines would be required to direct the interested party in appropriate techniques and processes towards building a green building.

The idea of green rating of buildings has taken roots in India. This is in line with the global trend in which the rating tools set benchmarks for green measures for constructing and using buildings to make them sustainable and to reduce their negative impacts on

* *PhD Scholar, Lady Irwin College, University of Delhi*

environment. Globally, large numbers of rating tools have evolved in a number of regions that are influencing property markets towards more sustainable practices. A wide range of rating systems have evolved in different regions of the world based on local climates and geographical conditions.

A green building rating system is an evaluation tool that measures environmental performance of a building through its life cycle. It comprised of a set of criteria covering various parameters related to design, construction and operation of a green building. A project is awarded points once it fulfills the rating criteria. The points are added up and the final rating of a project is decided. Globally, green building rating systems are largely voluntary in nature and have been instrumental in raising awareness and popularizing green building designs. Each criterion has pre-assigned points and sets performance benchmarks and goals that are largely quantifiable

Leadership in Energy and Environmental Design (LEED) is an internationally recognized green building certification system, providing third-party verification that a building or community was designed and built using strategies aimed at improving performance across all the metrics that matter most: energy savings, water efficiency, CO2 emissions reduction, improved indoor environmental quality, stewardship of resources and sensitivity to their impacts.

LEED Green Building Rating System, developed by United States Green Building Council (USGBC) is one of the most widely accepted rating systems in countries such as China, India, and Canada (LEED, 2005). The design and construction industry has gradually accepted the LEED rating system in mainstream practice as evidenced through growth of LEED-New Construction (NC) certified projects over the past few years (LEED, 2005). The increase in LEED-NC certified project represents a steady and growing interest in green buildings (Syal, 2007).

These rating systems serve two functions; of promoting high performance buildings, and creating the demand for sustainable construction. One of the most significant indicators of the shift towards green design and construction practices in the past few years is the growing number of LEED-NC certified buildings in the United States (USGBC, 2006).

LEED- INDIA

Following in the footsteps of the United States Green Building Council, the India Green Building Council has been promoting green buildings in India for many years now. The IGBC has developed an internationally accepted India-specific rating program called the LEED-INDIA Green Building Rating System in 2007, making it easy for Indian buildings to go green. In India, there are 2,007 Registered Buildings and 357 Green Rated Buildings having a Green Building Footprint of 1.4 Billion Sq.ft (IGBC, 2013). So, it is seen clearly that the green building sector is growing in India and more companies are adopting this concept.

The USGBC had instituted the LEED rating, which covers various project types detailed as follows: LEED is a "National-consensus based, market driven building rating system designed to accelerate the development and implementation of Green Building practices". LEED takes into account all the project types including: New Construction, Existing Buildings, Commercial Interiors, Core& Shell, Homes and neighbourhood development.

LEED for New Construction is a one time event, designed to guide and distinguish high-performance commercial and institutional projects, with a focus on office buildings.

The LEED India rating system was formally launched by the IGBC in order to indigenize LEED US to suit Indian requirements. It adopts several Indian codes and standards such as the National Building Code, guidelines of the Environment and Forests Ministry, Central Pollution Control Board norms and the Energy Conservation Building Codes of the Bureau of Energy Efficiency. From January 2007 onwards LEED-India started registering projects under the Green Building New Construction (NC) system.

LEED-INDIA provides building owners, architects, consultants, developers, facility managers and project managers the tools they need to design, construct and operate green buildings. It promotes a whole-building approach to sustainability by recognizing performance in the following five key areas:

- Sustainable site development
- Water savings
- Energy efficiency
- Materials selection and
- Indoor environmental quality

The intent is to promote healthful, durable, affordable, and environmentally sound practices in building design and construction. LEED-INDIA rating system provides a roadmap for measuring and documenting success for every building type and phase of a building lifecycle.

