IGBC Rating System for Green Affordable Housing
Pilot Version
Abridged Reference Guide
May 2017
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INDIA
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# Green Affordable Housing rating system

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Green Affordable Housing – The Indian perspective

Introduction

While rapid urbanisation, growing cities provide various opportunities, there are fallouts in terms of proliferation of slums, high prices of land and building materials which render houses unaffordable for the segment at the bottom of the pyramid. Therefore, the need for adequate housing for the low-income groups will substantially increase.

MoHUPA has estimated the housing shortage of 18.78 million during the 12th Five Year Plan (FYP) period of which over 95% of this housing shortage is estimated in the Economically Weaker Sections (EWS) and Low Income Group (LIG) categories. To address this shortage, intensive efforts are required to substantially increase affordable housing stock.

Most importantly, while we create housing for these sections of the society, they need to be green too. The principles of green and sustainability are fortunately or unfortunately community-agnostic, in the sense that they also need to handle wastages a bit more carefully, be thrifty in the usage of energy & water, handle waste in a hygienic manner to avoid outbreak of epidemics, reduced use of virgin materials and above all enhance their own quality of lives.

Green Affordable Housing

Housing that is appropriate to the needs of a household and within their means to pay along with being environment conscious. The means (or capacity) of a household to pay for their housing depends on three primary factors:

- The income of the household;
- The cost of appropriate housing; and
- Other essential living costs to be met by the household, such as food and household goods, transport, education and healthcare.

The influencing parameters for such housing will take into consideration various design characteristics of the housing, alongside social, economic and cultural attributes of the household. Some central indicators of green affordable housing would be:

- Standard and quality of housing
- Availability of basic amenities
- Located close to the services, jobs and community facilities
- Energy and water efficient
- Cost efficient in maintenance & operations
The overarching objective of the proposed rating would be to ensure a high degree of sustainability with no / meagre additional cost to the developer or the occupant. Therefore, the approach would be to selectively adopt those measures that are simple and yet have profound impacts in conserving the environment.

Few of the attributes that would define the success of implementing sustainability in this segment are:

- Green measures should be easily implementable
- Easy to monitor and measure
- Operation & maintenance friendly throughout the life
- No / Meagre costs to end-user

**National Benefits Anticipated**

Green concepts and techniques in the affordable housing sector can help address the following:

- Reduction in energy and water consumption
- Improved health and hygiene
- Better sanitation
- Better ventilation and light in the dwellings
- Fuel savings in transit of people to work places & associated pollution

IGBC would strive to reach out the sustainability principles amongst the affordable housing community. This is a wonderful opportunity for the country to be a trend-setter amongst other countries in addressing such sections of the society.

**Implementability of Green features**

To facilitate wider implementation, the rating system is made simple, practical and easily implementable. The economic payback periods for various measures have also been considered.

**Applicability of Rating System**

The Green Affordable Housing Rating is applicable for housing projects designed with carpet-area less than or equal to 60 sq.m per dwelling unit, which constitutes to atleast 70% of the total project built up area.

**Scope of IGBC Green Affordable Housing**

IGBC Green Affordable Housing Rating System is designed for rating New and Major renovation of affordable multi-dwelling residential buildings/ units.

In general, all projects which meet the mandatory requirements and minimum points can apply. Various levels of green building certification are awarded based on the total points earned.
IGBC Green Affordable Housing Rating System

IGBC Green Affordable Housing rating system addresses green features under the following categories:

- Site Measures
- Water Conservation
- Energy Conservation
- Materials Conservation
- Indoor Environmental Quality
- Innovation & Design Process

The guidelines detailed under each mandatory requirement & credit enables the design and construction of green affordable housing. However, every dwelling unit should meet certain mandatory requirements, which are non-negotiable.

The various levels of rating awarded are:

<table>
<thead>
<tr>
<th>Certification Level</th>
<th>Recognition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certified</td>
<td>Best Practices</td>
</tr>
<tr>
<td>Silver</td>
<td>Outstanding Performance</td>
</tr>
<tr>
<td>Gold</td>
<td>National Excellence</td>
</tr>
<tr>
<td>Platinum</td>
<td>Global Leadership</td>
</tr>
</tbody>
</table>

a) IGBC Green Affordable Housing Registration

Project teams interested in IGBC Green Affordable Housing Certification for their project must first register with IGBC. Projects can be registered on IGBC website (www.igbc.in) under ‘IGBC Green Affordable Housing’. The website includes information on registration fee for IGBC member companies as well as non-members. Registration is the initial step which helps establish contact with IGBC and provides access to the required documents, templates, important communications and other necessary information.

IGBC website will have all important details on IGBC Green Affordable Housing registration & certification - process, schedule and fee.

b) Pre-certification

Projects by developers can register for Pre-certification. This is an option provided for projects aspiring to get pre-certified at the design stage. The documentation submitted for pre-certification must detail the project design features which will be implemented. The rating awarded under pre-certification is based on the project's intention to conform to the requirements of IGBC Green Affordable Housing Rating System.
system. It is important to note that the pre-certification rating awarded need not necessarily correspond to the final certification.

**Pre-certified projects are required to provide the status of the project to IGBC, in relation to the rating, once in every six months until the award of the final rating.**

Pre-certification gives the owner/developer a unique advantage to market the project to potential buyers.

Those projects which seek pre-certification need to submit the following documentation:

1. **General information of project including**
   a. Project brief stating project type, different type of spaces, occupancy, number of floors, area statement, etc.,
   b. General drawings (in PDF format only):
      i. Master/ Site plan
      ii. Parking plans
      iii. Floor plans
      iv. Elevations
      v. Sections
      vi. Photographs/ Rendered views

2. **Filled-in Master Template (in excel format)**

3. **Narratives and supporting documentation such as conceptual drawings, estimate/ tentative calculations (in excel sheets), declarations from the owner, etc., for each mandatory requirement/credit**

4. **In addition, project teams can refer the ‘Documentation Required for Pre-certification’ section provided under each mandatory requirement/credit.**

The above necessary details are mentioned in this guide, under each mandatory requirement and credit.

IGBC would take 30 days to review the first set of pre-certification documents. On receiving the clarifications posed in the first review, IGBC would take another 30 days to award the precertification.

A certificate and a letter are provided to projects on precertification.
c) **IGBC Green Affordable Housing Certification**

The threshold criteria for certification levels are as under:

<table>
<thead>
<tr>
<th>Certification Level</th>
<th>Multi-dwelling Residential Unit</th>
<th>Recognition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certified</td>
<td>38 – 44</td>
<td>Best Practices</td>
</tr>
<tr>
<td>Silver</td>
<td>45 – 51</td>
<td>Outstanding Performance</td>
</tr>
<tr>
<td>Gold</td>
<td>52 – 59</td>
<td>National Excellence</td>
</tr>
<tr>
<td>Platinum</td>
<td>60 - 75</td>
<td>Global Leadership</td>
</tr>
</tbody>
</table>

**d) Documentation**

To earn the IGBC Green Affordable Housing Rating, the project must satisfy all the mandatory requirements and the minimum number of credit points.

The project team is expected to provide supporting documents at preliminary/ design and final/ construction stage of submission for all the mandatory requirements and the credits attempted.

The project needs to submit the following:

1. **General information of project including**
   
   c. Project brief stating project type, different type of spaces, occupancy, number of floors, area statement, etc.,
   
   d. General drawings (in PDF format only):
   
      i. Master/ Site plan
      
      ii. Parking plans
      
      iii. Floor plans
      
      iv. Elevations
      
      v. Sections
      
      vi. Photographs/ Rendered views

2. **Filled-in Master Template (in excel format)**

3. **Narratives and supporting documentation such as drawings, calculations (in excel sheets), declarations/ contract documents, purchase invoices, manufacturer cut sheets/ letters/ material test reports, etc., for each mandatory requirement/ credit**

4. **In addition, project teams can refer the ‘Documentation Required for Certification’ section provided under each mandatory requirement/ credit.**
The necessary details are mentioned in this guide, under each mandatory requirement and credit.

Documentation is submitted in two phases – preliminary submittal and final submittal:

- The preliminary submission involves those credits which can be evaluated at the design stage. The reference guide provides the list of design and construction phase credits. After the design submission, review is done by third party assessors and review comments are provided within 35 days.

- The next phase involves submission of clarifications to preliminary review queries and final submittal. The construction document is submitted on completion of the project. This review would be provided within 35 days, after which the rating is awarded.

- It is important to note that the mandatory requirements/ credits earned at the preliminary review are only considered as anticipated. These mandatory requirements/ credits are not awarded until the final documents are submitted, along with additional documents showing implementation of design features. If there are changes in any ‘credit anticipated’ after preliminary review, these changes need to be documented and resubmitted during the final review.

- IGBC will recognise affordable housing that achieves one of the rating levels with a formal letter of certification and a mountable plaque.

**e) Physical Verification & Monitoring**

Before the award of rating, the residential project would be physically audited to verify implementation of the design measures.

**f) Appeal Process**

In rare cases, mandatory requirements or credits may be denied due to misinterpretation of the intent. On receipt of the final review, if a Project Team feels that sufficient grounds exist to appeal a credit denied in the final review, the project has an option to appeal to IGBC for reassessment of denied mandatory requirements or credits. The documentation for the mandatory requirements or credits seeking appeal may be resubmitted to IGBC along with necessary fee. IGBC will take 35 days to review such documentation. If an appeal is pursued, please note that a different review team will assess the Appeal Documentation.

The following documentation should be submitted:

1. General information of project including
   a. Project brief stating project type, different type of spaces, occupancy, number of floors, area statement, etc.,
   b. General drawings (in PDF format only):
      i. Master/ Site plan
ii. Parking plans  
iii. Floor plans  
iv. Elevations  
v. Sections  
vi. Photographs/ Rendered views  

2. Filled-in Letter Template for respective mandatory requirement/ credit.  

3. Original, re-submittal, and appeal submittal documentation for only those mandatory requirement/ credits that the project is appealing for. Also include a narrative for each appealed mandatory requirement/ credit to describe how the documents address the reviewers’ comments and concerns.  

a. Fee  

Registration, Certification, Appeal and CIR fee details are available on IGBC website (www.igbc.in) or projects can write to IGBC (igbc@cii.in).
### CHECKLIST : IGBC GREEN AFFORDABLE HOUSING RATING

