Inclusion of EE in green rating systems

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Structure of the presentation

- Salient features of GRIHA (Green Rating for Integrated Habitat Assessment)
- Energy efficiency: implementation and impact
- Examples of certified projects
- Way forward
Why is green rating required

- Helps implement relevant policies and programs (Eg: NMSH)
- Quantification of benefits accrued e.g energy savings, water savings
- Design decisions based on life cycle costs
- Motivates the user and the owner to fulfill their commitment to the environment
- Generates awareness by way of sheer visibility, media attention
- Enhances brand image
- Stimulates competition among peers to achieve the same performance or to endeavor to better it

- Helps ascertain the financial and economic benefits
GRIHA: Relevance to Indian context

- Mandatory usage of solar passive and renewable energy
- Mandatory ECBC
- Mandatory Energy and Water Audit
- Solid waste management and waste to energy
- Health and hygiene of construction workers
- Universal accessibility
- Water quality for potable/non potable use
- Air pollution and noise pollution control
- Mandatory tree preservation plan and/or transplantation/compensatory plantation
- Water management during construction
GRIHA incorporates:

- National Building Code
- Energy Conservation Building Code
- Appliance star labeling programme of BEE
- Environmental Clearance/ EIA norms
- Central Pollution Control Board guidelines
- National Mission on Sustainable Habitats objectives
- Jawaharlal Nehru National Solar Mission objectives
- Solar buildings programme for energy efficiency
- Solar cities programme
- Waste to energy projects of MNRE
- 12th Five Year Plan objectives
GRIHA

Tool to facilitate design, construction, operation of a green building, and in turn ... measure “greenness” of a building in India

What gets measured gets managed

GRIHA is administered by ADaRSH, an independent Society set up by TERI with support from MNRE and other relevant stakeholders.
GRIHA

Set of 34 criteria

100 +4 point system

- 51 – 60 ★
- 61 – 70 ★★★
- 71 - 80 ★★★★★
- 81- 90 ★★★★★
- 91- 100 ★★★★★★★★★★★

- Materials and construction technology
- Site Planning
- Energy (end use) and Renewable Energy
- Water
- Waste Management
- Health and well being
GRIHA compliant building: beyond ECBC

**ECBC Compliance:**
- Insulation
- High Performance glass
- Controls
- Efficient electrical, mechanical and lighting systems

Incremental cost: 15%
Payback period < 5 years

**GRIHA Compliance:**
- ECBC +
- Passive principles (shading, orientation, controlled glass area)
- Higher indoor design conditions (higher by 1 deg C)
- Optimized lighting design
No further incremental cost
Payback period: < 4 years
How does GRIHA make a difference?

425 projects with over 13 million sqm registered

Typical office building- 8 hr use

- 30% - 50% reduction in energy consumption compared to GRIHA benchmarks
- 40 - 65 % reduction in building water consumption compared to GRIHA base case
- At no/negligible incremental cost

- Passive architectural design
- Daylight integration
- Shaded windows
- Roof insulation
- RE integration
- Solar water heaters
- Low flow fixtures

200kwhr/sq m/annum

100kwhr/sq m/annum

45 lpd

31.5 lpd
Variants of GRIHA

SVA GRIHA for projects < 2500 sqm

GRIHA for projects > 2500 sqm

GRIHA for large developments

GRIHA for schools
Approach to rating of green buildings
Mandatory criteria of GRIHA

Sustainable Site Planning
• Site plan in conformity with the development plan/master plan/UDPFI Guidelines
• Trees (if cut) to be replanted within site premises in ratio of 3:1
• Surface parking not to exceed local bye laws.
• Automatic controls to be installed for 100% Outdoor Lights.

Health & Well Being
• Compliance with National Building Code on construction safety.
• Use of air pollution preventive measures on site during construction.