LEED NC 2011 FOR INDIA

The first LEED India rating programme, referred to as LEED India Version 1.0, was launched during the Green Building Congress Conference in October 2006. The latest rating system is now called the LEED 2011 for India - New Commercial Construction and Major Renovations or LEED 2011 for India - NC. The Indian Green Building Council launched version of LEED India, LEED 2011 for India. The new projects will are register under the new rating system beginning 20th October 2011. LEED India 2011 focuses on reduction of energy usage & carbon di oxide emission

Features of LEED India

The LEED 2011 for India Green Building Rating System is a voluntary, consensus based, market-driven building rating system based on existing proven technology. It evaluates environmental performance from a whole building perspective over a building's life cycle, providing a definitive standard for what constitutes a "green building".

LEED India for 2011 is a measurement system designed for rating new and existing commercial, institutional and residential buildings. It is based on accepted energy, environmental principles and strikes a balance between known established practices and emerging concepts. It is a performance-oriented system where credits are earned for satisfying criterion designed to address specific environmental impacts inherent in the design and construction. Different levels of green building certification are awarded based on the total credits earned. The system is designed to be comprehensive in scope, yet simple in operation.

Review of LEED-NC - Credit List (2011)

- 7 major categories
- 8 mandatory prerequisite
- 49 credits and sub credits
- 100 possible points under 5 categories + 10 bonus points in 2 categories = 110 points in 7 categories
- Categories are not equally based

From the above figure it can be seen that all the categories have different weightage. The most important category is energy and atmosphere as its weightage is 35%. The second most important category is sustainable site (26%). The other categories are indoor environmental quality (15%), Materials and Resources (14%) and water efficiency (10%).

- Points not equal benefit

Figure 1: Major categories in LEED 2011 credit list

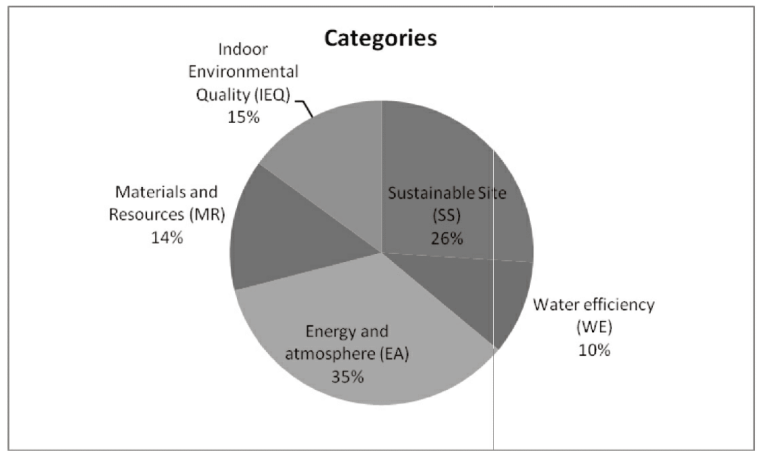
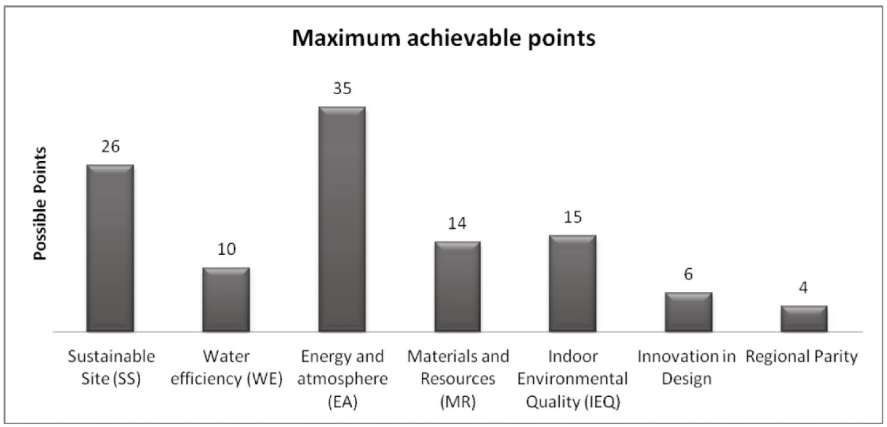