<table>
<thead>
<tr>
<th>Credits</th>
<th>Criteria</th>
<th>Point (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Site Measures (SM)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SM Mandatory Requirement 1</td>
<td>Local Building Regulations</td>
<td></td>
</tr>
<tr>
<td>SM Mandatory Requirement 2</td>
<td>Site Selection</td>
<td></td>
</tr>
<tr>
<td>SM Credit 1</td>
<td>Proximity to Public Transport</td>
<td>1</td>
</tr>
<tr>
<td>SM Credit 2</td>
<td>Top Soil Preservation</td>
<td>2</td>
</tr>
<tr>
<td>SM Credit 3</td>
<td>Access to Social Infrastructure</td>
<td>2</td>
</tr>
<tr>
<td>SM Credit 4</td>
<td>Green Cover on-site -15%, 20%</td>
<td>2</td>
</tr>
<tr>
<td>SM Credit 5</td>
<td>Heat Island effect-Non Roof: 25%, 50%</td>
<td>2</td>
</tr>
<tr>
<td>SM Credit 6</td>
<td>Heat Island effect-Roof : 75%, 95%</td>
<td>2</td>
</tr>
<tr>
<td>SM Credit 7</td>
<td>Parking Facilities for Tenements</td>
<td>1</td>
</tr>
<tr>
<td>SM Credit 8</td>
<td>Design For differently abled</td>
<td>2</td>
</tr>
<tr>
<td>SM Credit 9</td>
<td>Basic Facilities for construction workforce</td>
<td>2</td>
</tr>
<tr>
<td><strong>Sub Total</strong></td>
<td></td>
<td><strong>16</strong></td>
</tr>
<tr>
<td><strong>Water Conservation (WC)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WC Credit 1</td>
<td>Availability of Potable Water</td>
<td>1</td>
</tr>
<tr>
<td>WC Credit 2</td>
<td>Rainwater Harvesting : 50%, 75%, 95%</td>
<td>3</td>
</tr>
<tr>
<td>WC Credit 3</td>
<td>Water Efficient Plumbing Fixtures</td>
<td>3</td>
</tr>
<tr>
<td>WC Credit 4</td>
<td>Waste water treatment: 50%, 75%, 95%</td>
<td>3</td>
</tr>
<tr>
<td>WC Credit 5</td>
<td>Treated waste water Reuse</td>
<td>2</td>
</tr>
<tr>
<td>WC Credit 6</td>
<td>Management of Irrigation Systems</td>
<td>2</td>
</tr>
<tr>
<td>WC Credit 7</td>
<td>Water meters for dwelling units</td>
<td>1</td>
</tr>
<tr>
<td><strong>Sub Total</strong></td>
<td></td>
<td><strong>15</strong></td>
</tr>
<tr>
<td><strong>Energy Conservation (EC)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC Credit 1</td>
<td>Energy Efficient Building Envelope</td>
<td>4</td>
</tr>
<tr>
<td>EC Credit 2</td>
<td>Shading Elements for Building Openings</td>
<td>2</td>
</tr>
<tr>
<td>EC Credit 3</td>
<td>Efficient Lighting</td>
<td>2</td>
</tr>
<tr>
<td>EC Credit 4</td>
<td>On-site Renewable Energy: 50%, 75% - Solar Water Heaters: 25%, 50%</td>
<td>2</td>
</tr>
<tr>
<td>EC Credit 5</td>
<td>Energy Saving Measures in Appliances &amp; other Equipment</td>
<td>2</td>
</tr>
<tr>
<td><strong>Sub Total</strong></td>
<td></td>
<td><strong>12</strong></td>
</tr>
</tbody>
</table>
### Material Conservation (MC)

<table>
<thead>
<tr>
<th>Credit</th>
<th>Requirement</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC Mandatory 1</td>
<td>Segregation of House-hold waste</td>
<td></td>
</tr>
<tr>
<td>MC Credit 1</td>
<td>Organic Waste Management: 50%, 75%</td>
<td>2</td>
</tr>
<tr>
<td>MC Credit 2</td>
<td>Handling of construction waste materials: 50%, 75%</td>
<td>2</td>
</tr>
<tr>
<td>MC Credit 3</td>
<td>Use of local Materials: 50%, 75%, 95%</td>
<td>3</td>
</tr>
<tr>
<td>MC Credit 4</td>
<td>Material with Recycled content: 10%, 20%, 30%</td>
<td>3</td>
</tr>
<tr>
<td>MC Credit 5</td>
<td>Appropriate Technologies: 25%, 50%, 75%, 95%</td>
<td>4</td>
</tr>
<tr>
<td>MC Credit 6</td>
<td>Alternate Construction Materials: 25%, 50%</td>
<td>2</td>
</tr>
</tbody>
</table>

Sub Total 16

### Indoor Environment Quality (IEQ)

<table>
<thead>
<tr>
<th>Credit</th>
<th>Requirement</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEQ Mandatory 1</td>
<td>Tobacco Smoke Control</td>
<td></td>
</tr>
<tr>
<td>IAQ Credit 1</td>
<td>Day Lighting: 75%, 95%</td>
<td>2</td>
</tr>
<tr>
<td>IAQ Credit 2</td>
<td>Fresh air ventilation: 50%, 75%</td>
<td>2</td>
</tr>
<tr>
<td>IAQ Credit 3</td>
<td>Cross Ventilation: 50%, 75%</td>
<td>2</td>
</tr>
<tr>
<td>IAQ Credit 4</td>
<td>Exhaust Systems</td>
<td>2</td>
</tr>
<tr>
<td>IAQ Credit 5</td>
<td>Low VOC Material, Paints &amp; Adhesives</td>
<td>2</td>
</tr>
<tr>
<td>IAQ Credit 6</td>
<td>Occupant Well-being Facilities</td>
<td>1</td>
</tr>
</tbody>
</table>

Sub Total 12

### Innovation & Design Process

<table>
<thead>
<tr>
<th>Credit</th>
<th>Requirement</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>INN Credit 1.1</td>
<td>Innovation &amp; Design Process</td>
<td>4</td>
</tr>
<tr>
<td>INN Credit 2</td>
<td>IGBC Accredited Professional</td>
<td>1</td>
</tr>
</tbody>
</table>

Sub Total 5

Total Credit Points 75

### IGBC Green Affordable Housing Certification Levels

<table>
<thead>
<tr>
<th>Rating</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-dwelling Residential Units</td>
<td></td>
</tr>
<tr>
<td>Certified</td>
<td>38 – 45</td>
</tr>
<tr>
<td>Silver</td>
<td>46 – 52</td>
</tr>
<tr>
<td>Gold</td>
<td>53 – 60</td>
</tr>
<tr>
<td>Platinum</td>
<td>61 – 75</td>
</tr>
</tbody>
</table>
Site Measures
Local Building Regulations

SM Mandatory Requirement 1

Intent:
Ensure that the building(s) complies with necessary statutory regulatory codes thereby regulating the growth of the built environment.

Requirements:
The following approvals are required from the competent authority:

- Approval of building plan (or) site plan
- Letter from Principal Architect / Fit-for-occupancy certificate

Benefits Anticipated:

- Restrict excessive and unsafe developments within the site

Documents Required:

Precertification Level

- Site plan approved by urban local body/ regulatory authority.
  
  (Or)

- Project Commencement certificate issued by local Government authority.

Note:
Projects which have not yet received site plan approved from local Government authority may submit an acknowledgement from the authority that the Project drawings have been submitted for approval and documentation demonstrating approval from the local Authorities shall be submitted at the time of Final Certification.

Certification Level

- Site plan approved by urban local body/ regulatory authority.

- Letter from Principal Architect mentioning fit for occupancy / copy of Fit-for-occupancy certificate from authority.

- Photographs of building taken at various stages of construction.
Site Selection

SM Mandatory Requirement 2

Intent:

Avoid the development on inappropriate sites thereby reducing the environmental impacts caused due to the location of a building on a site

Requirements:

Avoid development of buildings, hardscapes, roads or parking areas on portions of sites that meet any of the following criteria:

- High-value farmland as defined by the relevant local, regional, state or central government agency
- Previously undeveloped land within area classified at high or very high hydro geologic risk, including any land whose elevation is lower than 5 feet (1.5 meters) above the elevation of the 100-year flood, as defined by the relevant local, regional or central government agency.
- Land specifically identified as habitat for any species listed as threatened or endangered by Wildlife Institute of India.
- Land within 100 feet (30 meters) of a wetland listed as being of high ecological value by the relevant local, regional, state, or central government agency. Renovation of an existing building is allowed if construction impact is limited to the existing development footprint.
- Previously underdeveloped land that is within 50 feet (15 meters) of a water body or Full Tank Level (FTL) that supports or could support aquatic life, recreation or industrial use, as determined by a professional biologist.
- Land that prior to acquisition for the project was public parkland.

Benefits Anticipated:

- Ensures the occupants get access to the urban environment and basic amenities.
- Helps prevent the need for expanded transportation and utility infrastructure and likely affords building occupants more access to alternative transportation when the building site is selected on a previously developed site.
- Appropriate site selection can reduce the risk of property damage due to natural events such as landslides, floods, sinkholes and soil erosion.
- Not building on inappropriate sites preserves wildlife, recreation and ecological balance.
Documents Required:

**Precertification**
- Permit from the relevant local authority in the form of a land allotment/land use letter.
- Clearance from the Ministry of Environment and Forest (MoEF), as applicable.
- Map indicating the project location details.

**Certification**
- Site plan approved by urban local body/regulatory authority.
- Permit from the relevant local authority in the form of a land allotment/land use letter.
- Clearance from the Ministry of Environment and Forest (MoEF), as applicable.
- Map indicating the project location details.
Proximity to Public Transport

SM Credit 1  
Points: 1

Intent:
Encourage use of public transport, so as to reduce negative impacts caused from automobile use

Requirements:

- **Option 1: Public Transport**
  Locate the building within 1 km walking distance from an intra-city railway station (or) a bus-stop (or) other modes of public transport.

- **Option 2: Shuttle Service**
  The project can operate or have a contract in place for shuttle services (from / to the nearest intra-city railway station or bus-stop), for atleast 25% of the building occupants.

Benefits Anticipated:

- Savings on fuel in commuting
- Less dependence on vehicular usage

Documentation required:

Precertification Level

- Vicinity map (eg: Google, etc.,) with scale highlighting the proposed/existing public transport facility within proximity from the project entrance.

Certification Level

- Vicinity map (eg: Google, etc.,) with scale highlighting the proposed public transport within the proximity from project entrance.
- Shuttle service facility contract (minimum 2 years).
Top Soil Preservation

SM Credit 2

Points: 2

Intent:
Preserve excavated top soil and reuse later for landscaping applications thereby, reducing negative impacts to the site and surroundings

Requirements:
Preserve top 150 - 200 mm soil from excavation & reuse the soil for landscaping purposes within the same site and plant vegetation to prevent soil erosion

- Adopt the following measures:
- Stockpile the fertile topsoil prior to construction and reuse the same during landscaping.
- Cover stockpiled topsoil with tarpaulin so as to reduce its exposure to air borne dust from construction activities.
- Stockpiled soil can be reused later on-site or sold / donated for off-site use.

Benefits Anticipated
- Preserves the fertile top soil

Documents required:

Precertification Level

- Narrative stating the top soil preservation strategies and its future use.
- Conceptual site plan showing top soil stockpiling strategies to be implemented.

Certification Level

- Photographs showing top soil stockpiled & top soil stripping.

Guidelines & Examples:

(These guidelines are illustrative)

Photograph showing top soil stripping and stockpiling

Top Soil stockpiled
Access to Social Infrastructure

SM Credit 3  
Points: 2

Intent:

Provide access to basic amenities, so as to reduce negative impacts caused from automobile use.

Requirements:

Provide access to at least six basic amenities within a walking distance of 1 km from the site entrance

- Crèche / School / Anganwadi, provisional store, clinic, pharmacy, primary health center / dispensary, ATM, entertainment zones, milk booth, saloon, parks, restaurant: 1 point

  (AND/OR)

- Additionally, provide the following within the campus: 1 point
  - Seating facility and toilets in the common area for service staff & visitors
    - minimum one toilet for every 200 dwelling units
  - Tot-lot for children

Note: The project shall mandatorily have Creche or School as one of the basic amenities.

Benefits Anticipated:

- Savings on fuel in commuting
- Less dependence on vehicular usage
- Encourages people to walk or cycle, thereby improving health

Documentation required:

Precertification Level

- Vicinity map (e.g., Google, etc.) with scale highlighting the proposed basic amenities from project entrance.

  (Or)

- Conceptual drawings showing the proposed location of the social infrastructure to be implemented.
Certification Level

- Vicinity map (e.g: Google, etc..) with scale highlighting the proposed basic amenities from project entrance.

(Or)

- Photographs showing the social infrastructure implemented.

Guidelines & Examples:

(These guidelines are illustrative)

![Vicinity map](image1)

School

Medical clinic and Pharma Store
SITE MEASURES

Green Cover on-site – 15%, 20%

SM Credit 3 Points: 2

Intent:
Minimise disturbances or restore the site so as to reduce long-term negative environmental impacts, thereby promoting habitat and biodiversity

Requirements:
Provide vegetation / landscaping for at least 15% of total site area.

