IGBC Green Interiors

Detailed Reference Guide 2021

IGBC Green Interiors Rating System

For New & Existing Interior Fitouts
Version 1.0

Detailed Reference Guide
March 2017

First Pilot Version 2015

Indian Green Building Council

Greening India since 2001

www.igbc.in

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Indian Green Building Council

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Ar. B R Ajit has led this initiative from the front. He has shown tremendous involvement, commitment and leadership in developing this standard. His uncanny ability to consult members of the committee and create a consensus was critical in closure of many of the key aspects.

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Foreword from the Indian Green Building Council (IGBC)

India is witnessing tremendous growth in infrastructure and construction development. The construction industry in India is one of the largest economic activities and is growing at a rapid rate in the past 10 years. As the sector is growing rapidly, preserving the environment poses a host of challenges. To enable the construction industry become environmentally sensitive, CII has established the Indian Green Building Council (IGBC) in 2001. IGBC is a consenus driven not-for-profit Council represents the building industry, consisting of more than 2,065 committed member organisations.

The Council encourages, builders, developers, owners, architects and consultants to design & construct green buildings, thereby enhancing the economic and environmental performance of buildings. Thus far, the Council has been instrumental in enabling 7.8 Billion sq.ft of green building projects in the country. The Council's activities have enabled a market transformation with regard to green building materials and technologies. IGBC continuously works to provide tools that facilitate the adoption of green building practices in India. The development of IGBC® Rating system for Green Interiors is another important step in this direction.

IGBC Membership

IGBC draws its strength from its members who have been partners in facilitating the Green Building Movement in India. The local chapters led by individual champions and committed members have been instrumental in reaching out the vision of the IGBC at the regional levels. IGBC is today seen as a leader in spearheading the Indian Green Building Movement. The Council is member-driven and consensus-based.

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I. Introduction:

The building sector in India is growing at a rapid pace and contributing immensely to the growth of the National economy. The sector has embraced sustainable design & construction practices in the past decade and enabled India to be in the International map of green buildings and built environment. While the concept of green was initially adopted in commercial buildings, it is now extending to varied types of buildings and communities.

This augurs well for a country where the sector is expected to grow four-fold in the next two decades.

The green concepts and techniques in the building sector can help address National concerns like water efficiency, energy efficiency, reduction in fossil fuel use, handling of consumer waste and conserving natural resources. Most importantly, these concepts can enhance occupant health and well-being, which is assuming greater importance.

90% of the time people stay indoors. Therefore the indoor aesthetics, air quality and comfort are of paramount importance to occupants. World over, designers are exploring opportunities to construct interiors considering these key elements.

Against this background, the Indian Green Building Council (IGBC) has formed a Technical committee to establish green interior standards for buildings. The committee, through various deliberations has come out with a Pilot rating to establish standards in designing sustainable interiors. This has been developed considering the Indian context and the National priorities. The Pilot will be operational for one year. Based on the learning from the Pilot, the rating system will be further streamlined.

II. Benefits of Green Interiors

Sustainable Interior design can result in multifold benefits:

- 30-40% reduction in Energy cost
- 20-30% reduction in Water requirement
- Enhanced Indoor Air Quality
- Use of materials that are non-toxic
- Better acoustics & ergonomics
- Improved health & wellbeing of occupants

III. National Benefits:

Green Interiors can also result in substantial National benefits:

