

# Study on Griha Rating System for Green Building in Chennai

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**Abstract:** Generally, the buildings are designed and constructed in various parts of the world. But not all buildings are green buildings that can save the environment and improve the climatic conditions around the world. To make existing buildings suitable for the environmentally friendly and sustainable development to nature. The various rating system is adopted for existing buildings like GRIHA, LEED, IGBC etc. The GRIHA rating system for the existing buildings have been studied which includes construction, operation and maintenance of the buildings for the Sri Sairam engineering college campus.

**Keywords:** GRIHA, RATING SYSTEM, GREEN BUILDING, SUSTAINABILITY  
**GRIHA RATING**

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## I. Introduction

The seventh-largest country in the world by the leading economy is India. The various problems affect the greener construction Industry which includes Greenhouse gas emissions and Increasing energy deficit. The rating system address the concerns and sustainable growth in the construction industry. The existing buildings in India have more than 8700 million KWh and 74 lakh tonnes of C<sub>0</sub>2 saving potential. We must alter that trend to minimize the detrimental impact on the environment and to create a new future for our children, our towns, cities and our country(TERI, 2008)

India renowned for its growing economy and occupying its seventh position worldwide has begun to establish its growth towards efficiency and sustainability(Sanchita et al., 2020)The Government of India taking various steps in the construction industry “Demand Management” in the energy sector. The rating system GRIHA concentrates on the recent construction in the last few years which aims to “Inspire and engage with society” to achieve sustainable growth in construction”. Green buildings are resource-efficient and environmentally responsible structures(Journal, n.d.). The negative impacts of the industries such as climate change, global warming, ozone depletion and inefficient resource consumption have become a great concern and awareness among the public, politicians and academicians is the need of the time(Bonde et al., 2018) The new construction can easily achieve more sustainability than existing buildings because the stakeholders are more and various building management departments with different issues and responsibilities. To establish a systematic use of all sustainable approaches, uniform, recognized, and internationally compatible standards are needed(Potbhare et al., 2009)

The rating for sustainable performance of sites and building projects by the building assessment framework by using SBTools generic. Nowadays we are facing various environmental impacts due to which we need to build with more sustainable materials which will lead to a reduction of impacts on the environment(Mokal et al., 2015). The Non-Governmental Organization(NGO) to create and establish the rating system to suit their location and the building types. The different modules for assessment of sites and the various buildings. The Ministry of New and Renewable Energy and The Energy and Resource Institute (TERI) developed GRIHA (the Green Rating for Integrated Habitat Assessment)(Smith, 2015). It operates with various conditions and education tools for learning and user experience for graduate students.

## 5.2 RATING PROCESS

1. Feasibility check: The maintenance team and project team is mainly responsible for checking facilities and housekeeping to apply for GRIHA rating and checking it by using the calculator in the GRIHA website and the project get registered and submitted documents are checked and evaluated by the GRIHA Council.

2. Registration: To register under the existing building category on the GRIHA council website after feasibility check provided username and password for documentation in the panel.

3. Orientation workshop: The GRIHA Council Conducts Orientation Workshop. The main purpose of the workshop is to provide detailed information about the existing building rating system and address specific problems related to the certification process.
4. Submission of documents: The project team must submit the documents on the online panel by using a username and password.
5. Preliminary evaluation: A team of professionals from the GRIHA Council investigates the document which completed in all criteria and incomplete criteria shall not be evaluated. The council review the project with the compliance of the GRIHA criteria and reject it in the event of any non-compliance in the criteria. After that evaluate optional criteria for total achievable points after 20-251 working days of document submission.
6. Verification by Due diligence site visit: The submitted documents as compared to on-site implementation by the site visit, within 7-10 working days the report is submitted.
7. Final evaluation: Both the reports are evaluated, based on evaluation GRIHA Council prepares scores with 20-252 working days after the project team provides all the information.
8. Award of rating: The final score should be presented to the eminent professional in the field of awarding and it is valid for five years from the date of awarding and have the right to conduct the random audit in any criteria for points that have been awarded.