- Select plants, shrubs and trees which are local or adaptive species to the region
- Design buildings with minimal footprint
- Consider retaining the natural topography on the site
- For sites that have fully grown trees, avoid felling of trees or consider transplanting of trees which may obstruct the construction activities
  - For every tree uprooted, plant at least 5-7 saplings
- While designing the landscape, restrict the grass area
  - Grass requires about 6-10 liters of water for every 1 sq.m

<table>
<thead>
<tr>
<th>% of vegetated/landscaped area: Total landscaped area x 100</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Site area</td>
<td></td>
</tr>
<tr>
<td>≥ 15%</td>
<td>1</td>
</tr>
<tr>
<td>≥ 20%</td>
<td>2</td>
</tr>
</tbody>
</table>

Note: For compliance, vegetation over ground & built spaces can be considered.

Benefits Anticipated:
- Increased green cover
- Restoring native and adaptive plants will require less maintenance, irrigation and fewer application of chemical fertilizers
- Attracts birds and other habitat
Documentation required:

Precertification

- Conceptual site drawing highlighting the area with green cover.
- Site area calculations (approximate) indicating the total site area, area with natural topography (and/or) vegetation on the ground only.

Certification

- Photographs showing the site area with vegetation/ landscape.
- Site drawing highlighting the area with green cover.
- Site area calculations (approximate) indicating the total site area, area with natural topography (and/or) vegetation on the ground only.

Note:

The total site area must be consistent across all the credits.

Guidelines & Examples:

(These guidelines are illustrative)

Exemplary Performance:

The project team may earn an Innovation and Design Process credit point (for exemplary performance) by showing 40% or above of the site as Green Cover (existing vegetation/ landscaped area/ roof gardens) post construction.
SITE MEASURES

Heat Island Effect: Non Roof – 25%, 50%

SM Credit 4

Points: 2

Intent:
Minimise heat island effect so as to reduce negative impacts on micro-climate, human and bio-diversity

Requirements:
Provide one or combination of the following, for atleast 25% of exposed non-roof impervious/ hardscape areas within the project site:

- Shade the footpaths, pathways, roads, uncovered surface parking and other impervious/ hardscaped areas with tree cover
- Install open grid pavers (or) grass pavers (or) light colored materials with solar reflective index (SRI) between 29-64

Points are awarded as below:

<table>
<thead>
<tr>
<th>% of Non-Roof Area: Non-Roof area with proposed strategy x 100</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Non-Roof area</td>
<td></td>
</tr>
<tr>
<td>≥ 25%</td>
<td>1</td>
</tr>
<tr>
<td>≥ 50%</td>
<td>2</td>
</tr>
</tbody>
</table>

Benefits Anticipated:
- Reduction in local temperatures
- Better ambience

Documentation required:

Precertification Level
- List of proposed strategies to reduce heat island effect from non-roof areas.
- Submit breakup of non-roof area calculations.
- Conceptual site drawing highlighting non-roof impervious (hardscape) areas and areas covered with shade from tree cover within 5 years.
Certification Level

- List of adopted strategies with supporting photographs to reduce heat island effect from non-roof areas.
- Submit breakup of non-roof area calculations.

Guidelines & Examples:

(These guidelines are illustrative)

![Tree Cover for Parking Areas](image1.png)

![Open Grid Pavers for Non Roof Areas](image2.png)

Exemplary Performance:

The project team may earn an Innovation and Design Process credit point (for exemplary performance) by showing at least 95% of the exposed non roof area is shaded with tree cover or installed with appropriate pavers/ light colored materials with solar reflective index (SRI) between 29-64.
Heat Island Effect: Roof – 75%, 95%

SM Credit 5

Intent:
Minimise heat island effect so as to reduce negative impact on micro-climate, human and bio-diversity

Requirements:
Cover atleast 50% of the exposed roof areas with reflective materials to reduce heat islands

- White surface applications (or) Light coloured china mosaic tiles/ white tiles with high solar reflective index SRI.

Points are awarded as below:

<table>
<thead>
<tr>
<th>% of Non-Roof Area: Non-Roof area with proposed strategy x 100</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Roof area</td>
<td></td>
</tr>
<tr>
<td>≥ 75%</td>
<td>1</td>
</tr>
<tr>
<td>≥ 95%</td>
<td>2</td>
</tr>
</tbody>
</table>

Benefits Anticipated:

- Reduction in local temperatures
- Better ambience

Documentation required:

Precertification Level

- Narrative describing the proposed strategies to reduce heat island effect from roof area.
- Conceptual roof plans highlighting location and the extent of high reflective roof materials/vegetation.
- Tentative roof area calculations showing exposed roof area, service and utility areas and area covered with high reflective roof materials/vegetation.
- List of proposed high reflective materials (make & model).
Certification Level

- Details of roof area covered with tiles/ paint/ vegetation.
- Photographs of the measures adopted.
- Purchase invoice/ payment receipts of the high reflective roof materials sourced for the project.
- Letters/ brochures from the manufacturer indicating Solar Reflective Index (SRI) of the high reflective roof materials used in the project.
- Drawings highlighting location and the extent of highly reflective roof materials/ vegetation.

Guidelines & Examples:

*(These guidelines are illustrative)*

![Roof covered with White](image1)

![Roof covered with China Mosaic tiles](image2)
Parking facilities for Tenements

SM Credit 6  Points: 1

Intent:
Provide adequate parking within the site to minimise disturbance caused due to parking on public roads, thereby, enhancing the quality of civic life

Requirements:

- Provide parking on-site to cater two wheeler parking facility to each tenement (AND)
- Equivalent car parking spaces (AND/OR)
- Follow the local bye-law parking regulations which ever is stringent

Benefits Anticipated:

- Avoid parking on roads
- Reduced traffic snarls

Documentation required:

Precertification Level

- Conceptual parking plan showing the resident and visitor parking spaces.
- A copy of the local bye-law highlighting the parking requirements.

Certification Level

- Photographs showing the proposed strategies.
- Drawings of the total number of parkings provided

Guidelines & Examples:

(These guidelines are illustrative)

Surface Parking for Vehicles
Design for Differently Abled

SM Credit 7  

Points: 2

Intent:

Ensure that the building design caters to differently abled and senior citizens for their wellbeing

Requirements:

Provide the following features:

- Non-slippery ramps with hand rails on atleast one side for easy access till main entrance and special parking provision for differently abled near lifts/ main entrance
  - Case 1: Projects with lift facility – provide uniform flooring levels/ ramps with hand rail till lift facility
  - Case 2: Projects without lifts – project shall provide a declaration mentioning that preferred allotments of housing are provided for differently abled in ground floor and ramps shall be provided till ground floor

- (AND)
  - Differently abled friendly toilet in the common area facility as per NBC standards

Benefits Anticipated:

- Comfortable living conditions for the differently abled and senior citizens

Documentation required:

Precertification Level

- A narrative describing all measures proposed in the building for differently abled people.
- Conceptual drawings highlighting provisions for differently abled people.

Certification Level

- Photographs of measures implemented.
- Drawings highlighting provisions for the differently abled.
SITE MEASURES

Guidelines & Examples:

*(These guidelines are illustrative)*

Non-slippery ramps with handrails

Differently abled Toilet
Basic Facilities for Construction Workforce

SM Credit 8  

Points: 2

Intent:

Provide facilities for wellbeing and hygiene of the construction workforce to enhance the quality of life and promote safe and healthy work conditions.

Requirements:

Provide the following on-site basic facilities for construction workforce:

- Adequate drinking water facilities to workforce
- Safety and personal protective equipment
- Sanitary measures to meet or exceed local / labour bye-law requirement (OR) Provide at least one toilet seat/urinal for every 50 workers (separate for men and women)
- Adequate illumination levels in construction work areas
- First-aid and emergency facilities

Benefits Anticipated:

- Better work environment leading to better productivity
- Health and wellbeing

Documents required:

Precertification Level

- A narrative describing the basic facilities proposed in the project for construction workforce.
- Conceptual drawing highlighting the basic facilities proposed for the construction workforce.

Certification Level

- Photographs showing the proposed strategies for wellbeing of construction workforce.

Guidelines & Examples:

(These guidelines are illustrative)

- Personal Protective Equipment
- Adequate illumination levels in construction work areas
Water Conservation
Availability of Potable Water

WC Credit 1  

Intent:
Ensure that households are provided with piped water supply to meet water requirements, so as to ensure that the community is habitable

Requirements:
Provide piped fresh water supply and storage system, considering per capita consumption of 90 litres fresh water per person per day.

Benefits Anticipated:
- Community will be encouraged to reside
- Availability of potable water
- Improved hygiene and quality of life

Documentation required:

Precertification Level
- Narrative describing the proposed strategies for providing water supply to households.

Certification Level
- Narrative describing the strategies adopted for providing water supply to households.
- Photographs of installed water storage systems.
Water Conservation

Rainwater Harvesting – 50, 75, 95%

WC Credit 2  Points: 3

Intent:
Implement Rainwater management systems to enhance ground water table and thereby reducing dependence on potable water

Requirements:
Provide rainwater harvesting system to capture at least 50% of run-off volumes from roof and non-roof areas. The harvesting system designed should cater to at least 1 day of normal rainfall* occurred in the last 5 years.

Case 1:
Points are awarded as below:

<table>
<thead>
<tr>
<th>Rainwater harvesting system to capture / recharge runoff from site</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 50% from roof &amp; non-roof areas</td>
<td>1</td>
</tr>
<tr>
<td>≥ 75% from roof &amp; non-roof areas</td>
<td>2</td>
</tr>
<tr>
<td>≥ 95% from roof &amp; non-roof areas</td>
<td>3</td>
</tr>
</tbody>
</table>

Case 2:
In areas where the central/ state ground water board does not recommend artificial rain water recharge (or) if the groundwater table is less than 4 m, the projects can show nominal compliance by collection & reuse and points are awarded as below:

<table>
<thead>
<tr>
<th>Rainwater harvesting system to capture</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 10% from roof &amp; non-roof areas</td>
<td>1</td>
</tr>
<tr>
<td>≥ 20% from roof &amp; non-roof areas</td>
<td>2</td>
</tr>
<tr>
<td>≥ 30% from roof &amp; non-roof areas</td>
<td>3</td>
</tr>
</tbody>
</table>

Rain Water Harvesting Calculations
Rain water runoff from site = Total site Area X Runoff coefficient X Average rainfall per day

Notes:
- Average rainfall per day considerations
  - Region with average rainfall during the year up to 1000 mm to consider avg. rainfall per day as 20mm for RWH calculations.
Region with average rainfall during the year from 1001 mm-2000 mm to consider avg. rainfall per day as 25 mm for RWH calculations.

Region with average rainfall during the year from 2001 mm – 3000 mm to consider avg. rainfall per day as 30 mm for RWH calculations.

- Refer to annexure for average annual rainfall for the various cities or from the websites - http://hydro.imd.gov.in/hydrometweb/(S(djmz0a552lu5jaur0pwy55))/PdfPageImage.aspx?imgUrl=PRODUCTS\Rainfall_Maps\Normal_Rainfall_Maps\Annual\Subdivision\annual.SUBDIVISION_NORMAL_RAINFALLMAP_COUNTRY_INDIA_c.JPG&landingpage=other http://hydro.imd.gov.in/hydrometweb/(S(djmz0a552lu5jaur0pwy55))/PRODUCTS/Publications/Rainfall%20Statistics%20of%20India%20-%202015/Rainfall%20Statistics%20of%20India%20-%202015.pdf

- Runoff coefficient for typical surfaces can be used from the below table:

<table>
<thead>
<tr>
<th>S No</th>
<th>Surface Type</th>
<th>Runoff Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cemented / Tiled Roof</td>
<td>0.95</td>
</tr>
<tr>
<td>2</td>
<td>Cemented or Pavement</td>
<td>0.95</td>
</tr>
<tr>
<td>3</td>
<td>Pavement Asphalt</td>
<td>0.9</td>
</tr>
<tr>
<td>4</td>
<td>Open-grid Grass Pavement</td>
<td>0.5</td>
</tr>
<tr>
<td>5</td>
<td>Roof Garden (&gt; 500 mm thickness)</td>
<td>0.1</td>
</tr>
<tr>
<td>6</td>
<td>Garden, Farms, Parks</td>
<td>0.3</td>
</tr>
</tbody>
</table>

Benefits Anticipated:

- Harvesting rainwater will reduce dependence on municipal supply of potable water.
- Rainwater collected could reduce the amount of water being discharged into drains and watercourses thereby reducing the risk of localised flooding.
- Recharging of aquifers maintains or augments natural groundwater, would conserve surface water and combat progressive depletion of groundwater levels.