Table 1: Total credits and possible points in LEED 2011

Categories	Possible Points	Prerequisite	Credits & Sub-credits	Total Credits
Sustainable Site (SS)	26	1	14	15
Water efficiency (WE)	10	1	3	4
Energy and atmosphere (EA)	35	3	6	9
Materials and Resources (MR)	14	1	8	9
Indoor Environmental Quality (IEQ)	15	2	15	17
Innovation in Design	6	0	2	2
Regional Parity	4	0	1	1
Total	110	8	49	57

Figure 2: Maximum achievable points in each category



As it can be seen from the above figure, maximum possible points (35) can be achieved in energy and atmosphere, 26 points can be achieved in sustainable site, 15 points in indoor environmental quality, 14 points in materials and resources, 10 points in water efficiency, 6 points in innovation in design and 4 points in regional parity. It can be revealed that all the categories provide scope to a constructor for achievement.

Certification Levels

Table 2: Level of certification (LEED-2011)

Certification	Points Achieved
Certified	40–49 points
Silver	50–59 points
Gold	60–79 points
Platinum	80 and above

There are four different levels for achieving certification for a building i.e. certified, silver, gold and platinum.

LEED 2014 FOR INDIA - New Building Rating Systems

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 there is now 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 for commuting, handling of consumer waste and conserving natural resources. Most importantly, these concepts can enhance occupant health, productivity 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, 2014)

Announcing the launching of the three systems at the CII Green Building Congress 2014, Prem C Jain, Chairman of IGBC, said the New Building Rating System comes in the backdrop of IGBC and US Green Building Council parting ways on the LEED certification programme. "All these years, the US LEED certification was followed in rating new buildings. However, we have decided now to part ways and decided to have our own rating system for new buildings. We have adopted this approach as we believe India could become a next big Green Building base in the world," he said. A portal has also been created to facilitate online interface on green building rating systems.

National Priorities Addressed in the Rating System

The IGBC 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 better the national standards so as to create new benchmarks.

- **Water Conservation:** Most of the Asian countries are water stressed and in countries like India, the water table has reduced drastically over the last decade. IGBC Green New Buildings rating system encourages use of water in a self-sustainable manner through reduce, recycle and reuse strategies. By adopting this rating programme, green new buildings can save potable water to an extent of 30 50%.
- **Handling of Consumer Waste:** Handling of waste in buildings is extremely difficult as most of the waste generated is not segregated at source and has a high probability of going to landfills. This continues to be a challenge to the municipalities which needs to be addressed. The rating system intends to address this by encouraging buildings to segregate the building waste.
- **Energy Efficiency:** The building sector is a large consumer of electrical energy. Through IGBC Green New Buildings rating system, buildings can reduce energy consumption through energy efficient building envelope, lighting, air conditioning systems, etc., The energy savings that can be realised by adopting this rating programme can be to the tune of 20 30%.
- **Reduced Use of Fossil Fuels:** Fossil fuel is a slowly depleting resource, the world over. The use of fossil fuel for transportation has been a major source of pollution. The rating system encourages the use of alternate fuel vehicles for transportation.
- **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.
- **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. (IGBC, 2014).

FEATURES

IGBC Green New Building rating system is designed primarily for new buildings, both for air-conditioned and non air-conditioned buildings. New Buildings include (but are not limited to) offices, IT parks, banks, shopping malls, hotels, hospitals, airports, stadiums, convention centers, educational institutions (colleges, universities), libraries, museums, etc., Building types such as residential, factory buildings, schools, integrated townships will be covered under other IGBC rating programmes. It 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 more than 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.

It 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 this rating system is to facilitate a holistic 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 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 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.