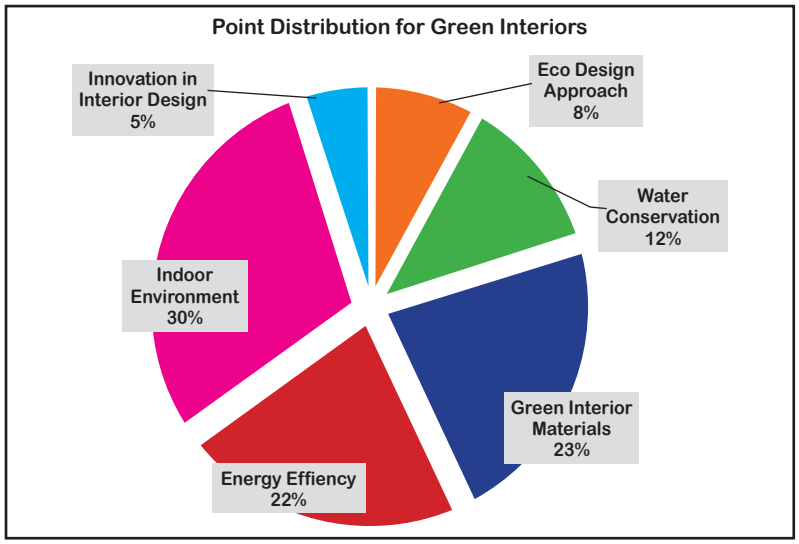
- Reduction in investment for Power & Water Infrastructure
- Conservation of Natural Capital Resources

- Extend the life of virgin materials
- Encourage locally manufactured materials
- Reduction in GHG emissions
- Better health & improved quality of life for citizens

IV. IGBC Green Interiors

The sustainable aspects of green interior design are addressed in the IGBC Green Interiors rating system under the following modules:

- ❖ Eco Design Approach
- ❖ Water Conservation
- ❖ Energy Efficiency
- ❖ Green Interior Materials
- ❖ Indoor Environment
- ❖ Innovation in Interior Design



The guidelines detailed under each mandatory requirement & credit enables the design and construction of green interiors of all sizes and types. Different levels of green building certification are awarded based on the total credits earned. However, every Green Interiors project should meet certain mandatory requirements, which are non-negotiable.

The various levels of rating awarded are:

Certification Level	Recognition
Certified	Best Practices
Silver	Outstanding Performance
Gold	National Excellence
Platinum	Global Leadership

V. Scope of IGBC Green Interiors

The IGBC Green Interior Rating programme is designed to address the specific requirements of tenants-occupied commercial spaces. The rating can also be applied by owner occupied spaces, provided they have not already addressed these in the main building.

The rating is ideally suited but not limited to office interior fitouts, malls, retail spaces, hotels, restaurants, resorts, IT spaces, banks, healthcare and other buildings. The rating is applicable for both new and existing interior fitouts

VI. IGBC® Rating system for Green Interiors - Registration

Project teams interested in IGBC Green Interiors Certification for their project must first register with IGBC. Projects can be registered on IGBC website (www.igbc.in) under 'IGBC® Rating system for Green Interiors progamme'. Registration is the initial step which helps establish contact with IGBC and provides access to documents, templates, important communications and other necessary information.