Documentation required:

- Narrative describing the proposed strategies for Rain water harvesting.
- Details of the rainwater harvesting system specifying storage / harvesting capacity of system.
- Photographs of the implemented measures.
- Document supporting the case 2 to demonstrate the water table level.
WATER CONSERVATION

Guidelines & Examples:

Provide rainwater harvesting system to capture at least 50% of run-off volumes from roof and non-roof areas for a project located in Hyderabad with a total site area of 2000 sqm.

<table>
<thead>
<tr>
<th>S. No</th>
<th>Surface Type</th>
<th>Runoff Coefficient</th>
<th>Area (Sq.m)</th>
<th>Impervious Area (Sq.m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cemented / Tiled Roof</td>
<td>0.95</td>
<td>1000</td>
<td>950</td>
</tr>
<tr>
<td>2</td>
<td>Cemented or Pavement</td>
<td>0.95</td>
<td>500</td>
<td>475</td>
</tr>
<tr>
<td>3</td>
<td>Pavement Asphalt</td>
<td>0.9</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>Open-grid Grass Pavement</td>
<td>0.5</td>
<td>100</td>
<td>50</td>
</tr>
<tr>
<td>5</td>
<td>Roof Garden (&gt; 500 mm thickness)</td>
<td>0.1</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>Garden, Farms, Parks</td>
<td>0.3</td>
<td>400</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>Total Impervious area</td>
<td></td>
<td>1595</td>
<td></td>
</tr>
</tbody>
</table>

Average Normal rainfall per day (m) 0.02
Total roof & nonroof runoff volume (cu.m) 31.9
Total Storage or harvesting capacity (cu.m) 25
Percentage of Rainwater harvesting done 78%

Exemplary Performance:

The project team may earn an Innovation and Design Process credit point (for exemplary performance by showing Reuse of harvested rain water:

Reusing of harvested rain water helps reduce the water requirement on the local municipality or site bore wells.
Water Efficient Plumbing Fixtures

WC Credit 3

Points: 3

Intent:

Enhance efficiency of plumbing fixtures, thereby minimising potable water use

Requirements:

Install all water taps with aerators and water closets with dual flush cistern (1 point each measure)

- Aerators fitted for taps (in dwelling units)
- Water closets with dual flush (in dwelling units)
- Water efficient fixtures in common area toilets

Benefits Anticipated:

- Installation of aerators in taps reduces water consumption
- Reduced water will decrease the load on municipal supply of potable water
- Water conservation reduces the need to overdraw groundwater resources, which are vulnerable to depletion and contamination
- Reduces energy consumption for distribution and wastewater treatment systems

Documentation Required:

Precertification Level

- Summary sheet of the proposed list of plumbing fixtures (flow and flush), with respective make, model and flow rate.
- Schematic drawing showing proposed dual plumbing lines, if treated waste water is reused for flushing.
- Manufacture cut-sheets/ brochures/ letters indicating the flow rates of the proposed plumbing flow and flush fixtures.
WATER CONSERVATION

Certification Level

- Photographs showing the water efficient plumbing fixtures installed.
- Manufacture cut-sheets/ brochures/ letters indicating the flow rates of the installed plumbing flow and flush fixtures.
- Summary sheet of the list of plumbing fixtures (flow and flush) installed, with specific flow rates.
- Purchase invoice or payment receipts/ letter from manufacturer confirming the installation of plumbing fixtures (flow and flush) with make & model.

Guidelines & Examples:

(These guidelines are illustrative)

Aerators fitted to tap and dual Flush Cistern
Waste Water Treatment: 50%, 75%

WC Credit 4 Points: 3

Intent:
Reduce consumption of potable water and waste water generation to minimise the burden on municipal water supply

Requirements:
Provide on-site waste water treatment system to treat minimum 50% of the waste water generated to reduce consumption of potable water: 2 points

Points are awarded as below:

<table>
<thead>
<tr>
<th>% of Waste Water Treated:</th>
<th>Waste water treated x 100</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 50%</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>≥ 75%</td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

(AND / OR)
- Install In-situ Non-mechanical, Biological and natural ways of treating the waste water in STP's: 1 point
  - Consider installing De-centralised sewerage treatment units for cluster of houses.

Benefits Anticipated:
- Self-sufficiency of water needs within the project
- Saves in maintenance costs
- Reduces the dependency on municipal water supply
- Using natural treatment procedures instead of mechanised STP helps reduce energy consumption and other operational and maintenance costs

Documentation required:
Precertification Level
- Narrative describing the proposed on site waste water treatment plant/ system, along with quality standards of waste water treated.
- Tentative daily and annual water balance of the project.
- Site plan highlighting the location of the proposed on-site waste water treatment system.
WATER CONSERVATION

Certification Level

- Narrative describing the installed on-site waste water treatment plant/system, along with quality standards of waste water treated.
- Daily and annual water balance of the project.
- Photographs showing the on-site waste water treatment system installed.
- Site plan highlighting the location of the installed on-site waste water treatment plant/system.

Guidelines & Examples:

(These guidelines are illustrative)

Decentralised Waste Water Treatment system

Phytoremediation

Exemplary Performance:

The project team may earn an Innovation and Design Process credit point (for exemplary performance) by providing on-site waste water treatment system to treat 95% or above of the waste water generated to reduce consumption of potable water.
Treated Waste Water Reuse

WC Credit 5  
Points: 2

Intent:
Encourage use of treated waste water to reduce dependence on potable water

Requirements:
Reuse the treated waste water on-site for reducing the dependency on potable water requirement. Reuse of treated water for the following applications (1 point each measure, max 2 points):

- Flushing
- Landscaping
- Vehicle wash applications/ Other appropriate applications

Benefits Anticipated:
- Self-sufficiency of water needs within the project
- Saves in maintenance costs
- Reduces the dependency on municipal water supply

Documentation required:

Precertification Level
- Narrative describing the proposed use of the treated water on site along with quality standards of waste water reused.
- Submit schematic drawing showing proposed dual plumbing lines, if treated waste water is reused for flushing.
- Tentative daily and annual water balance of project.

Certification Level
- Narrative describing the use of the treated water on site along with quality standards of waste water reused.
- Photographs showing reusing of treated for flushing/ landscaping/ vehicle wash
- Daily and annual water balance of the project.
- Submit schematic drawing showing dual plumbing lines, if treated waste water is reused for flushing.
Management of Irrigation Systems

WC Credit 6  
Points: 2

 Intent:
Reduce water demand for irrigation through water efficient management systems and techniques to reduce dependence on potable water

 Requirements:
Provide or install highly efficient irrigation systems incorporating the features mentioned below: (every two features 1 point, maximum points: 2)

- Central shut-off valve
- Turf and each type of bedding area must be segregated into independent zones based on watering needs
- Sprinklers for turf areas
- Atleast 50% of landscape planting beds must have drip irrigation system to reduce evaporation
- Pressure regulating device(s) to maintain optimal pressure to prevent water loss
- Any other innovative methods for watering

 Benefits Anticipated:
- About 40 - 60% of potable water savings for landscape irrigation
- Controlled and optimised irrigation would result in healthier plants

 Documentation Required:

 Precertification Level
- Narrative describing all the proposed water efficient irrigation systems and techniques.
- Conceptual landscape plan highlighting drip irrigation system.
- Manufacturer’s cut-sheets/ brochures of the proposed water efficient irrigation systems.

 Certification Level
- Narrative describing all the installed water efficient irrigation systems and techniques.
- Landscape plan showing drip irrigation system.
- Manufacturer’s cut-sheets/ brochures of the installed water efficient irrigation systems.
- Photographs showing the installed irrigation systems and techniques.
Water meters for dwelling units

WC Credit 7  Points: 1

Intent:
Encourage water sub-metering to improve the water performance in the project, and thereby save potable water

Requirements:
Provide water meters to all dwelling units

Benefits Anticipated:
- Water meters can help measure any deviations in the water lines and can be diagnosed or corrected to reduce additional water costs.

Documentation Required:

Precertification Level
- A narrative describing the proposed list of water metering system/ equipment in the project.
- Single line diagram showing the proposed water metering system/ equipment. (Optional)

Certification Level
- A narrative describing the installed water metering system/ equipment in the project.
- Single line diagram showing the installed water metering system/ equipment.
- Purchase invoice of installed water meters or Photographs of the installed meters.
Energy Conservation
Energy Efficient Building Envelope

EC Credit 1

Points: 4

Intent:

Improve energy efficiency of the building(s) and system(s) to reduce environmental impacts from excessive energy use.

Requirements:

Implement efficient wall, roof and glazing for building envelope measures to improve the energy efficiency. (1 point for each parameter)

- **Wall:** The project must ensure that the overall U-value of the wall assembly shall meet the baseline criteria based on climatic zones of India as mentioned in the below table:

<table>
<thead>
<tr>
<th>Climate Zone*</th>
<th>Maximum ‘U’-Value of the overall Wall assembly (W/m²K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composite</td>
<td>≤ 2.5</td>
</tr>
<tr>
<td>Hot and Dry</td>
<td>≤ 2.5</td>
</tr>
<tr>
<td>Warm and Humid</td>
<td>≤ 2.5</td>
</tr>
<tr>
<td>Moderate</td>
<td>≤ 1.1</td>
</tr>
<tr>
<td>Cold</td>
<td>≤ 2.5</td>
</tr>
</tbody>
</table>

- **Roof:** The project must ensure that the U-value of the overall Roof assembly shall meet the baseline criteria based on climatic zones of India as mentioned in the below table:

<table>
<thead>
<tr>
<th>Climate Zone*</th>
<th>Maximum ‘U’-Value of the overall roof assembly (W/m²K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composite</td>
<td>≤ 1.2</td>
</tr>
<tr>
<td>Hot and Dry</td>
<td>≤ 1.2</td>
</tr>
<tr>
<td>Warm and Humid</td>
<td>≤ 1.8</td>
</tr>
<tr>
<td>Moderate</td>
<td>≤ 1.2</td>
</tr>
<tr>
<td>Cold</td>
<td>≤ 1.2</td>
</tr>
</tbody>
</table>

- **Glazing:** The project must ensure that the U-value of the Glazing of all windows shall meet the baseline criteria based on climatic zones of India as mentioned in the below table:

<table>
<thead>
<tr>
<th>Climate Zone*</th>
<th>Maximum U-Value (W/m²K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composite</td>
<td>≤ 5.7</td>
</tr>
<tr>
<td>Hot and Dry</td>
<td>≤ 5.7</td>
</tr>
<tr>
<td>Warm and Humid</td>
<td>≤ 5.7</td>
</tr>
<tr>
<td>Moderate</td>
<td>≤ 5.7</td>
</tr>
</tbody>
</table>
ENERGY CONSERVATION

- **Solar Heat Gain Coefficient (SHGC) of Glazing:** The project must ensure that the SHGC of the Glazing of all windows shall meet the baseline criteria based on the window to wall ratio & climatic zones of India as mentioned in the below table.