**GRIHA FEES:-**

- It costs for preliminary assessment, administration, online document coordination and additional support for the project.
- The training workshop is conducted for the project team.
- It Includes third party evaluator fees.

Built-Up Area(sqm)	Fees
Upto 10,000sqm	3,74,000+GST
For Every sqm above 10,000	7.5/sqm+GST

A maximum fee of Rs 15,00,000+GST is charged for the project.

**5.3 CRITERIA CONSIDERED UNDER GRIHA RATING**

**5.3.1 SITE PARAMETERS**

**5.3.1.1 ACCESSIBILITY TO BASIC SERVICES**

**Points: 2**

Five services within the campus or the 500m walking distance from the main entrance.

- The various services like the bank, Park, Community Centre, Gym and metro station.

**5.3.1.2 MICRO CLIMATIC IMPACT**

**Points: 4**

- The total number of trees planted on the site is 1 tree per 80 m<sup>2</sup> of the total plot area. The total number of trees on site is greater than the GRIHA existing Building threshold level. **-2 Points**
- More than 25% of the site surface is visible to the sky which includes building roofs is covered by trees or high SRI coatings (SRI>25%) or which covered by solar panels- **1 Point**
- More than 50% of the site surface is visible to the sky which includes building roofs is covered by trees or high SRI coatings (SRI>50%) or which covered by solar panels- **1 Point**



### 5.3.2 MAINTENANCE AND HOUSEKEEPING

#### 5.3.2.1 MAINTENANCE, GREEN PROCUREMENT AND WASTE MANAGEMENT

Points: 7

Maintenance

- The maintenance and housekeeping protocols need to be followed for the electrical, plumbing system and other civil repair works- **Mandatory.**
- Fire fighting equipment- **Mandatory.**

#### Green Procurement

The site should follow the particular policy for purchasing environment-friendly pest control products and housekeeping materials- **1Point**

All the electrical appliances on the site should be at least 3-star BEE star rating – **1Point**

#### Waste Management

The Segregation of the waste at the source is done by providing Multi-coloured dustbins to the building occupants- **1Point**

The collected waste from the source is provided with hygienic storage spaces before treatment or recycling- **1Point**

The recycling of the waste is done by contractual tie-ups with waste recyclers for the various waste like plastic, glass, e-waste etc - **1Point.**

Always have ways to treat the organic waste by both on-site and off-site process into manure and bio-gas and which are suitable for re-use- - **1Point.**



#### 5.3.2.2 METERING AND MONITORING

Points: 10

It should have the basic metering requirements- **Mandatory**

The site should have the advanced metering requirements – **3 Points**

One-way communication should be installed– **3 Points**

- Reporting hourly data in real-time
- Compare Historical and benchmark data.
- Consumption patterns tracking
- Updated in the web-hosted portal.

Two-way communication should be installed- **4 Points**

- Water and energy consumption should be updated monthly.
- Energy and water efficiency.



### 5.3.3 ENERGY

#### 5.3.3.1 ENERGY EFFICIENCY

Points: 20

The energy efficiency in the % reduction= $(A-B)/A*100$

- Building energy Consumption- **Mandatory**
- Operation and maintenance cost – **5 Points**
- Energy consumption reduction in the building – **15 Points**

%Reduction in Energy consumption(Residential Buildings)	%Reduction in Energy consumption (Non-Residential Buildings)	Points
3	4	2
6	8	5
9	12	8
12	16	11



**RENEWABLE ENERGY UTILIZATION**

**Points: 15** The two types of renewable energy system is an on-site and off-site combination as part of annual total energy consumption.

%Offset for day-time (Occupied commercial buildings)	%Offset for day-time (commercial buildings)	%Offset for day-time (24*7 commercial buildings)	Points
2.5%(On-site)	-	0.5%(On-site)	Mandatory
5%	5%	1%	3
10%	10%	3%	5
15%	15%	5%	7

**Off-site Energy utilization**

The off-site renewable energy system to take an offset part of total energy consumption.