Review of LEED-NC Credit List (2014)

- 7 categories
- Divided into two categories: Owner occupied and tenant occupied
- 10 mandatory prerequisite
- 42 credits
- No sub-credits
- 88 possible points under 5 categories + 12 bonus points in 2 categories = 100 points
- Categories not equally based

As it can be seen that maximum weightage (28% - owner occupied and 27% - tenant occupied) is given to energy efficiency. The second most important weightage (18% - owner occupied and 19% - tenant occupied) is given to water conservation. 16% and 14% weightage is given to building materials and resources and site selection and planning respectively. Other categories has a weightage of indoor environmental quality (12%), innovation and development (7%) and sustainable architecture and design (5%). Each category has a different weightage and it provides the constructor a scope for working accordingly.

- Points not equal benefit

Figure 3: Major categories in LEED 2014 credit list (Owner and Tenant Occupied Buildings)

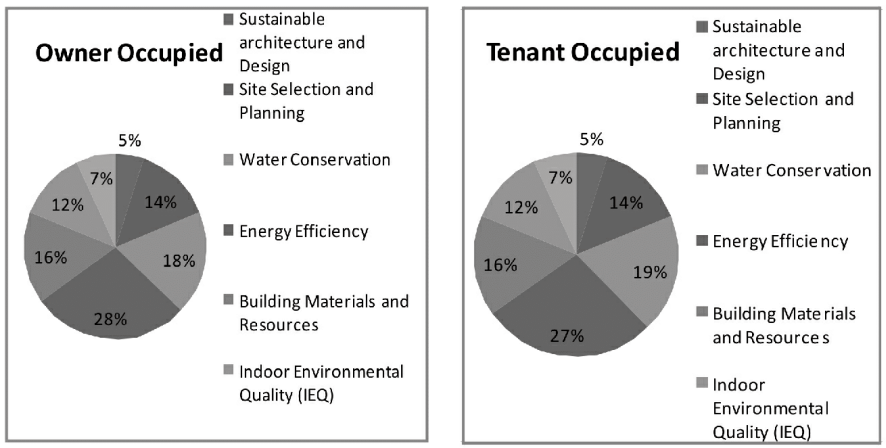
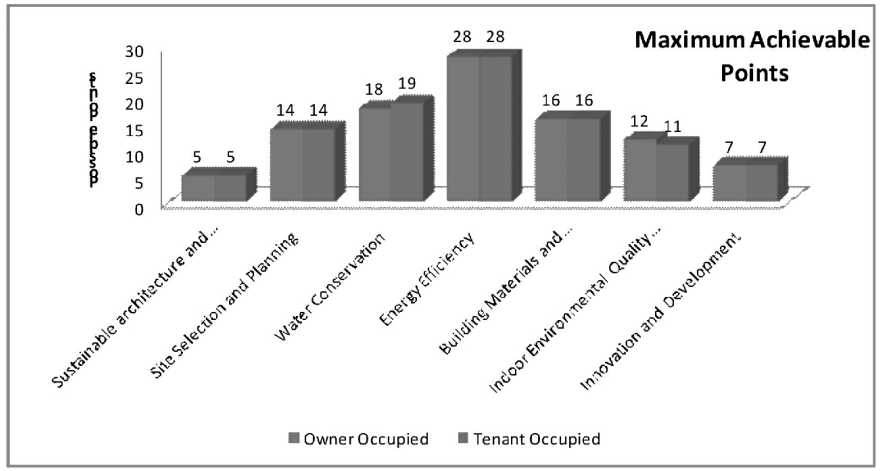


Table 3: Total credits and possible points in LEED 2014

Categories	Possible Points		Prerequisite	Credits	Total Credits in each category
	Owner Occupied	Tenant Occupied			
Sustainable architecture and Design	5	5	0	3	3
Site Selection and Planning	14	14	2	11	13
Water Conservation	18	19	2	6	8
Energy Efficiency	28	28	3	6	9
Building Materials and Resources	16	16	1	4	5
Indoor Environmental Quality (IEQ)	12	11	2	8	10
Innovation and Development	7	7	0	4	4
Total	**100**	**100**	**10**	**42**	**52**

Figure 4: Maximum achievable points in each category



Maximum achievable points are 28 in the category of energy efficiency. For water conservation (18 points - owner occupied, 19 point tenant occupied) and IEQ (12 points owner occupied and 11 points tenant occupied). Other categories have same points in both owner occupied and tenant occupied buildings. The points are: Building materials and resources (16 points), site selection and planning (14 points), innovation and development (7 points) and sustainable architecture and design (5 points).