<table>
<thead>
<tr>
<th>Climate Zone +</th>
<th>Maximum SHGC Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WWR &lt; 20%</td>
</tr>
<tr>
<td>Composite</td>
<td>0.5</td>
</tr>
<tr>
<td>Hot and Dry</td>
<td>0.5</td>
</tr>
<tr>
<td>Warm and Humid</td>
<td>0.5</td>
</tr>
<tr>
<td>Moderate</td>
<td>0.6</td>
</tr>
<tr>
<td>Cold</td>
<td>0.8</td>
</tr>
</tbody>
</table>

**Note:** Materials certified by CII under Green Products Certification Program can be considered by project as an alternative compliance to the above specifications.

**Benefits Anticipated:**
- Reduced energy bills
- Energy cost saving for up to 20-30%

**Documents Required:**

**Precertification Level**
- Narrative stating the climate zone and the list of proposed Energy Conservation Measures (ECMs) to be implemented.
- Comparison of the baseline building parameters and the proposed building parameters.
- Details of proposed glazing along with the list of identified manufacturers and respective specifications of glazing (SHGC value, U-value and VLT). Also, specify proposed window-to-wall ratio (WWR) for each building.

**Certification Level**
- Narrative stating the climate zone and the list of Energy Conservation Measures (ECMs) implemented
- Comparison of the baseline building parameters and the building parameters incorporated.
- Details of glazing along with the list of manufacturers and respective specifications of glazing (SHGC value, U-value and VLT). Also, specify window-to-wall ratio (WWR) for each building.
- Photographs showing the implemented strategies.
Guidelines & Examples:

Common approximate U-values for wall compositions

- Assembly: 230mm Brick wall with 15mm external & 12mm internal plaster
  U-value: 1.91 W/m² K

- Assembly: 200mm concrete block with 15mm external & 12mm internal plaster
  U-value: 3.09 W/m² K

- Assembly: 200mm AAC block with 15mm external & 12mm internal plaster
  U-value: 0.56 W/m² K

- Assembly: 140mm porotherm block with 100mm glass fibre
  U-value: <0.27 W/m² K

- Assembly: 150mm ULC block with 15mm external & 12mm internal plaster
  U-value: 0.80 W/m² K

- Assembly: 100mm RCC wall
  U-value: 5.45 W/m² K

Common approximate U-values for Roof compositions

- Assembly: 100mm RCC slab with 75mm brickbat coba, 20mm external & 12mm internal plaster
  U-value: 2.93 W/m² K

- Assembly: 100mm RCC slab with 75mm XPS, 75mm brickbat coba, 20mm external & 12mm internal plaster
  U-value: 0.43 W/m² K

- Assembly: 100mm RCC slab with 75mm EPS, 75mm brickbat coba, 20mm external & 12mm internal plaster
  U-value: 0.35 W/m² K
Shading Elements for Building Openings

EC Credit 2

Points: 2

Intent:

Incorporate passive architectural features to improve energy efficiency

Requirements:

Implement shading devices over external openings and optimise Window to Wall ratio.

Shading Devices: (1 point)

- At least 80% of the exterior openings (fenestration) shall have sun shades/ chajjas with a projection factor of 0.5 or more.

  (AND / OR)

- Climate responsive concepts and design features as applicable: (1 point)
  - Eg: Extended louvers, punched windows, pergolas, horizontal and vertical landscaping, bamboo chick curtains/blinds

Benefits:

- Reduced energy bills
- Energy cost saving for up to 20-30%

Documentation Required:

Precertification Level:

- Conceptual plans with opening schedules and proposed shading elements.

Certification Level:

- External building photographs showing the shading elements and shading devices.

Guidelines & Examples:

(These guidelines are illustrative)

Shaded balconies

Sun Shades
Efficient Lighting

EC Credit 3  Points: 2

Intent:
Enhance energy efficiency of the building(s) and system(s) to reduce environmental impacts from excessive energy use

Requirements:
Use energy efficient lighting fixtures to reduce the lighting power densities (LPD) in all interior, exterior, common and parking areas. (Any 2 measures, max 2 points)

- Install lighting design such that the lighting power density (LPD) shall meet the following maximum values:

<table>
<thead>
<tr>
<th>Lighting</th>
<th>Applicable Areas</th>
<th>Baseline Lighting Power Density (LPD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interior Lighting (for residential units)</td>
<td>Individual dwelling unit, Apartments</td>
<td>≤ 0.5 W/ft²</td>
</tr>
<tr>
<td>Exterior Lighting, excluding Parking Area</td>
<td>Landscaping, Façade, Street lighting, Pathways, Signage's, etc.,</td>
<td>≤ 0.25 W/ft²</td>
</tr>
<tr>
<td>(for residential &amp; non-residential units)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common Area Lighting, excluding Parking Area</td>
<td>Corridors, Lobbies, Staircases, Terrace, etc.,</td>
<td>≤ 0.4 W/ft²</td>
</tr>
<tr>
<td>(for residential &amp; non-residential units)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parking Area</td>
<td>Surface parking (covered &amp; uncovered), Basement parking</td>
<td>≤ 0.25 W/ft²</td>
</tr>
</tbody>
</table>

Benefits:
- Reduced energy bills
- Energy cost savings up to 20-30%

Documents Required:

Precertification Level

- List of proposed type of lighting fixtures to be installed in all interior, exterior, common and parking areas.
ENERGY CONSERVATION

Certification Level

- Photographs showing the installed energy efficient light fixtures.
- Manufacturer cut-sheets/ brochures/ letters indicating the wattage and type of light fixtures installed.

Guidelines & Examples:

(These guidelines are illustrative)

Replacement of incandescent lamps with high efficiency lamps / CFLs

T5 uses 12 % less energy than T8 tube
T5 uses 45 % less energy than T12 tube
On-site Renewable Energy and Solar Water Heating Systems

EE Credit 4 Points: 2

Intent:
Promote self-sufficiency in energy through renewable technologies for on-site power generation and use within the project.

Requirements:
Install renewable energy systems for atleast 50 % of annual energy consumption for common area lighting (AND/OR) for Solar Water Heating, whichever is applicable. (Max 2 points)

Points are awarded as below:

<table>
<thead>
<tr>
<th>Percentage of Annual energy consumption for common area lighting</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total on-site renewable energy generated annually</td>
<td></td>
</tr>
<tr>
<td>≥ 50 %</td>
<td>1</td>
</tr>
<tr>
<td>≥ 75 %</td>
<td>2</td>
</tr>
</tbody>
</table>

(AND/OR)

| Hot water through solar water heating system as a percentage     | Points |
| of total hot water requirements of a building(s)                |        |
| ≥ 25 %                                                          | 1      |
| ≥ 50%                                                           | 2      |

Note: Consider hot water requirement as 20 litres per person per day

Benefits:
- Reduces the adverse environmental impacts caused by fossil fuel based energy production and use
- Ensures energy security for the country

Documents Required:

Precertification Level *(Renewable Energy)*
- Narrative describing the proposed renewable energy system.
- Proposed list of renewable energy systems with manufacturer details.
- Drawings showing the location of proposed renewable energy systems.
ENERGY CONSERVATION

Certification Level

- Calculations indicating the total annual common area lighting energy consumption (kW) of the project and capacity of the installed RE Systems (kW).
- Purchase invoices of the installed RE Systems.
- Photographs of the installed RE systems

Exemplary Performance:

The project team may earn an Innovation and Design Process credit point for exemplary performance by incorporating both On-site Renewable Energy and Solar Water Heating Systems.
Energy Saving Measures in Appliances & other Equipment

EC Credit 5

Points: 2

Intent:
Conserve energy in the use of appliances and other equipment, thereby reducing environmental impacts.

Requirements:
Provide the following (each application 1 point, Maximum 2 points):

- Pumps: BEE 4-Star rated pumps or Minimum 60% efficiency for pumps for capacity greater than 3HP and ISI certified pumps for others
- Motors: BEE 4-star rated motors (or) Minimum 75% efficiency for motors of capacity greater than 3 HP and ISI certified motors for others
- Other energy efficient equipment/ system

Benefits Anticipated:
- Reduction in energy consumption, thereby reducing associated adverse environmental impacts

Documentation Required:

Precertification Level
- List of the proposed energy efficient appliances & other equipment in the project, with the energy efficiency parameters.

Certification Level
- Manufacturer’s cut-sheets/ brochures of the installed appliances and others equipment.
- Purchase invoices of the installed appliances & equipments.
- Photographs of the installed appliances and other equipment
Materials Conservation
Separation of House-hold Waste

MC Mandatory 1

Intent:
Facilitate segregation of house-hold waste at source so as to prevent such waste being sent to land-fills

Requirements:
- Provide separate bins to collect dry waste (paper, plastic, metals, glass, etc.,) and wet waste (organic).
- Additionally provide separate bins in a centralised/ common facility to collect waste such as e-waste, medical and paper waste.

Benefits:
- Reduces the burden on landfills

Documentation Required:

Precertification Level
- Narrative describing the strategies to be implemented to segregate and divert dry & wet waste from the easily accessible common facility.
- Conceptual plan showing the location of the proposed waste bins at individual unit level and common facilities.

Certification Level
- Narrative describing the strategies adopted to segregate & divert dry & wet waste.
- Purchase invoice of colour coded bins for wet and dry waste segregation for all dwelling units.
- Photographs showing the dry and wet bins along with common segregation area.

Guidelines & Examples:
(These guidelines are illustrative)
Organic waste management: 50%, 75%

MC Credit 1

**Points: 2**

**Intent:**

Ensure effective organic waste management, post-occupancy, so as to prevent waste being sent to landfills.

**Requirements:**

Install on-site waste treatment systems Viz. dump-pits, organic waste converter or Vermi-Composting, etc., to treat at least 50% of the organic waste generated and reuse them for landscaping needs.

Points are awarded as below:

<table>
<thead>
<tr>
<th>% of Organic Waste treated</th>
<th>Organic wasted treated x 100</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total organic waste generated on-site</td>
<td></td>
</tr>
<tr>
<td>≥ 50%</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>≥ 75%</td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

**Benefits Anticipated:**

- Reduces the burden on landfills.
- Encourages the manufacturing industry to re-utilise waste materials. Facilitates local municipal corporations to generate power from waste.
- Improved hygiene.

**Documentation Required:**

**Precertification Level**

- Narrative describing the proposed organic waste treatment system.
- Tentative calculations indicating the amount of organic waste (kitchen waste) generated and treated.
- Conceptual site plan highlighting the location of proposed on-site organic waste treatment system.
- Manufacturer brochure of the proposed organic waste treatment system, as applicable.
Certification Level

- Narrative describing the installed organic waste treatment system
- Calculations indicating the amount of organic waste (kitchen waste) generated and treated.
- Photographs showing the organic treatment implemented on-site

Guidelines & Examples:

(These guidelines are illustrative)

Exemplary Performance:

The project team may earn an Innovation and Design Process credit point for exemplary performance by installing on-site waste treatment systems to treat at least 90% of the organic waste generated and reuse them for landscaping needs.
Handling of Construction Waste Materials: 50%, 75%

MR Credit 2 Points: 2

Intent:
Encourage practices to manage construction waste, thereby, avoiding waste being sent to land-fills.

Requirements:
Avoid atleast 50% of the waste generated (by either weight or volume) during construction from being sent to land-fills.

Points are awarded as below:

<table>
<thead>
<tr>
<th>Construction Waste Materials reused x 100</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total construction waste generated on-site</td>
<td></td>
</tr>
<tr>
<td>≥ 50%</td>
<td>1</td>
</tr>
<tr>
<td>≥ 75%</td>
<td>2</td>
</tr>
</tbody>
</table>

Notes:
• Excavated earth & stones should not be considered under this credit, as these are natural resources.
• Temporary materials such as materials used for form-work, scaffolding shall not be considered for credit calculations.

Benefits Anticipated:
❖ Reduces the burden on landfills and associated environmental impacts.
❖ Reduces impacts associated with resource extraction & processing.
❖ Facilitates conservation of virgin materials.
❖ Better waste management contributes towards mitigating the effects of global climate change.