VII. IGBC® Rating system for Green Interiors - Certification

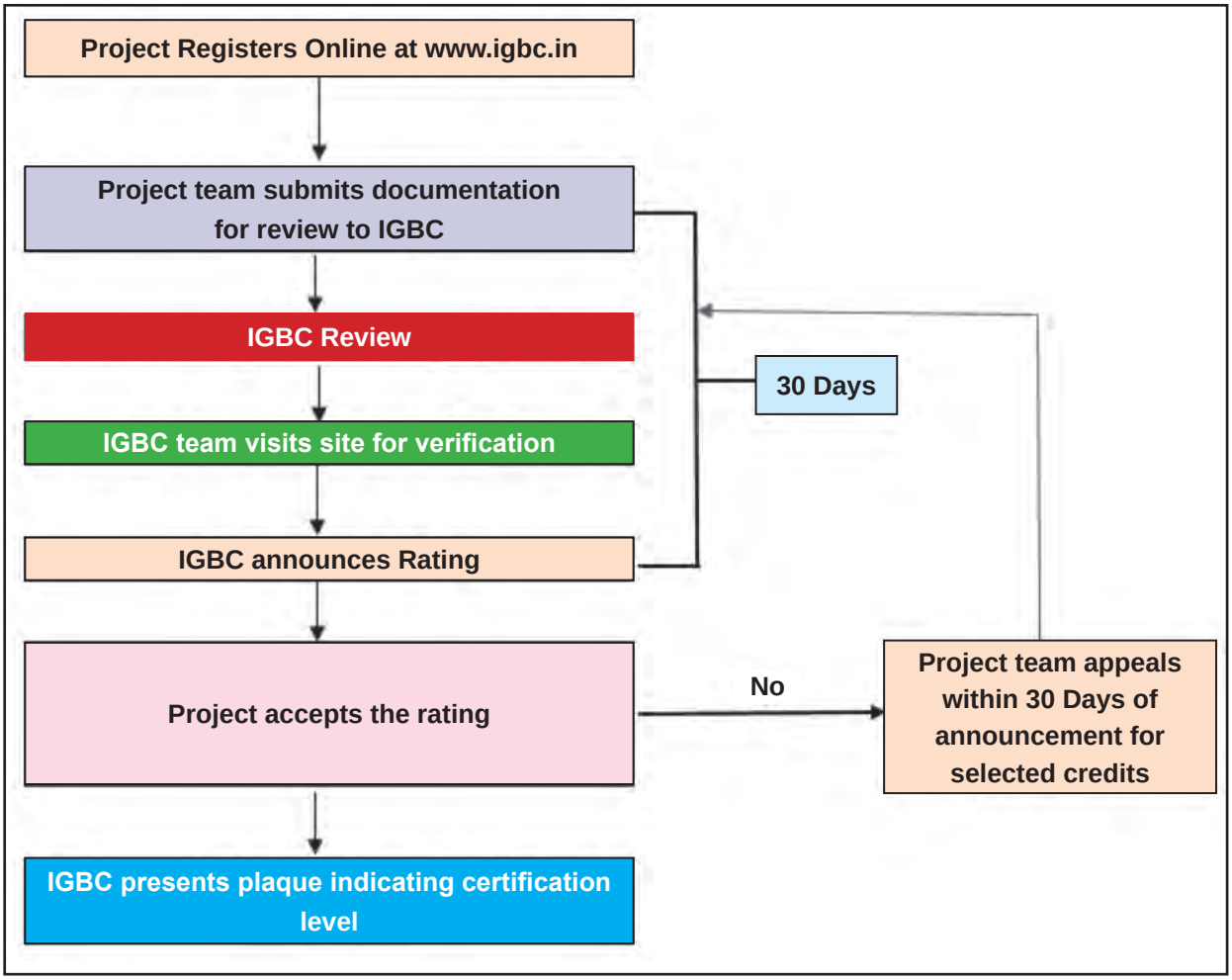
Certification of project will be carried out by a third party assessor, trained by International agencies & IGBC. The certification will comprise of two stages - assessment followed by IGBC site visit.

- The assessment will comprehensively evaluate both design & construction aspects when the project is nearer to completion.
- The assessment also will involve a site visit to verify that all green features have been implemented.

It is important to note that the mandatory requirements/ credits earned at the preliminary assessment are only considered as anticipated. These mandatory requirements/ credits are not awarded until the final documents are submitted, along with additional documents showing implementation. If there are changes after the preliminary assessment, such changes need to be submitted during the IGBC site visit.

IGBC will recognise Interior projects that achieve one of the rating levels with a formal letter of certification and a mountable plaque.

VIII. IGBC Green Interiors - Certification Flow Chart



IX. IGBC® Rating system for Green Interiors - Documentation required

The project must satisfy all the mandatory requirements and minimum number of credit points

The following are the documents required:

1. General information of project including
   - Concept brief, occupancy distribution chart, area calculations, number of floors, occupant density.
   - General drawings (in PDF format only):
     a. All typical floor plans
     b. Interior Elevations & Sections
     c. Photographs/ rendered views

2. Filled-in Green Interiors Master Template (in excel format)

3. The project would submit purchase invoices, manufacturer cut sheets and material test reports, if required by the assessor, verified during IGBC site visit.

The detailed reference standard mentions the documentation required for each mandatory requirement & credits.