% Off-set Energy consumption	Points
10%	Mandatory
20%	3
40%	5
60%	7

**5.3.4 WATER EFFICIENCY**  
**5.3.4.1 WATER FOOTPRINT**

**Points: 15**

- Water supply and usage study and also system audit, discharge analysis- **Mandatory**
- Building water consumption reduction by 30% through water-efficient ways- 3 Points.

- Reducing lawn area to 25% of the total landscaped area -2 Points
- Greywater 100% treatment -2 Points.
- Treatment of sewage water(Grey water+ Blackwater) to meet non-portable water requirement- 2 Points.
- Water-efficient irrigation system to reduce water requirements by 50%- 2Points
- Rain-water Harvesting -2 Points.
- 100% Catchment area- 4 Points.



**5.3.4.2 REDUCTION IN CUMULATIVE WATER PERFORMANCE**

**Points: 10**

- Out of total water use reduces to 20% of water performance – 2Points
- Out of total water use reduces to 30% of water performance – 2Points
- Out of total water use reduces to 50% of water performance – 2Points
- Out of total water use reduces to 70% of water performance – 2Points



**5.3.5 HUMAN HEALTH AND COMFORT**

**5.3.5.1 ACHIEVING INDOOR COMFORT REQUIREMENTS (THERMAL, VISUAL, AND ACOUSTIC)**

**Points:8**

- Requirements of NBC 2005 thermal comfort of Indian adaptive comfort model- 2 Points.
- All living areas meet at least 25% of adequate levels Daylight factor- 2 Points
- Sufficient acoustic insulation indoor noise levels - 2 Points
- Artificial lighting lux level within limits as per NBC 2005- 2Points.



**5.3.5.2 MAINTAINING GOOD IAQ**

**Points: 4**

- On entire premises, Smoking should be banned- **Mandatory.**
- National Ambient Air Quality standard for fresh air – **2 Points**
- Acceptable Indoor Air Quantity -**2 Points.**

**5.3.6 SOCIAL ASPECTS**

**5.3.6.1 UNIVERSAL ACCESSIBILITY AND ENVIRONMENTAL AWARENESS Points: 5**

- To increase the environmental awareness among people – 3 Points.
- Provide space standards for the barrier-free built environment for the differently-abled person and also for elderly people in residential and public buildings – 2 Points.



**Checklist of GRIHA Rating**

SECTION	CRITERIA	MAX POINTS	AWARDED POINTS
SITE PARAMETERS	Accessibility to Basic services	2	0
	Microclimatic Impact	4	3
Maintenance & Housekeeping	Green Procurement and waste Management	7	3
	Metering & Monitoring	10	5
ENERGY	Energy Efficiency	20	13
	Renewable Energy Utilization	15	7
WATER	Water Footprint	15	7
	Cumulative Water performance Reduction	10	3

Human Health & Comfort	Achieving Indoor Comfort Requirements	8	8
	Maintaining Good IAQ	4	3
Social Aspects	Universal Accessibility & Environmental Awareness	5	4
Bonus Points	Bonus Points	4	0
	<b>TOTAL</b>	<b>104</b>	<b>56</b>

Conditions for GRIHA Rating

THRESHOLD	GRIHA RATING FOR EXISTING BUILDINGS
25-40	1 STAR
41-55	2 STAR
56-70	3 STAR
71-85	4 STAR
86&ABOVE	5 STAR

**II. CONCLUSION:-**

The Paper represents the GRIHA rating system for the college campus buildings with a 3 Star rating and ways to improve the GRIHA star rating and the suggestions are as follows

- Improving by purchasing the Eco-Friendly Products for pest control and housekeeping.
- By Achieving the net-zero water discharge and generation of renewable energy on-site in the college campus.
- Tracking and update the energy consumption in the web-hosted portal.
- By Achieving 100% Greywater treatment and rainwater harvesting in the college campus.
- By Creating awareness and achieving water reduction usage in the college campus.
- Recycling waste like metals, e-waste, plastic, glass to improve the sustainability of nature.

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