Documents Required:

Precertification
❖ Site plan highlighting the proposed construction waste management yard.
❖ List of construction waste materials likely to be generated and diverted from landfills for reuse and recycle
Certification

- Site plan highlighting the construction waste management yard.
- Calculations indicating the amount of waste generated, reused, recycled and sent to landfill, either by weight or volume.
- Photographs showing the construction waste management.

Exemplary Performance:

The project team may earn an Innovation and Design Process credit point (for innovative practices) by using waste material generated on-site as/ in building elements/ features/ structural elements/ other appropriate applications.
Use of Local Material: 50%, 75%, 95%

MC Credit 3  
Points: 3

Intent:
Encourage use of building materials available locally thereby minimising the associated environmental impacts resulting from transportation

Requirements:
- Source atleast 50% materials which are extracted and manufactured, locally within a distance of 400 kms
- Survey and identify building materials which are in the specified distance, in early stages of project design.

Points are awarded as below:

<table>
<thead>
<tr>
<th>% of Local materials used:</th>
<th>Local materials used x 100</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>50%</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>75%</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>95%</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

*Note: Total cost of materials does not include the labour charges.

Benefits:
- Decreased transportation costs for the project
- Encourages vernacular architecture
- Supports local economy

Documentation Required:

Precertification Level
- Narratives describing the proposed strategies implemented to source local materials
  - List/ Bill of Quantities (BOQ) of proposed local materials specifying approximate distance from the project site to place of manufacturing units
Certification Level

- Narratives describing the strategies implemented to source local materials.
  - List of procured local materials specifying approximate distance from the project site to place of manufacturing units.
- Calculations indicating the percentage of local materials sourced (in terms of cost) with respect to the total materials cost of the project.
- Supplier/ vendor declaration letter indicating the distance from the project site to the place of manufacturing unit.
Materials with Recycled Content: 10%, 20%, 30%

MC Credit 4 Points: 3

**Intent:**
Encourage use of materials which contain recycled content to reduce environmental impacts associated with the use of virgin materials

**Requirements:**
- Use materials with recycled content such that the total recycled content constitutes at least 10% of the total cost of the materials used in the building(s)
- Survey the materials with recycled content and locate such local suppliers
- Consider using the following materials with recycled content:
  - Fly ash / AAC / CLC / Phosphogypsum / red mud blocks
  - Cement
  - Composite wood
  - Glass
  - Steel
  - Tiles
  - Falgy (Fly ash + Lime + Gypsum)

Points are awarded as below:

<table>
<thead>
<tr>
<th>Recycled content material:</th>
<th>Recycled materials used in project x 100 Total Cost of the materials*</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>20%</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>30%</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

*Notes:
- Total cost of materials does not include the labour charges.
- Materials certified by CII under Green Products Certification Program can be considered by project as a compliance with the above specification
Benefits Anticipated:

- Eliminates energy use and associated pollution that result from extraction of virgin resources & production of building materials.
- By diverting recyclable materials, construction waste volumes are reduced, that would otherwise be deposited in a landfill.

Documentation Required:

Precertification Level

- Narratives describing the proposed strategies implemented to source materials with recycled content.
  - List of proposed recycled content materials specifying approximate recycled content.
  - List of proposed manufacturers to source materials with recycled content.

Certification Level

- Narratives describing the strategies implemented to source materials with recycled content
  - List of recycle content materials specifying approximate recycled content
  - List of manufacturers to source materials with recycled content
- Calculations indicating the percentage of recycled materials (in terms of cost) with respect to the total materials cost of the project
- Manufacturer letters/ cut-sheets/ brochures indicating the recycled content in the materials sourced.
### Guidelines & Examples:

*(These guidelines are illustrative)*

<table>
<thead>
<tr>
<th>Material/ Product Name</th>
<th>Manufacturer Name</th>
<th>Quantity</th>
<th>Material/ Product cost</th>
<th>Percentage of Recycled content</th>
<th>Recycled content value (Rs)</th>
<th>Information Source (Please choose from drop down)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cement</td>
<td>ACC limited</td>
<td>1,67,892 cu.ft</td>
<td>99 1,66,21,308</td>
<td>20.00%</td>
<td>33,24,262</td>
<td>Mnf letter</td>
</tr>
<tr>
<td>Reinforcement</td>
<td>Bhagya lakshmi rolling limited</td>
<td>5,39,653 Kg</td>
<td>51 2,75,22,303</td>
<td>35.00%</td>
<td>96,32,806</td>
<td>others</td>
</tr>
<tr>
<td>Brick works (6&quot; flyash blocks)</td>
<td>Ashtech Pvt Ltd</td>
<td>1,33,625 Sq.ft</td>
<td>45 60,13,125</td>
<td>70.00%</td>
<td>42,09,188</td>
<td>Mnf letter</td>
</tr>
<tr>
<td>Windows</td>
<td>Ken</td>
<td>25,697 Sq.ft</td>
<td>70 17,98,790</td>
<td>15.00%</td>
<td>2,69,818</td>
<td>others</td>
</tr>
<tr>
<td>Other Materials</td>
<td></td>
<td></td>
<td>5,52,00,000</td>
<td>0.00%</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Total Material cost</td>
<td></td>
<td></td>
<td></td>
<td>(Rs) 1,07,15,526</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Recycled Value</td>
<td></td>
<td></td>
<td></td>
<td>(Rs) 1,74,36,074</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage</td>
<td></td>
<td></td>
<td></td>
<td>16.2%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appropriate Technologies: 25%, 50%, 75%, 95%

MC Credit 5  

Points: 4

Intent:
Encourage use of appropriate and alternative construction technologies to conserve natural resources and thereby reduce environmental impacts

Requirements:
At least 50% (by cost) of the structure should be constructed using appropriate and cost effective technologies without compromising on strength, durability & functional performance and encourage use of alternative technologies.

<table>
<thead>
<tr>
<th>Cost of Structure constructed with alternative technologies x 100</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Cost of the structure</td>
<td></td>
</tr>
<tr>
<td>25%</td>
<td>1</td>
</tr>
<tr>
<td>50%</td>
<td>2</td>
</tr>
<tr>
<td>75%</td>
<td>3</td>
</tr>
<tr>
<td>95%</td>
<td>4</td>
</tr>
</tbody>
</table>

Project can consider using the following technologies:

- Monolithic Concrete Construction
- Precast Concrete Construction for Super structures
- Glass Fiber Reinforced Gypsum (GFRG) Panel Building System
- Use of Compressed Stabilized Earth Blocks
- Filler Slabs
- Any other innovative technologies

Notes: For further details on available alternative technologies please refer to Building Materials & Technology Promotion Council (BMTPC)

Benefits Anticipated:

- Fast track construction
- Minimum wastage of materials
- Better strength and durability
- Provides quality working environment for the Work force
MATERIALS CONSERVATION

Documentation Required:

Precertification Level

❖ Narratives describing the proposed strategies for use of alternate construction techniques.

Certification Level

❖ Narratives describing the strategies for use of alternate construction techniques
❖ On-site photographs of the implemented alternate construction techniques
❖ Calculation showing percentage of cost involved in construction of appropriate and cost effective technologies without compromising on strength, durability & functional performance.

Guidelines & Examples:

(These guidelines are illustrative)

Monolithic Concrete Construction - BDA

GFRG Demonstration Building – IIT Madras
Alternative Construction Materials: 25%, 50%

MC Credit 6 Points: 2

Intent:
Encourage use of alternative construction materials to conserve natural resources and thereby reduce environmental impacts

Requirements:
Atleast 25% of the alternative materials should be used in the building construction.

<table>
<thead>
<tr>
<th>Cost of alternative Construction materials x 100</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Cost of the Construction materials used</td>
<td></td>
</tr>
<tr>
<td>25%</td>
<td>1</td>
</tr>
<tr>
<td>50%</td>
<td>2</td>
</tr>
</tbody>
</table>

Project can consider using the following alternative building construction materials:

- Innovative curing materials
- Use Ground-granulated blast-furnace slag (GGBS or GGBFS) to minimise cement usage
- Replace natural sand with slag sand/artificial sand
- Other alternative construction materials

Note: Materials certified by CII under Green Products Certification Program can be considered by project as a compliance to the above specifications.

Benefits Anticipated:

- Savings in natural resources consumption. Use of curing compounds will save huge consumption of water for construction
- Better strength and durability
- Provides quality working environment for the Work force

Documentation Required:

Precertification Level

- Narrative describing the proposed strategies for use of alternate construction materials to replace the natural resources in construction.
- Proposed list of identified vendors as applicable
MATERIALS CONSERVATION

Certification Level

- Narratives describing the strategies for use of alternate construction materials & to replace the natural resources in construction.
- On-site photographs of the implemented alternate construction materials.
- Cut-sheets/ brochures from manufacturers.

Exemplary Performance:

The project team may earn an Innovation and Design Process credit point (for innovative practices) by using atleast 75% of the alternative materials should be used in the building construction.
Indoor Environment Quality (IEQ)
Tobacco Smoke Control

IEQ Mandatory Requirement 1

Intent:
Minimise exposure of non-smokers to the adverse health impacts arising due to passive smoking, post occupancy.

Requirements:
Smoking should be prohibited in all the common areas of the building.

Benefits Anticipated:
- Reduces health hazards caused due to passive smoking
- Improves air quality thereby improving the health of the community as a whole

Documents Required:

Precertification Level
- ‘No smoking’ policy mentioned in the green guidelines document.
- Proposed implementation strategies to be adopted to control smoking on site.

Certification Level
- Photographs showing no smoking signages in the project.
- ‘No smoking’ policy mentioned in the green guidelines document.
Day lighting: 75%, 95%

IEQ Credit 1 Points: 2

Intent:
Ensure connectivity between the interior and the exterior environment, by providing adequate daylighting

Requirements:
Achieve a minimum glazing factor (GF) or lux level for all regularly occupied spaces.

- Multiple openings of adequate window sizes to the exteriors, openings in proper orientation preferably north or east facing

Points are awarded as below:

<table>
<thead>
<tr>
<th>% of Daylighting</th>
<th>Regularly occupied area with GF x 100</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Regularly occupied area</td>
<td></td>
</tr>
<tr>
<td>75%</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>95%</td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

Option 1: Prescriptive Approach

Achieve minimum glazing factors as listed below in atleast 50% of the regularly occupied spaces in each dwelling unit.

Glazing factors for Regularly Occupied Spaces

<table>
<thead>
<tr>
<th>Type of Regularly Occupied Spaces</th>
<th>Glazing Factor (GF)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Living/ Bedroom</td>
<td>1</td>
</tr>
<tr>
<td>Multi-purpose room</td>
<td>1</td>
</tr>
<tr>
<td>Kitchen</td>
<td>2</td>
</tr>
</tbody>
</table>

Note:
For other regularly occupied spaces which are not listed in the table above, a minimum glazing factor of 1 should be achieved.

Glazing Factor Calculation:

Glazing factor can be calculated using the formula given below:

$$\text{Glazing Factor} = \frac{\text{Window Area [sq.m] x Actual Visible Transmittance of Glazing x Constant x 100}}{\text{Floor Area [sq.m]}}$$
Constant Values:

Windows on wall : 0.2
Window on roof (skylight) : 1.0

Notes:

- Regularly occupied spaces include living room, bed rooms, dining room, study room, kitchen, etc.,
- Regularly occupied spaces which are used for multi- purpose, such as living-cum-dining room, can be considered as separate spaces based on the function. The room boundary need not be a physical boundary.
- Window openings where the angle of obstruction of objects obscuring the sky dome is greater than 700 from the horizontal shall not be considered for daylight calculations (refer figure no.1)

![Figure – Angle of Obstruction](image)

Option 2: Measurement/ Simulation Approach

Demonstrate through daylight illuminance measurement that 50% of the regularly occupied spaces in the building achieve daylight illuminance levels for a minimum of 110 Lux.