X. Physical Verification & Monitoring

Physical audit is unique to IGBC's processes. Before award of rating, the IGBC team would physically audit and verify implementation of the green measures.

XI. Credit Interpretation Ruling

In some instances the design team can face certain challenges in applying or interpreting a mandatory requirement or a credit.

To resolve this, IGBC uses the process of 'Credit Interpretation Ruling' (CIR) to ensure that rulings are consistent and other projects can also get benefitted.

The following are the steps to be followed if a project team faces an issue not addressed in the IGBC Green Interiors Reference Guide:

- Consult the Abridged Version for description of the credit intent
- Review the intent of the mandatory requirement/ credit and self-evaluate whether the project satisfies the intent.
- Review the Credit Interpretation web page for previous CIR on the relevant mandatory requirement or credit. All projects registered under IGBC Green Interiors will have access to this page.

If a similar CIR has not been addressed or does not address the issue sufficiently, submit a credit interpretation request (A CIR shall not exceed 600 words or 5,000 characters including spaces). Only registered projects are eligible to post CIRs. Two CIRs are answered without levying any fee and for additional CIRs beyond the first two CIRs, a fee is levied.

The CIR Rulings for the earlier CIR raised by project teams is available in www.igbc.in

XII. IGBC® Rating system for Green Interiors - 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 30 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. Concept brief, occupancy distribution chart, area calculations, number of floors, occupant density.
    b. General drawings (in PDF format only):
        - All typical floor plans
        - Interior Elevations & Sections
        - 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.

XIII. 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)

XIV. IGBC® Rating system for Green Interiors - Updates and Addenda

The rating system continues to improve and evolve, updates, addenda and errata to the Reference Standard will be made available through the IGBC website. These additions will be incorporated in the next version of the rating system.

Note: IGBC team shall also conduct Virtual Audits through virtual platforms to verify the credit compliance.

Checklist

Checklist		Points Distribution	
		New Interiors	Existing Interiors
Eco Design Approach		**8**	**8**
EDA Credit 1	Eco Vision for Interior Design	2	2
EDA Credit 2	Optimise Circulation Spaces	2	2
EDA Credit 3	Public Transportation Proximity	1	1
EDA Credit 4	Occupancy in a Green Facility	1	1
EDA Credit 5	Commercial Lease Term / Ownership	2	2

Water Conservation		**12**	**12**
WC Credit 1	Water Conservation	12	12

Energy Efficiency		**22**	**21**
EE Credit 1	Eco-friendly Refrigerants & Halons	1	1
EE Credit 2	Energy Efficient Interiors	10	10
EE Credit 3	Energy Metering & Management	4	4
EE Credit 4	On-site /Off-site Renewable Energy	6	6
EE Credit 5	Embodied Energy	1	NA

Interior Materials		**23**	**7**
IM Mandatory Requirement 1	Segregation of Waste, Post Occupancy	Required	Required
IM Credit 1	Waste Management (During Installation)	3	NA
IM Credit 2	Local Materials	4	NA
IM Credit 3	Recycled Content Materials	4	NA
IM Credit 4	Salvaged Materials	2	NA
IM Credit 5	Eco Friendly Wood Based Materials	6	NA
IM Credit 6	Eco-certified InteriorFurniture	4	4
IM Credit 7	Purchase of Green Consumables	NA	3

