



Shirpur Education Society's
**R. C. Patel College of Engineering & Polytechnic,
Shirpur**



Department of Civil Engineering

Name of Subject: - **ENERGY CONSERVATION & GREEN BUILDING (ECG)**

Course Code: - **315316**

Scheme:- **CE-5K**

Semester:- **Fifth**

Unit No. 05

Green Building Standards and Certification Systems

CO5 - Propose a relevant rating system for assessment of given type of green building.

Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
V	Green Building Standards and Certification Systems	CO5	12	0	8	12	20

THEORY SYLLABUS CONTENT

Unit - V Green Building Standards and Certification Systems

- 5.2 Functions of government organization working for Energy conservation and Audit(ECA): Ministry of New and Renewable Energy (MNRE), Bureau of Energy efficiency (BEE) Maharashtra Energy Development Agency (MEDA).
- 5.3 Green building rating system: Leadership in Energy and Environmental Design (LEED) criteria, Indian Green Building council (IGBC) and Green Rating for Integrated Habitat Assessment. (GRIHA): Salient Features and Evaluation Criteria for assessment

Subject Incharge

Mr. D. B. Wagh

Unit NO. 05

Green Building standard and certification system.

* The functions of government organization for ECA

1) National Productivity Council (NPC)

- a) It is national level organization to promote productivity culture in India. It help to monitor, review and implement identified strategies.
- b) It provides reliable database for decision making improved system and procedures, work culture & customer satisfaction.

2) Ministry of New and Renewable Energy (MNRE) :-

- a) It is the nodal ministry of government of India for all matters relating to new and renewable energy
- b) It function includes facilitating research, design, development, manufacture and deployment of new and renewable energy systems/devices for transportation, application in rural, urban, industrial and commercial sectors.

3) Bureau of Energy Efficiency (BEE) :-

- create awareness and disseminate information of energy efficiency and conservation.

4) Maharashtra Energy Development Agency (MEDA) :-

- Working as noble agency in renewable energy sector & state designated agency conservation sector.

* Ministry of New and Renewable Energy (MNRE)

MNRE plays a pivotal role in India's transition toward a green economy and climate-resilient future.

Functions

1) Policy Formulation and Strategic Planning:

- MNRE drafts and implements national policies and strategic action plans to promote the use of renewable energy resources such as solar, wind, biomass, small hydro, and green hydrogen.
- Establishes guidelines, codes, and quality standards for the installation, operation, and maintenance of renewable energy systems.
- Supports the India's long-term vision for achieving Net-zero emission by 2070, in alignment with global climate commitments under Paris Agreement.

2) Promotion and Development of Renewable Energy Technologies:

- DN Grid-connected Renewable Energy project ->
 - Implements large-scale solar parks, wind farms, and hybrid projects connected to the national grid
- Off-grid and Decentralized Applications
 - Promotes solar lighting systems, solar pumps, micro grids, and biomass-based power plants in rural and remote areas.
 - Support energy access for villagers under schemes like the PM-KUSUM (for solar agriculture pumps)

3) Financial Support and Incentive Programs:

- Subsidies and Capital Grants offers financial assistance and capital subsidies for residential, commercial and industrial installation of solar and other renewable systems.

4) Research, Development and Innovation (R&D)

- Institutional support:- funds academic and national research institutions like NISE (National Institute of solar energy) and NIWE (National Institute of wind energy)

5) Human Resource Development and Capacity Building

a) Training programs:-

- i) conducts skill development programs for technicians, engineers and energy professionals.
- ii) provides certifications and curriculum support through affiliated national training centers.

b) Academic Collaboration:- Partners with universities and institutions to develop courses and modules on renewable energy technologies and management.

6) Monitoring, Evaluation and Reporting:-

a) Monitors progress of renewable energy installations across the country using GIS mapping, dashboards, and audits.

b) publishes annual reports and statistics on installed capacity, energy generation, and CO₂ emissions reduction.

