

# How green is your building?

An introduction to the  
TERI-GRIHA rating system



The Energy and Resources Institute



## What is a green building?

A building can be said to be 'green' or sustainable when conscious steps are taken during its construction and operation to keep natural resource depletion minimal. The aim of the green building design is to minimize demand on non-renewable resources; maximize utilization efficiency; and maximize reuse, recycling, and use of renewable resources. A green building is evolved through a design process that requires all the concerned professionals – the architect; the landscape designer; and the air conditioning, electrical, plumbing, and energy consultants – to work as a team that carefully considers all aspects of the building and associated systems.

A green building's liabilities to the environment are minimized by

- the use of efficient building materials and construction practices;
- the utilization of on-site sources and sinks by bio-climatic architectural practices; and
- the deployment of efficient equipment and management practices to meet its lighting, heating, cooling, water, and other needs.

The following aspects of the building design are looked into in an integrated way in a green building.

- Site planning
- Building envelope design
- Building system design: HVAC (heating, ventilation, and air conditioning), lighting, plumbing, electricity, and water heating
- Integration of renewable energy sources to generate energy on-site
- Water and waste management
- Selection of ecologically sustainable materials
- Quality of indoor ambience

## A benchmark for sustainable buildings

TERI-GRIHA (TERI-Green Rating for Integrated Habitat Assessment) is a tool for measuring and rating a building's environmental performance in the context of India's varied climate and building practices. Designed as a unique system that evaluates a building's compatibility with environmental priorities, TERI aims to apply the tool to mainstream the concept of green buildings in India. TERI-GRIHA, by its qualitative and quantitative assessment criteria, 'rates' buildings on their degree of 'greenness'. The rating would be applied to new and existing building stock of varied functions—commercial, institutional, and residential.

TERI-GRIHA has been developed after thorough study and understanding of the prevailing building practices in India as well of green building rating systems prevalent internationally.

## How it works

The primary objective of the rating system is to help design green buildings and, in turn, help evaluate the 'greenness' of buildings. The rating system follows best practices along with national/international codes that are applicable to achieve the intent of sustainable architecture and building design.

TERI-GRIHA evaluates the environmental performance of the 'whole building' over its life cycle, thereby providing a definitive standard for what constitutes a 'green building'. The rating system is based on accepted energy and environmental principles, and strikes a balance between established practices and emerging concepts, both national and international. The guidelines/criteria appraisal may be revised periodically to take into account the latest scientific developments.

The green building rating system devised by TERI is a voluntary scheme. It has derived useful inputs from the upcoming mandatory voluntary building codes/guidelines being developed by the Bureau of Energy Efficiency, the Ministry of Non-conventional Energy Sources, the Ministry of Environment and Forests, the Government of India, and the Bureau of Indian Standards. The rating system aims to achieve efficient resource utilization, enhanced resource efficiency, and an improved quality of life in buildings.

## Why you should get your building rated

The TERI-GRIHA system, and preceding building processes, assures significant business and social benefits. While the rigorous efficiency and resource consumption standards of TERI-GRIHA maximize a building's operational savings, the community surrounding it benefits with an improved environment as greenhouse gas emissions and natural resource depletion are contained.

Some benefits of a green design to the building owner, user, and the community within which it operates are as follows.

- Reduced energy consumption without sacrificing comfort levels
- Reduced depletion of natural habitats and biodiversity
- Reduced air and water pollution with direct health benefits
- Reduced water consumption
- Limited waste generation due to recycling and reuse
- Reduced pollution loads
- Increased user productivity
- Enhanced image and marketability

TERI-GRIHA's green design practices, and the array of individuals and institutions that put these to practice, would be automatically publicized and promoted for the following reasons.

- It helps generate awareness.
- It recognizes the user and the owner for their commitment to the environment.
- It sets examples for others to emulate.
- It has immense replication probability based on the proverbial saying 'seeing is believing'.
- It stimulates competition among peers to achieve the same performance or do better.

## How to get your building rated

Except for industrial complexes, all buildings – offices, retail malls, institutions, hotels, hospitals, health-care facilities, residences, and multi-family high-rise buildings – in the design stage are eligible for certification under TERI-GRIHA.

## Registration

The certification process begins with the registration of the building project through the TERI website (<http://www.teriin.org>). Registration details are available on the website. Registration should preferably be completed at the beginning of the project, as there are several issues that need to be addressed at the pre-design stage.

The registration process includes access to essential information related to rating, application forms, list of submissions, score points, and the weightage system. It also includes a one-day training session (optional) on the rating system, conducted by the TERI-GRIHA team at a nominal additional cost.

## Evaluation

Once the registration and submission of the application – along with other necessary documentation – are done, the building shall be evaluated and rated in a three-tier process. The preliminary evaluation shall be made by a team of professionals and experts from TERI.