Checklist		Points Distribution	
		New Interiors	Existing Interiors
Indoor Environment		**30**	**22**
IE Mandatory Requirement 1	Tobacco Smoke Pollution	Required	Required
IE Mandatory Requirement 2	Fresh Air Ventilation	Required	Required
IE Credit 1	Enhanced Fresh Air Ventilation	2	2
IE Credit 2	Daylighting	4	4
IE Credit 3	Thermal comfort	NA	1
IE Credit 4	Ergonomic Design	2	2
IE Credit 5	CO_2 Monitoring	2	2
IE Credit 6	Indoor Plants	2	2
IE Credit 7	Material Acoustic performance	3	NA
IE Credit 8	Outdoor Views	4	4
IE Credit 9	Minimise Indoor Pollutant Contamination	2	2
IE Credit 10	Low-Emitting Materials	4	NA
IE Credit 11	Indoor Air Quality Management, During Installation	2	NA
IE Credit 12	Interior Flush out	1	NA
IE Credit 13	Occupant Well-being Facilities	2	2
IE Credit 14	Dedicated Dining Spaces	NA	1
Innovation in Interior Design		**5**	**5**
ID Credit 1.1	Innovation in Interior Design	1	1
ID Credit 1.2	Innovation in Interior Design	1	1
ID Credit 1.3	Innovation in Interior Design	1	1
ID Credit 1.4	Innovation in Interior Design	1	1
ID Credit 2	IGBC Accredited Professional	1	1
	Total Available Points	**100**	**75**

Certification Level	New Interiors Points	Existing Interiors Points	Recognition
Certified	30-44	22-32	Best Practices
Silver	45-59	33-44	Outstanding Performance
Gold	60 -79	45-59	National Excellence
Platinum	80-100	60-75	Global Leadership

Eco Design Approach

Introduction

Eco design is an approach to minimise the negative impacts on the environment by adopting and implementing sustainable design strategies right from the concept stage to the implementation stage.

90% of their time people stay indoors. Establishing an Eco Design Approach for an Interior Fit-out project is therefore key in ensuring that the fit-out is key in an eco-friendly as well as occupant friendly habitat.

In order to effectively implement a sustainable interior, it is imperative to have an overall strategy that encompasses all aspects of green design in the initial ideation and planning phase of the project. This will ensure that environmental consideration is comprehensively incorporated into the design philosophy. This module is therefore aimed at establishing an overall green direction to the project that will complement the other green features planned and make it easier for the project to implement them.

An overarching eco-vision would influence decisions such as the selection of a location and facility to house the fit-out, material specifications, and establishing appropriate efficiency parameters for energy and water use. It would also go a long way in implementing and sustaining a green lifestyle within the interior space. For instance, an overall green vision will help ensure that the design is sensitive to the local, cultural and climatic context. This will in turn ensure energy efficiency without compromising occupant well-being and occupant comfort.

This module also focuses on the selection of an appropriate facility and space planning that will complement the overall green design of the fit-out. The selection of a facility that is itself a certified green facility will enable the fit-out to leverage the green features provided at the facility level. A facility that is well connected by public transportation will help the occupants of the fit-out opt for eco-friendly transportation options. Establishing a long-term lease will help avoid frequent changes to the fit-out and thereby unnecessary use of materials and generation of waste. Providing adequate circulation spaces will enhance occupants' well-being make and help them make better use of the green features provided in the fit-out.

Eco Vision for Interior Design

EDA Credit 1 Points: 2

Intent:

Encourage designers to have a eco-vision, thereby incorporating sustainable strategies in all facets of design

Compliance o ptions:

Demonstrate how the design philosophy and approach have resulted in sustainable practices & impacts in the following areas: *(1 point for two measures, max 2 points)*

- ❖ Vernacular architectural elements
- ❖ Health & wellbeing of occupants
- ❖ Space efficiency
- ❖ Materials and resources
- ❖ Passive Interior Architecture
- ❖ Any other design aspect

Courtyard

Outdoor views

Circulation space

Indoor plants

Green Building Concerns:

The inherent complexity of construction projects is such that environmental sustainability can easily be relegated to a low priority unless an overall ecological vision is established right from the start of the project. Many environmental factors can easily be incorporated into the project if done at the initial design stages. However, as a project unfolds it becomes progressively harder to incorporate environmental sensitivity into the project.