Measurements shall be taken at 2 feet 6 inches height at 9 am, 12 pm, and 3 pm, on a 10 foot square grid.

(OR)

Demonstrate through computer simulation that 50% of the regularly occupied spaces in the building achieve daylight illuminance levels for a minimum of 110 Lux in a clear sky condition on 21st September at 12 noon, at 2 feet 6 inches height.
INDOOR ENVIRONMENT QUALITY (IEQ)

Benefits Anticipated:

- Lower electricity bills
- Improves quality of life
- Connectivity to exterior environment.
- Better health and well-being of occupants.

Documentation Required:

Precertification Level

- Proposed site/ master plan showing all the buildings & floor plans.
- Calculations indicating proposed door/ window schedules.

Certification Level

- Site/ master plan showing all the buildings and floor plans.
- Calculations indicating door/window schedules.
- Manufacturer/ brochure/ cut-sheet / letter of proposed glass showing the visual light transmittance.
- Simulation reports where applicable.

Guidelines & Examples:

(These guidelines are illustrative)

Daylighting
Fresh Air Ventilation: 50%, 75%

IEQ Credit 2 Points: 2

Intent:
Avoid indoor pollutants by providing adequate outdoor air ventilation, thereby enhancing the indoor environment quality

Requirements:
- Provide openable windows or doors and ventilators to the exteriors in all regularly occupied spaces of each dwelling unit such that the openable area is designed as outlined in the table below:

<table>
<thead>
<tr>
<th>Space type</th>
<th>Net Openable area as a percentage:</th>
<th>Openable area x 100</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>of total carpet area*</td>
<td>Total carpet area</td>
</tr>
<tr>
<td>Living Spaces</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>Kitchen</td>
<td>8%</td>
<td></td>
</tr>
<tr>
<td>Bathrooms*</td>
<td>4%</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
- *Net Openable area as a percentage of total carpet area shall be calculated room by room
- For sliding windows / doors, only openable area to the exteriors shall be considered in calculations

Points are awarded as below:

<table>
<thead>
<tr>
<th>Percentage of Ventilation in Regularly Occupied Spaces:</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of rooms meeting above criteria</td>
<td></td>
</tr>
<tr>
<td>Total regularly occupied area</td>
<td></td>
</tr>
<tr>
<td>50%</td>
<td>1</td>
</tr>
<tr>
<td>75%</td>
<td>2</td>
</tr>
</tbody>
</table>

Benefits:
- Enhances indoor air quality
- Improves quality of life
- Good health and wellbeing of the occupants
INDOOR ENVIRONMENT QUALITY (IEQ)

Documentation Required:

Precertification Level

❖ Conceptual site/ master plan showing all the buildings and floor plans.
❖ Proposed door and window schedules.
❖ Tentative calculations showing percentage of ventilation in regularly occupied spaces.

Certification Level

❖ Site/master plan showing all the buildings and floor plans
❖ Door and window schedules
❖ Calculations showing percentage of ventilation in regularly occupied spaces
❖ Photographs of the interior spaces showing windows

Guidelines & Examples:

*These guidelines are illustrative*

Ventilation
Cross Ventilation: 50%, 75%

IEQ Credit 3 Points: 2

Intent:
Encourage adequate cross ventilation in the design thereby, providing a healthy environment.

Requirements:
Provide openable doors / windows / ventilators to the exteriors in all regularly occupied spaces of each dwelling unit in atleast two of the orientations.

<table>
<thead>
<tr>
<th>Percentage of regularly occupied spaces with cross ventilation in regularly occupied spaces</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥50%</td>
<td>1</td>
</tr>
<tr>
<td>≥75%</td>
<td>2</td>
</tr>
</tbody>
</table>

Notes:
- Regularly occupied spaces include living room, bed room, dining room, study room, kitchen.
- The windows/ ventilators should not have any obstruction within 2 m from outside surface.
- The openings considered should meet IEQ Credit 2.
- Regularly occupied spaces with an opening to the outdoors only in one orientation can also be considered for calculations, if there is a permanent opening to the adjoining room which meets cross ventilation criteria.

Benefits Anticipated:
- Enables good circulation of fresh air
-Flushes out contaminants and provide a better indoor environment

Documents Required:

Precertification Level
- Conceptual floor plans with door/ window schedules for each typical dwelling unit.
- Tentative calculations indicating regularly occupied spaces compliant with cross ventilation.

Certification Level
- Floor plans with door/ window schedules for each typical dwelling unit.
- Calculations indicating regularly occupied spaces compliant with cross ventilation.
- Photographs of opening and windows promoting cross ventilation.
Exhaust Systems

IEQ Credit 4

Points: 2

Intent:

Ensure that bathrooms and kitchen are adequately ventilated, so as to improve the quality of the indoor environment.

Requirements:

Design exhaust systems in bathrooms as per the requirements provided in the table below:

<table>
<thead>
<tr>
<th>Location</th>
<th>Floor Area</th>
<th>Minimum Airflow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bathroom</td>
<td>≤ 4.64 sq.m (50 sq.ft)</td>
<td>50 cfm</td>
</tr>
<tr>
<td>Kitchen</td>
<td>≤ 9.3 sq.m (100 sq.ft)</td>
<td>100 cfm</td>
</tr>
</tbody>
</table>

- Mechanical Exhaust system: (1 point)
  
  (AND / OR)

- Ventilators or openings above lintel level: (1 point)
  
  Incorporated with mesh to keep insects out

Notes:

- For bathrooms with higher floor areas than the above values, airflow has to be proportionally increased.
- Ensure exhaust systems take away the polluted indoor air to the outdoors (i.e. exhaust outlets into common areas are not allowed).

Benefits Anticipated:

- Flushes out contaminants and provide a better indoor environment

Documents Required:

Precertification Level

- Conceptual floor plan showing the location of exhaust systems or ventilators in bath rooms and kitchens.
- Technical specifications of the proposed exhaust system(s) where applicable.

Certification Level

- Technical specifications of the installed exhaust system(s) and photographs.
- Purchase invoice/ payment receipts and photographs showing the installed exhaust systems.
- Floor plans showing the location of exhaust systems in bathrooms & kitchens.
Low VOC Materials, Paints & Adhesives

IEQ Credit 5 Points: 2

Intent:
Encourage use of materials with low emissions so as to reduce adverse health impacts on building occupants

Requirements:
Use low VOC paints, sealants and adhesives to reduce adverse health impacts on building occupants.

✦ Use lime based surface treatments / Low VOC paints (1 point) (AND / OR)

✦ For adhesives and sealants used within the interiors, ensure that the VOC content does not exceed the limits as specified in the table below (1 point)

<table>
<thead>
<tr>
<th>Type of material</th>
<th>VOC Limit (g/L less water)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paints:</td>
<td></td>
</tr>
<tr>
<td>Non-flat (Glossy) paints</td>
<td>150</td>
</tr>
<tr>
<td>Flat (Mat) paints</td>
<td>50</td>
</tr>
<tr>
<td>Anti-corrosive/ anti-rust paints</td>
<td>250</td>
</tr>
<tr>
<td>Varnish</td>
<td>350</td>
</tr>
<tr>
<td>Adhesives:</td>
<td></td>
</tr>
<tr>
<td>Glazing adhesive</td>
<td>100</td>
</tr>
<tr>
<td>Tile adhesives</td>
<td>65</td>
</tr>
<tr>
<td>Wood adhesive</td>
<td>30</td>
</tr>
<tr>
<td>Wood flooring adhesive</td>
<td>100</td>
</tr>
</tbody>
</table>

Benefits Anticipated:
✦ Reduces impact on health of occupants.
✦ Eliminates sick building syndrome.

Documentation Required:

Precertification Level
✦ List of proposed low or no VOC content materials (make & model) to be used in the building interiors.

Certification Level
✦ List of low or no VOC content materials (make & model) used in the building interiors
✦ Purchase invoice/ payment receipts of the paint & adhesives sourced for the project
✦ Manufacturer/ brochure/ cut-sheet/ letter of proposed Low VOC materials, paints and Adhesives.
**Occupant Well-being Facilities**

**IEQ Credit 6**

**Points: 1**

**Intent:**

Provide occupant well-being facilities, so as to enhance physical, emotional and spiritual well-being of building occupants.

**Requirements:**

Demonstrate that the project has community well-being facilities of appropriate size (such as yoga/meditation room/ reading room or any gathering space and common seating spaces).

**Benefits:**

- Enhance social connectivity
- Promote health & wellbeing

**Documents Required:**

**Precertification Level**

- List of proposed community well-being facilities
- Conceptual drawing highlighting total area of the facility with dimensions and calculation of number of people it caters to.
- Provide conceptual plans highlighting proposed community well-being facilities.

**Certification Level**

- Plans highlighting proposed community well-being facilities.
- Drawings highlighting total area with dimensions of the well-being facilities and calculation of number of people it caters to.
- Photographs of facility provided for occupant’s well-being.
Innovation & Design Process
Innovation & Design Process

Innovative practices Credit 1  Points: 2

Intent:
Provide design teams and projects an opportunity to attempt for innovative performance in green building categories not specifically addressed by the IGBC Green Affordable Housing Rating System.

Requirements:
Credit 1.1: Innovative practices (1 point for each of the credits; maximum 2 points)
The projects can also identify the innovation strategies those are not addressed by any existing credits in the rating system. Identify the intent of the proposed innovation credit, to achieve significant, measurable environmental performance requirements for compliance of the credit.

Credit 1.2: Innovative practices
Same as credit 1.1

Benefits Anticipated:
- Leads to more sustainable design/practices thereby benefiting the environment

Documentation Required:

Precertification Level
- A narrative describing intent, requirements, proposed potential strategies and technologies adopted to achieve the respective innovative practices credit. Strategies proposed must be significantly better than standard sustainable design practices
- Tentative quantitative performance improvements, comparing a baseline and design case.
- Other supporting documents such as drawings, photographs, illustrations, cut sheets, test reports, etc., as applicable

Certification Level
- A narrative describing intent, requirements, potential strategies and technologies adopted in the respective innovation credits. Strategies adopted must be significantly better than standard sustainable design practices
- Quantitative performance improvements, comparing a baseline and design case.
- Other supporting documents such as drawings, photographs, illustrations, cut sheets, test reports, etc., as applicable
Exemplary Performance Credit 2

Points: 2

Intent:
Exemplary performance strategies result in performances that greatly exceed the performance level or expand the scope required by an existing Green Affordable Housing credit. To earn exemplary performance credits, teams must meet the performance level defined by the next step in the threshold progression. For credits with more than 1 compliance path, an Innovation and Design Process point can be earned by satisfying more than 1 compliance path if their benefits are additive.

Requirements:
Credit 2.1: Exemplary Performance (1 point for each of the credits; maximum 2 points)
Identify the intent of the proposed Exemplary Performance credit, the proposed requirement for compliance and the proposed documentation to demonstrate compliance and the design approach used to meet the required measures.
Credit 2.2: Exemplary Performance
Same as credit 2.1

Benefits Anticipated:
- Leads to more sustainable design/ practices thereby benefiting the environment

Documentation Required:

Precertification Level
- A narrative describing intent, requirements, proposed potential strategies and technologies adopted to achieve the respective exemplary performance. Strategies proposed must be significantly better than standard sustainable design practices.
- Tentative quantitative performance improvements, comparing a baseline and design case.
- Other supporting documents such as drawings, photographs, illustrations, cut sheets, test reports, etc., as applicable

Certification Level
- A narrative describing intent, requirements, potential strategies and technologies adopted in the respective exemplary performance credits. Strategies adopted must be significantly better than standard sustainable design practices
- Quantitative performance improvements, comparing a baseline and design case.
- Other supporting documents such as drawings, photographs, illustrations, cut sheets, test reports, etc., as applicable
IGBC Accredited Professional

ID Credit 2  Points: 1

Intent:
Support and encourage involvement of IGBC Accredited Professional in green affordable housing projects, so as to integrate appropriate design measures and streamline certification process

Requirements:
Atleast one principal participant of the project team shall be an IGBC Accredited Professional.