The TERI team shall review the mandatory credit points and check for compliance. The project shall be rejected if mandatory criteria are not complied with. The team shall then evaluate the optional criteria and estimate the total number of achievable points. All compliance documents shall be vetted through the appraisal process as outlined by TERI-GRIHA

The evaluation report shall be given to members of an evaluation committee, comprising of renowned external experts in building and landscape architecture, lighting and HVAC design, renewable energy, water and waste management, and building materials. The members shall independently review and award points.

## Rating

The final score shall be presented to the advisory committee comprising eminent personalities and renowned professionals in the field, for approval and award of the rating. The rating awarded shall be valid for a period of five years from the commissioning of the building. TERI shall reserve rights to conduct random audits of any criteria for which points have been awarded. Queries on rating may be sent to <[griha@teri.res.in](mailto:griha@teri.res.in)>, and will be responded to within two working days.

## Facilitating green buildings: TERI's role

TERI has been working in the area of green buildings for the past 15 years and TERI's initiatives amply demonstrate its experience and expertise in designing green habitats. In addition to developing TERI's own eco-friendly RETREAT (Resource Efficient TERI Retreat for Environmental Awareness and Training) in Gurgaon and the green office complexes at Bangalore and Mukteshwar, TERI has conducted energy conservation studies for over 30 commercial buildings and provided design assistance for over 15 energy-efficient buildings.

TERI-GRIHA reinstates TERI's commitment to enable the design, construction, and operation of environmentally sensitive buildings and, in turn, recognizes the efforts of owners and design teams by rating the buildings on a green scale. TERI professionals have authored several books and popular publications on green buildings and regularly conduct training programmes, workshops, and seminars on the subject of eco-friendly architecture. TERI has also partnered with several national and international organizations and government bodies to mainstream green design in urban development processes.

## First building undergoing TERI-GRIHA rating

### Hitkarini College, Jabalpur (Construction in progress)

The new core building of the Hitkarini College of Engineering is the first building in Jabalpur, Madhya Pradesh to undergo green certification.

Sustainable principles and practices recommended by TERI-GRIHA have been followed not only around the proposed core building, but also throughout the college campus covering 40 655 square metres.



Adhering to the guidelines and recommendations provided by TERI-GRIHA, the Hitkarini College of Engineering has implemented the following green practices.

- Erosion and sedimentation control measures like trenches, sedimentation basins, and mulching have been incorporated on the site, and the dense plantation of trees is being proposed on steep slopes to prevent erosion.
- Temporary drainage channels are being constructed around the construction site to direct pollutant-laden water to a treatment device, thereby preventing groundwater contamination.
- Topsoil from the site has been collected and stored; it will be re-applied, after adding fertilizers, to achieve the nutrient content recommended by TERI-GRIHA for the healthy growth of vegetation.
- Compensatory plantation in the ratio of 1:4 of removed mature trees has been integrated in the landscape plan.
- Water consumption in the building has been reduced to 50% as compared to a conventional building by the use of fixtures with flow rates recommended by TERI-GRIHA.
- Features such as soak pits and detention basins in the form of water ponds have been incorporated to integrate rainwater harvesting at the site.
- Taking cognizance of the lack of sewer lines on the existing campus, the college has followed the norms provided by TERI-GRIHA to treat all waste water on the campus by a decentralized waste water treatment plant.
- The building envelope in the air-conditioned spaces has been optimized following recommendations provided by the draft ECBC (Energy Conservation Building Code).
- The building envelope has been optimized through proper fenestration design, shading, a combination of insulated and double brick cavity walls, and an efficient lighting and air-conditioning system.
- It is estimated that the annual energy consumption for cooling and lighting the building will achieve a 24% reduction from the benchmark.
- Thermal comfort criteria as specified by the *National Building Code 2005* have been satisfied for air-conditioned and non-air-conditioned spaces.



## TERI-BCSD India

TERI-BCSD India is a partner of the WBCSD (World Business Council for Sustainable Development), Geneva, and a member of its regional network. It encourages Indian businessmen to develop a vision of a sustainable company, translate that vision into a management action plan, and turn sustainability into a competitive advantage.



## About TERI

A dynamic and flexible organization with a global vision and a local focus, TERI was established in 1974. A unique developing-country institution, TERI is deeply committed to every aspect of sustainable development. From providing environment-friendly solutions to rural energy problems to helping shape the development of the Indian oil and gas sector; from tackling global climate change issues across many continents to enhancing forest conservation efforts among local communities; from advancing solutions to growing urban transport and air pollution problems to promoting energy efficiency in the Indian industry, the emphasis has always been on finding innovative solutions to make the world a better place to live in.

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