Approach and Methodology:

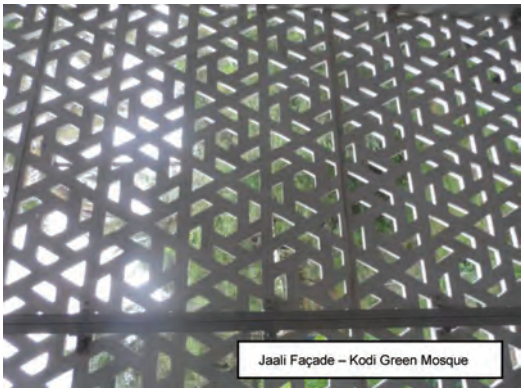
Incorporate an ecologically sensitive vision into the design right from the conceptual planning stage that will help in enhancing the environmental sustainability of the fit-out as well as quality of life of the occupants. An eco-vision can encompass a wide range of elements and measures as described below:

- **Vernacular architectural elements:**

  Vernacular architecture and traditional design strategies have evolved over time to be most suitable for local climatic conditions and also environmentally sustainable.

Each project can adopt vernacular elements based on the location of the project. The use of traditional techniques also ensures job opportunities for local traders and artisans.

Following are some examples of design elements that can be incorporated:


Jaali Façade – Kodi Green Mosque

- **Internal verandahs / courtyards:** help keep interior spaces comfortable in hot and humid climates by enhancing air circulation. They also serve to create comfortable internal outdoor spaces in harsh and dry climates. Verandahs and courtyards also act as break-out spaces and social interaction spaces for the building occupants.
- **h igh ventilators:** which provide a vent for warm air to exhaust out of interior spaces and enable deeper penetration of natural light into interior spaces.
- ***'Jaalis':*** which provide an interesting, aesthetic and cost-effective way to ventilate spaces and can play a role of semi-open partitions between spaces.
- **Exposed masonry walls:** Walls left without plastering & painting can retain the charm of traditional building techniques while saving materiel and cost.
- **Traditional flooring:** Red-oxide cement flooring, Aathangudi flooring, terrazzo / mosaic flooring, etc., which are locally available and have much less embodied energy than modern flooring options such as vitrified tiles.

- **Passive Interior Architecture enhancing health & well-being of occupants:**

A truly sustainable green building is one which has been designed keeping the local climatic conditions in mind in order to ensure well-being and comfort of the occupants and to minimise effects of 'sick building syndrome'. Some of these aspects may have been covered under vernacular architectural elements above. Others include passive architectural elements such as:

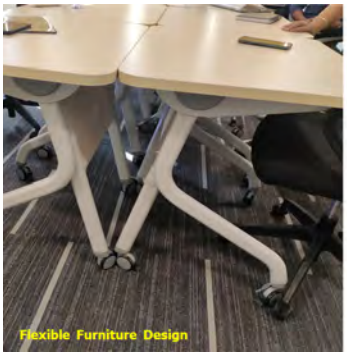
- **Light shelves** distribute natural light into deep spaces and **skylights / light pipes** bring natural light into spaces which do not have access to exterior fenestration thereby reducing the use of artificial lighting and improving quality of life.

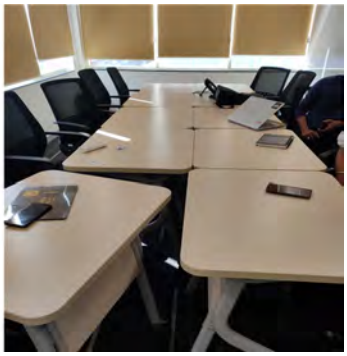
- Interior layouts planned so as to ensure **access to views** from most parts of the fit-out. This can greatly help in enhancing the quality of life and productivity of occupants. For instance, limiting the heights of interior partitions to below eye level when seated is one way to ensure access to views.
- **Interior water-bodies / fountains** or use of **watered blinds** (e.g. khas-khas blinds) can help reduce the temperature of the space due to evaporative cooling in dry areas. Such passive measures also help increase humidity in dry areas thereby enhancing occupant comfort.

- **Space efficiency:**

Good design should ensure optimal design of spaces without any wastage, thereby avoiding excess material and energy usage.