Energy
• Window Wall Ratio not to exceed more than 60%
• Daylight in minimum 25% of living spaces
• Overdesign of artificial lights to be avoided.
• Compliance with all mandatory clauses of ECBC and 10% reduction in energy consumption from GRIHA benchmark.
• Minimum 1% of connected load (light and HVAC) on RE in non residential projects
• Energy and water audit before final certificate

Water
• Building water demand to be reduced by 25%. Assure of water quality for drinking, irrigation as per BIS.
GRIHA – As a tool to manage resource utilization in buildings

GRIHA certified buildings:

- Save Minimum 25% - 50% less water than conventional buildings.
- Use less water for construction
- Follow mandatory provisions of ECBC (In case of air conditioned buildings)
- Reduce energy consumption by minimum 10% - 50% in comparison to conventional buildings.
- Provide 1% equivalent connected load of lighting and HVAC through renewable energy for non residential projects.
- Recycle waste water and reuse at least 25% - 75% of treated water.
- Segregate and resource recovery from waste in such a manner that only that minimal or zero waste goes to landfill.
GRIHA Rating - transparent process

Online registration
- Submission of project details
- Payment of registration fee (private projects)

Orientation workshop
- Submission of compliance form (govt & private)
- Submission of undertaking (govt)
- Part payment of registration fee (govt projects)

Compliance on site
- Due diligence site visits (minimum 3)
- Last visit to be conducted after commissioning of systems on site
- Assessment of compliance (online site visit reports)

Documentation
- Submission by clients
- 1st review - ADaRSH
- Comments on completeness, compliance (ref. initial commitment)
- Resubmit

1st Evaluation
- Submission by ADaRSH
- 2nd review - third party subject experts
- Comments on correctness of compliance
- Resubmit clarifications
GRIHA Rating - transparent process

2nd Evaluation
- Submission on clarifications sought
- Final evaluation - third party subject experts
- Compilation of score by ADaRSH
- Submission of final score to NAC

Provisional Rating
- NAC to announce award or provisional rating
- Remaining payment of registration fee (gvt projects)
- Release of MNRE incentives

Performance audit
- Conducted after 1 year of project operation
- BEE accredited auditor to submit report
- Review of report and recommendation of final rating by ADaRSH to NAC

Final Rating
- NAC to announce award or provisional rating

NAC approval
- ADaRSH to propose the final score and provisional star rating to NAC (by circulation)
- NAC to announce award or provisional rating
- Remaining payment of registration fee (gvt projects)
- Release of MNRE incentives

GRIHA Rating - transparent process
ResBuild India - linked to SVA GRIHA

- Based on the ISO whole-building-approach (Flexibility)

- Robust energy performance assessment (Comparability)

- Easy to use by architects and auditors (Scalability)

- Easy to compare different EE design, material and technology combinations (Optimization)

- Basis for Energy Efficiency Label (Communication)

- Joint Assessment Tool Developed by Fraunhofer Institute and TERI,
Certified project example: HIRCO Project, Panvel

Energy conservation measures adopted:

- **Roof:** Insulated
- **Wall:** with AAC block
- **Windows:** Well shaded
- Efficient lighting: LPD in range of **5.4-5.7 W/sqm**
- Efficient Air-Conditioners: BEE 4* ACs
- **Solar Hot Water System:** 25% of the roof top area

GRIHA pre certified
Certified project example: Ansal API Essentia, Gurgaon

Energy conservation measures adopted:

- Roof: Insulated
- Wall: with AAC block
- Windows: Well shaded
- Efficient common area lighting: LPD in range of 2 W/sqm
- Efficient Air-Conditioners: BEE 3* ACs
- Solar Hot Water System
- 1% of connected load on solar PV

GRIHA registered

Consumption of electrical energy in kWh/m²yr*:

This building: 69 kWh/m²yr

Reference: 107 kWh/m²yr

Savings: 35%

Energy shares considered for the loan application:
- Internal lighting
- Common lighting
- Cooling

*The consumption is related to the building area.
Certified project example: L-Axis, Pune

Energy conservation measures adopted:

- Wall: with **AAC block**
- Windows: **Well shaded with high performance glazing**
- Efficient common area lighting: LPD in range of **3.8 W/sqm**
- Efficient Air-Conditioners: **BEE 3* ACs**
- Solar Hot Water System

GRIHA pre certified
Certified project example: Gangaskies, Pune

Energy conservation measures adopted:

- Roof: **Insulated**
- Wall: with **AAC block**
- Windows: **Well shaded with high performance glazing**
- Efficient common area lighting: LPD in range of **1.5 W/sqm**

3 Star GRIHA rated project
Thank you

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