* Bureau of Energy Efficiency (BEE) :-

⇒ It is statutory body established by the government of India under the provisions of the Energy Conservation Act 2001.

⇒ It functions under the Ministry of Power (MoP) with the aim to develop policies and strategies for energy efficiency and conservation across all sectors of the economy.

Objectives:-

- a) Create awareness and disseminate information of energy efficiency and conservation.
- b) To reduce the energy intensity of the India economy.
- c) To promote and implement energy efficiency programs in all sectors.

Functions of BEE:-

1) Policy Formulation and Implementation.

a) Develops national policies and action plans for energy conservation.

b) Assists central and state governments in implementing the energy conservation act.

2. standards and Labelling programme

- standards of energy efficiency are formulated for appliances and equipment
- Introduces star labelling (1-star or 5-star) to indicate performance (eg. Ac's, refrigerators, fans, etc)

3. Energy conservation Building code (ECBC) :-

- Develops and promotes ECBC for new commercial buildings to ensure minimum energy performance standards

4) Designated consumers and energy Audits :-

- Identifies energy-intensive industries Designated consumers (DCs)
- mandates regular energy audits and appointment of certified energy managers.

5) Capacity Building and Training

- conducts training programs and certification for energy Auditors and energy managers.
- promotes energy efficiency research and development.

6) Public Awareness Campaigns :-

- conducts mass awareness programs like National Energy Conservation Day (14th December)
- promotes public participation in energy saving practices.

* Maharashtra Energy Development Agency (MEDA)

- ⇒ The Maharashtra Energy Development Agency (MEDA) is the State Nodal Agency (SNA) established by the Government of Maharashtra in 1985 under the department of Energy.
- ⇒ It works in coordination with the B&E to implement various energy conservation, renewable energy, and audit programs at the state level.

Objectives of MEDA

- a) To promote renewable energy development and energy conservation in Maharashtra.
- b) To act as the state Designated Agency (SDA) for implementing BEE programs.
- c) To support Industries, Institutions, and municipalities in adopting energy-efficient technologies.

* Functions of MEDA

1) Implementation of Renewable Energy Projects:-

- a) promotes solar, wind, Biomass, small hydro, and waste-to-energy projects
- b) provides technical and financial assistance for renewable energy installation.

2) Energy Conservation and Audit Activities

- a) conducts energy audits for government, industrial, and commercial buildings
- b) recommends energy-saving measures and retrofit solutions.

3) Execution of BEE Programs

- Implements BEE's Standards & Labelling, ECBC, and PAT scheme at the state level also organize the training and awareness programs.

4) Promotion of Energy Efficiency in Municipal Bodies:

- conducts street lighting audits, water pumping efficiency programs and renewable integration in local bodies.

5) Awareness and Capacity Building

- Observes state Energy conservation Day and workshops on energy saving practices.

6) Monitoring and Reporting:-

- monitors energy consumption trends in Maharashtra.
- submits progress reports on energy efficiency and renewable energy initiatives to the government.

Green Building Rating systems

Green Building rating systems are frameworks developed to evaluate the environmental performance and sustainability of buildings.

1) Leadership in Energy and Environmental Design (LEED)

* salient features

- a) Globally recognized and widely accepted system.
- b) provides certification for new construction, existing buildings, commercial interiors, schools, homes, and neighborhoods.
- c) Encourages sustainable site planning, energy efficiency, water efficiency, material selection, and indoor environmental quality.
- d) certification Levels: certified, silver, Gold, and platinum based on points earned.