- Provide adequate circulation space to ensure ease of access within the fit-out and also to ensure easy and hindrance-free evacuation under emergencies. It is important to ensure that circulation spaces have been designed to promote the efficient functioning of the fit-out and conform to norms and standards pertaining to the fit-out's industry. Please refer Eco Design Credit 2 for details.
- Projects can also achieve space efficiency by planning flexible spaces which allow multiple functional uses. Innovative use of partitions and temporary walls can facilitate multiple uses within one space. Flexible and modular furniture allow easy reconfiguration to suit the changing requirements within a fit-out.





- **Materials and resources:** Sustainable material use is more likely to be achieved when the overall design vision incorporates sustainable materials as a key element. For instance, a design vision that has a natural or rustic aesthetic will be better able to incorporate the use of salvaged materials (e.g. antique furniture, old doors / windows, etc.) or implement vernacular techniques that use materials with less embodied energy (e.g. red-oxide cement flooring, Aathangudi tile flooring). Projects can also explore opportunities for reuse of materials and structures for minimizing

the use of virgin material. For instance, a project can study the previous fit-out to explore if any part can be maintained and reused.


Vernacular architecture: Source: Interiors with an eco-vision at Yellow Train School, Coimbatore & Edge Design House, Chennai


Courtyards & Jaalis; Source: Interiors with an eco-vision at Dakshin Chitra, Chennai and Latent View, Chennai

Related Credits: This credit is related to all mandatory requirements and credits as it establishes an overall eco-design for the whole project.

Documentation Required:

1. Narratives elaborating the project design philosophy to address the broader goal of sustainability. Highlight the envisaged impacts of the sustainable design
2. Submit conceptual sketches & photographs as applicable

Exemplary Performance

This credit is not eligible for exemplary performance

Optimise Circulation Spaces

EDA Credit 2

Points: 2

Intent:

Design interiors to ensure optimum circulation space, thereby ensuring safety & wellbeing of occupants.

Compliance o ptions:

Design interior spaces such that the circulation area is atleast 25% of the carpet area

Points are awarded as below:

Circulation space	Points
≥ 25 %	1
≥ 30%	2

Notes:

- *Circulation area = Carpet Area – [Furniture area+ Equipment area+ Storage space]*
- *Carpet Area: Usable office space at any floor level (excluding the area of the walls)*
- *Furniture area shall include movable and immovable furniture*

Green Building Concerns:

Inadequate or poorly designed circulation spaces impede safe and easy access within a fit-out. Lack of adequate circulation spaces may force occupants to be desk bound, which impacts their well-being. During emergencies, poorly designed circulation spaces can hamper safe and quick evacuation of occupants. Therefore, providing adequate and well-designed circulation spaces is key in ensuring that the safety and well-being of occupants.