Benefits Anticipated:
- Hand holding the project team in designing green buildings.
- Impart knowledge to other team members about green buildings.

Documents Required:

Precertification Level
- A copy of IGBC Accredited Professional certificate of the principal participant.

Certification Level
- A copy of IGBC Accredited Professional certificate of the principal participant.
### Additional Investment for Green Features

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Green Guideline Measures</th>
<th>Investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Top Soil Preservation &amp; Reuse: Top soil preservation Water Spray for Dust Suppression</td>
<td>No Investment</td>
</tr>
<tr>
<td>2</td>
<td>Preservation or Transplantation of trees: Preserve Fully grown trees (or) Tree Transplantation</td>
<td>Tree Preservation: No additional investment Tree Transplantation: Rs. 7,000 - Rs. 25,000/-</td>
</tr>
<tr>
<td>3</td>
<td>Basic Household Amenities</td>
<td>No additional investment</td>
</tr>
<tr>
<td>4</td>
<td>Heat Island Effect: Non Roof Open Grid Pavers Grass pavers</td>
<td>Open Grid: Rs. 20/- per sq.ft Grass Pavers: Rs. 50/- per sq.ft</td>
</tr>
<tr>
<td>5</td>
<td>Heat Island Effect: Roof White Paint, China Mosaic tiles, White Tiles</td>
<td>White Paint: Rs. 15/- per sq.ft China Mosaic Tiles: Rs 20/- per sq.ft White Tiles: Rs 40/- per sq.ft</td>
</tr>
<tr>
<td>6</td>
<td>Parking facilities for Tenements</td>
<td>No additional investment</td>
</tr>
<tr>
<td>7</td>
<td>Design for Differently Abled</td>
<td>No additional investment</td>
</tr>
<tr>
<td>8</td>
<td>Well Being of Construction Workforce</td>
<td>No additional investment</td>
</tr>
<tr>
<td>9</td>
<td>Rain Water Harvesting: 1. Rainwater Recharge 2. Rainwater storage</td>
<td>No additional investment</td>
</tr>
<tr>
<td>10</td>
<td>Water Efficient Fixtures: Aerators Dual flush Cisterns</td>
<td>Aerator: Rs. 10/- per Tap Dual flush Cistern: Rs 1,000/- per WC</td>
</tr>
<tr>
<td>11</td>
<td>Waste Water Treatment &amp; Reuse</td>
<td>Phytoremediation: Rs. 5 Lakhs for 10 KLD Decentralised Wastewater Treatment Systems: Rs. 5-6 Lakhs for 10KLD Max Rs. 10,000/- per dwelling unit</td>
</tr>
<tr>
<td>12</td>
<td>Irrigation Systems</td>
<td>Rs. 40,000/- per acre</td>
</tr>
<tr>
<td>13</td>
<td>Water Metering</td>
<td>Rs. 600/- per meter</td>
</tr>
<tr>
<td>Sl. No</td>
<td>Green Guideline Measures</td>
<td>Investment</td>
</tr>
<tr>
<td>--------</td>
<td>---------------------------------------------------------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>14</td>
<td>Efficient Building Envelope</td>
<td>Marginal</td>
</tr>
<tr>
<td></td>
<td>• Wall</td>
<td>Rs. 40/- per sq.ft</td>
</tr>
<tr>
<td></td>
<td>• Roof</td>
<td>Rs. 20/- per sq.ft</td>
</tr>
<tr>
<td></td>
<td>• Glass</td>
<td>No additional investment</td>
</tr>
<tr>
<td>15</td>
<td>Energy efficient lighting fixtures: T5s, CFLs, LEDs</td>
<td>T5s (28W): Rs. 250/- per fixture</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CFL (20W): Rs. 130/- per fixture</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LED (12W): Rs. 300/- per fixture</td>
</tr>
<tr>
<td>16</td>
<td>Onsite renewable energy</td>
<td>Rs. 1 lakh per kW</td>
</tr>
<tr>
<td>17</td>
<td>Waste Segregation and Organic Waste Management: Segregation</td>
<td>Segregation</td>
</tr>
<tr>
<td></td>
<td>and Organic Waste Conversion</td>
<td>2 Bins: Rs. 200/-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Organic Waste Conversion</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dump Pits: Rs. 2,000/- per pit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vermi composting: Rs. 6,000/- per Ton</td>
</tr>
<tr>
<td>18</td>
<td>Local Materials</td>
<td>No additional investment</td>
</tr>
<tr>
<td>19</td>
<td>Materials with Recycled content</td>
<td>No additional investment</td>
</tr>
<tr>
<td>20</td>
<td>Alternative Technologies &amp; Materials</td>
<td>Marginal Investment</td>
</tr>
<tr>
<td>21</td>
<td>Daylighting</td>
<td>No additional investment</td>
</tr>
<tr>
<td>22</td>
<td>Ventilation</td>
<td>No additional investment</td>
</tr>
<tr>
<td>23</td>
<td>Low VOC Paints – Lime paints</td>
<td>Marginal Investment</td>
</tr>
<tr>
<td>24</td>
<td>Exhaust Systems</td>
<td>Rs. 400/- per fan</td>
</tr>
</tbody>
</table>
Abbreviations

- BEE – Bureau of Energy Efficiency
- DEWATS - Decentralized Wastewater Treatment Systems
- ECBC – Energy Conservation Building Code
- FSI /FAR – Floor Space Index / Floor Area Ratio
- LED – Light emitting diode
- MoEF – Ministry of Environment and Forestry
- NBC – National Building Code of India
- RE – Renewable Energy
- STP – Sewage Treatment Plant
- VOC – Volatile Organic Compound
Glossary of Terms

**Adapted Plants**: Plants that reliably grow well in a given habitat with minimal attention from humans in the form of winter protection, pest protection, water irrigation, or fertilization once root systems are established in the soil. Adapted plants are considered to be low maintenance but not invasive.

**Aerator** is often found at the tip of water faucets. Aerators can be simply screwed onto the faucet head, creating a non-splashing stream and often delivering a mixture of water and air.

**Agrifiber** is composite panel product derived from recovered agricultural waste fiber from sources including, but not limited to, cereal straw, sugarcane bagasse, sunflower husk, walnut shells, coconut husks, and agricultural prunings. The raw fibers are processed and mixed with resins to produce panel products with characteristics similar to those derived from woodfiber.

**BEE Star Rating System** for building, developed by Bureau of Energy Efficiency, Ministry of Power, Govt. of India, rates energy efficient buildings based on their actual performance in terms of specific energy use. The Rating is on 1-5 scale, with 5 labelled buildings being the most efficient. ([http://www.beeindia.in/](http://www.beeindia.in/))

**Biodiversity**: The variety of life in all forms, levels and combinations, including ecosystems diversity, species diversity, and genetic diversity.

**Day lighting** is the controlled admission of natural light into a space through glazing with the intent of reducing or eliminating electric lighting. By utilizing solar light, day lighting creates a stimulating and productive environment for building occupants.

**The Decentralised wastewater treatment system** is a simple design, non-dependent on energy, reliable, long-lasting, tolerant towards inflow fluctuation and low in costs. It can treat organic wastewater from domestic and industrial sources.

**Development footprint** is the area affected by development or by project site activity. Hardscape, access roads, parking lots, non-building facilities, and the building itself are all included in the development footprint.

**Dual flush toilet**: A dual-flush toilet is a variation of the flush toilet that uses two handles to flush different levels of water. The smaller level is designed for liquid waste, and the larger is designed for solid waste.

**Erosion**: A combination of processes in which materials of the earth's surface are loosened, dissolved or worn away, and transported from one place to another by natural agents (such as water, wind or gravel).

**E-waste**: It includes discarded materials from a range of electronic devices such as computers, refrigerators, televisions, air-conditioners, personal stereos, mobile phones etc.

**Fly Ash**: The solid residue derived from incineration processes. Fly ash can be used as substitute for Portland cement in concrete.
**Flow rate**: Flow rate is a parameter used to mark the efficiency of appliances using liquids. For water fixtures, flow rates give the amount of water (in litres) that flows from a particular fixture in a given time (in minutes).

**Grass Pavers**: Cellular blocks with grass growing in the voids. These are mostly used for external paving, gardens. They need maintenance and have good infiltration capacity.

**Heat Island Effect**: Occurs when warmer temperatures are experienced in urban landscapes compared to adjacent rural areas as a result of solar energy retention on constructed surfaces. Principal surfaces that contribute to the heat island effect include streets, sidewalks, parking lots and buildings.

**Impervious areas** are surfaces that promote runoff of precipitation volumes instead of infiltration into the subsurface.

**Landfills** are waste disposal sites for solid waste from human activities.

**Landscape Area**: Area of the site equal to the total site area less the building footprint, paved surfaces, water bodies, patios. Etc.,

**Lighting Power Density (LPD)** is the installed lighting power, per unit area.

**Low-flow fixtures** use high pressure to produce a comfortable, pleasing flow without using much water.

**LUX (lx)** is the SI unit of illuminance and luminous emittance, measuring luminous flux per unit area. It is equal to one lumen per square metre.

**Native (Indigenous) Plants**: Any plant species that occurs and grows naturally in a specific region. Native plant species do not require watering other than during the initial years of establishment.

**Open Space Area**: The property area minus the development footprint or as defined by local zoning requirements. Open space must be vegetated and pervious, also includes non-vehicular, pedestrian oriented hardscape spaces.

**Open grid pavers** are less than 50% impervious and accommodates vegetation in the open cells.

**Phytoremediation** is a Natural Biological system that has emerged as a safe, efficient and cost effective solution for remediation of water or soil contaminated by wide array of contaminants. Phytoremediation acts as a powerful physical, chemical and biological filter by the use of plants for the removal of pollutants from contaminated soil or water.

**Potable Water**: Water suitable for drinking and supplied from wells or municipal water systems.

**Projection Factor** is a ratio of the length of overhang projection divided by height from window sill to the bottom end of the overhang (must be permanent).

**Recycled content** is the proportion, by mass, of preconsumer or postconsumer recycled material in a product.(IS 14021).
**Regularly occupied spaces** include living room, bed room, dining room, study room, kitchen etc.

**Sewage Treatment:** It is a process of removing contaminants from waste water and house-hold sewage. Its objective is to produce an environmentally safe fluid waste stream suitable for disposal or reuse using advanced technology it is possible to reuse sewage affluent for drinking water.

**Sick building syndrome** is a situation in which a substantial portion of building occupants experience acute discomfort and negative health effects as result of exposure to contaminated air inside the building.

**Solar Reflective index (SRI)** is a measure of a material’s ability to reject solar heat, as shown by a small temperature rise. It is defined so that a standard black (reflectance 0.05, emittance 0.90) is 0 and standard white (reflectance 0.80, emittance 0.90) is 100. Materials with highest SRI values are the coolest choice for paving.

**Top soil conservation:** The process of removing and protecting the top soil from any construction or development site for reusing it onsite later.

**Transplantation:** The process of digging up a plant / tree and moving it to another location.

**U – Value:** The heat transmission in unit time through unit area of a material or construction and boundary air films, induced by unit temperature difference between the environments on each side.

**Vegetated area:** The area in the site which has plantation or greenery on it in any form, such as shrubs, grass, trees etc.

**Volatile Organic Compounds (VOCs)** are carbon compounds that participate in atmospheric photochemical reactions (excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides and carbonates and ammonium carbonate). The compounds vaporise (become a gas) at normal room temperatures.

**Walking distance** is the length of the walkable pathway between the building and public transportation.

**Window-to-Wall Ratio (WWR)** of a building is the percentage of its facade taken up by light-transmitting glazing surfaces, including windows and translucent surfaces such as glass bricks.