* Evaluation criteria

- 1) sustainable site :- site selection, landscape, transport facilities
- 2) Water efficiency - water use reduction, rainwater harvesting, wastewater treatment
- 3) Energy & Atmosphere :- optimized energy performance, renewable energy, efficient HVAC system.
- 4) Materials and Resources :- use of recycled/regional materials, waste management.
- 5) Indoor Environment Quality :- Air quality, lighting, thermal comfort, acoustics.
- 6) Innovation in Design :- Innovation sustainable features beyond standard requirements.
- 7) Regional priority credits :- Addressing local environmental priorities

2] Indian Green Building Council (IGBC)

* Salient provisions used in IGBC:-

- 1) IGBC, part of confederation of India Industry (CII) was formed in the year 2001. The vision of the council is "To enable a sustainable built environment for all and facilitate India to be one of the global leaders in the sustainable built environment by 2025.
- 2) The council offers a wide array of services which include developing new green building rating system certification services and green building training programs.
- 3) The council also organizes green building congress, its annual flagship event on green buildings.
- 4) The council is committee-based, member-driven & consensus-focused. All the stakeholders of construction industry comprising of architects, developers, product manufacturers, corporate, government, academia and nodal agencies participate in the council activities through local chapter.
- 5) provides guidance for different building typologies - residential, hospitals, schools, townships etc.
- 6) Recognized by the government of India and several state Government for incentives.
- 7) certification levels: certified, silver, Gold platinum.

* Evaluation Criteria of IGBC:-

- 1) sustainable Architecture and design:-
- Efficient site planning and passive design
- 2) Site selection and planning:-
- Location, ecological protection, soil conservation.
- 3) Water conservation:-
- Rainwater harvesting, low-flow fixtures, STP reuse

4) Energy Efficient -

- Building envelope, lighting renewable energy.

5) Indoor Environmental Quality

- Daylighting, air quality, ventilation.

6) Innovation & Development -

- New sustainable approaches

3) Green Rating for Integrated Habitat Assessment (GRIHA)

GRIHA is India's national rating system, jointly developed by TERI (The Energy and Resources Institute) and MNRE (Ministry of New and Renewable Energy). It is mandatory for certain categories of government buildings.

* Salient Features:-

- 1) Specifically designed for India climatic conditions.
- 2) Mandatory for all new public buildings above a certain area (as per government norms)
- 3) Emphasizes low environmental impact, life cycle cost, and integration of renewable energy.
- 4) Certification levels: one star to five stars.

⇒ Evaluation criteria:-

1) Site planning:-

Appropriate site selection, soil preservation, topography management.

2) Conservation and Efficient Utilization of Resources

- i) Energy :- Efficiency in HVAC, lighting, renewable energy integration.
- ii) Water :- Efficient usage, rainwater harvesting, wastewater reuse.
- iii) Materials :- Use of low-energy, recycled and local materials.

3) Sustainable Buildings design

Passive design, shading, daylighting thermal comfort.

4) Occupant - comfort and well-being

Air quality, noise control, safety, accessibility.

5) Innovation -

Innovative measures for sustainability.

6) Performance monitoring

Pos-occupancy evaluation operational efficiency.

My dear Mr. [illegible]

I have just received your letter of the 10th inst.

and am glad to hear from you.

I am well and hope these few lines will find you the same.

Very truly yours,

[illegible signature]

[illegible address]

[illegible text]



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Assignment Questions

Unit No. 05

Green Building Standards and Certification Systems

1. State the names of organizations of certification system.
2. State the salient features of LEED
3. State the salient features of IGBC
4. State the salient features of GRIHA
5. Write the evaluation criteria for LEED
6. Write the evaluation criteria for IGBC
7. Write the evaluation criteria for GRIHA
8. What are the roles and responsibilities of MNRE in promoting green buildings in India?
9. Explain the function of BEE with reference to the ECBC and appliance labeling.
10. What role does MEDA play in green building development and awareness in Maharashtra?
11. Differentiate between IGBC and GRIHA rating systems.
12. List the key assessment categories of LEED certification and their respective point distribution.
13. State the steps involved in the LEED certification process.
14. Compare the certification levels of IGBC, LEED, and GRIHA based on their point systems.
15. Describe the significance of energy conservation audits in green buildings.
16. What is the purpose of the Energy Conservation Building Code (ECBC)? Who implements it?
17. Explain how green building certifications contribute to environmental and economic benefits