Level of certification

The threshold criteria for certification levels are as under:

Table 4: Level of certification (LEED-2014)

Certification Level	Owner – Occupied Buildings	Tenant – Occupied Buildings	Recognition
Certified	50 - 59 points	50 - 59 points	Good Practices
Silver	60 - 69 points	60 - 69 points	Best Practices
Gold	70 - 79 points	70 -79 points	Outstanding Performance
Platinum	80 - 89 points	80 - 89 points	National Excellence
Super Platinum	90 - 100 points	90 - 100 points	Global Leadership

There are five level of certification for achieving rating for a building i.e. certified, silver, gold, platinum and super-platinum.

COMPARISON OF RATING SYSTEMS

Table VI: Entrepreneurial Activities Pursued by Rural Women Entrepreneurs in the Informal Sectors

<table>
<tr><th>Comparison</th><th>2011</th><th>2014</th></tr>
<tr><td>Categories</td><td>7 (regional parity included)</td><td>7 (sustainable architecture and design – new category, regional parity removed)</td></tr>
<tr><td>Sub-Categories</td><td>No divisions</td><td>Owner and tenant occupied buildings</td></tr>
<tr><td>Prerequisites</td><td>8</td><td>10</td></tr>
<tr><td>Credits and Sub credits</td><td>49</td><td>42, no sub - credits</td></tr>
<tr><td>Possible Points</td><td>100 possible points under 5 categories + 10 bonus points in 2 categories = 110 points in 7 categories</td><td>88 possible points under 5 categories + 12 bonus points in 2 categories = 100 points</td></tr>
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Sustainable site</td><td>Percentage
26%</td></tr><tr><td>Water efficiency</td><td>10%</td></tr><tr><td>Energy and atmosphere</td><td>35%</td></tr><tr><td>Materials and resources</td><td>14%</td></tr><tr><td>Indoor environmental quality</td><td>15%</td></tr><tr><td>Innovation in Design</td><td>6%</td></tr><tr><td>Regional Parity</td><td>4%</td></tr></table></td><td><table><tr><td>Category</td><td>Owner Occupied</td><td>Tenant Occupied</td></tr><tr><td>Sustainable architecture and design</td><td>5%</td><td>5%</td></tr><tr><td>Site selection and planning</td><td>14%</td><td>14%</td></tr><tr><td>Water conservation</td><td>18%</td><td>19%</td></tr><tr><td>Energy efficiency</td><td>28%</td><td>27%</td></tr><tr><td>Building materials and resources</td><td>16%</td><td>16%</td></tr><tr><td>Indoor Environmental quality</td><td>12%</td><td>12%</td></tr><tr><td>Innovation and development</td><td>7%</td><td>7%</td></tr></table></td></tr>
<tr><td>Highest Certification Level</td><td>Platinum</td><td>Super Platinum</td></tr>
<tr><td>Certified</td><td>40-49 points</td><td>50-59 points</td></tr>
<tr><td>Silver</td><td>50-59 points</td><td>60-69 points</td></tr>
<tr><td>Gold</td><td>60-79 points</td><td>70 - 79 points</td></tr>
<tr><td>Platinum</td><td>80 and above</td><td>80-89 points</td></tr>
<tr><td>Super platinum</td><td>No category</td><td>90 – 100 points</td></tr>
<tr><td>Recognition</td><td>No such criteria</td><td>Different levels of recognition for each certification level in terms of practices</td></tr>
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