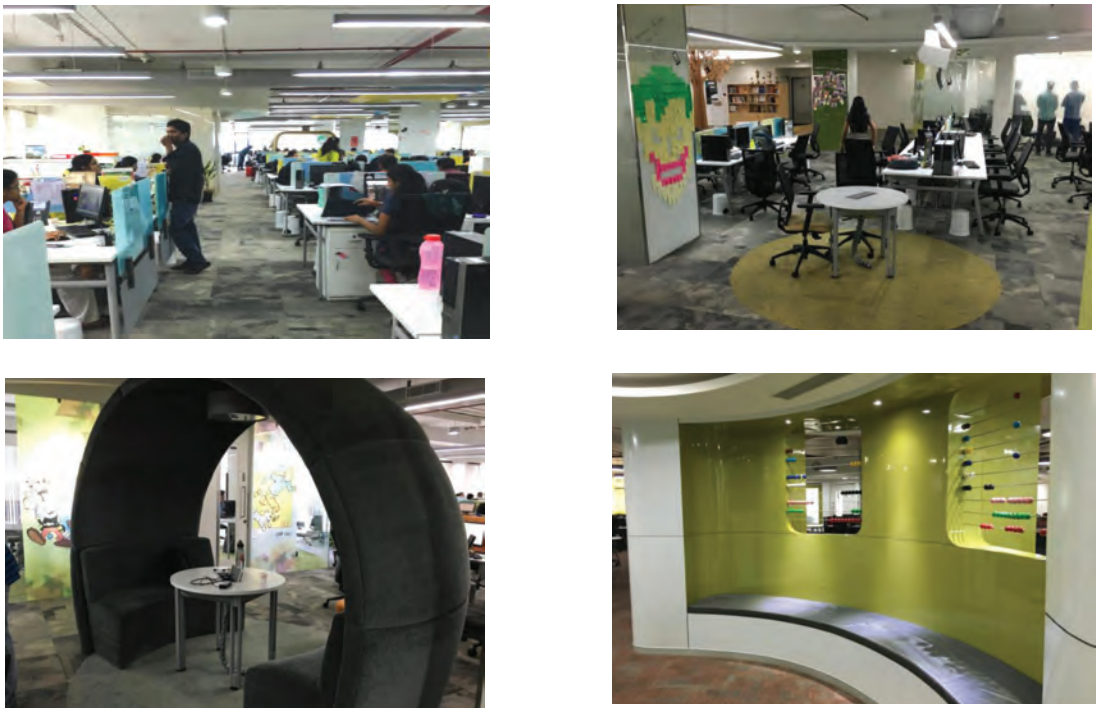
Approach and Methodology:

Circulation Space in regularly occupied spaces:

In order to ensure the safety, well-being and comfort of occupants in the indoor environment, adequate barrier free circulation space needs to be provided for unrestricted movement, group interaction and privacy. Initial planning shall factor such spaces as part of design. Indoor spaces shall be designed such that the circulation space is at least 25% of the carpet area planned of all regularly occupied spaces.

Some design elements that can be used include:

- **Break-out spaces:** which provide opportunities for informal interaction away from regularly occupied work spaces.
- **Spaces with vegetation:** which provide fresh and toxin free air to occupants in addition to making the space more interesting.
- **Corridors and passages of adequate width:** which ensure unrestricted movement of occupants and allow easy evacuation during emergencies.
- **Well-designed vertical circulation spaces:** such as internal staircases and elevators ensure safe and easy access within fit-outs that occupy multiple levels (e.g. lofts and mezzanine levels) or multiple floors.



Interiors with ample circulation space at Latent View's office, Chennai

Related credits:

- Indoor Environment – Credit 13: Occupant Well-being Facilities
- Indoor Environment – Credit 14: Dedicated Dining Spaces

Documentation Required:

1. Interior layouts showing the circulation zones clearly indicating the passage dimensions, breakup of carpet areas and percentage of circulation areas in each space
2. Photographs taken in different locations of the interior spaces showing circulation

Exemplary Performance

This credit is not eligible for exemplary performance

Public Transportation Proximity

EDA Credit 3 Points: 1

Intent:

Encourage eco-friendly transit facility to minimise environmental impacts associated with automobile use.

Compliance o ptions:

Demonstrate pedestrian access to mass transit facilities such as bus stations, metro, rail or water ways within a walking distance of 800 meters from the site entrance.

(o r)

In-house pooling facility / shuttle services to the nearest public transit facilities.

Note: In addition to access to mass transit facilities, demonstrate nearby auto rickshaw stands for tier 2 & tier 3 cities to promote sustainable urban transport in India

Green Building Concerns:

The use of fossil fuel based private vehicles for commuting is one of the leading causes of greenhouse gas emissions in many cities. Increasing use of private vehicles also results in traffic congestion which in turn leads to lower mileage as well as longer travel times. This, in turn, speeds up the depletion of natural resources and adversely impacts commuters' health and well-being.

Approach and Methodology:

Locating the interior fit-out project in a building that is connected by pedestrian access to public mass transit facilities such as bus stops, suburban/metro rail stations or water ways greatly encourage occupants in adopting eco-friendly transport options. Mass public transit is usually less polluting and better able to use clean energy. Furthermore, public transit systems greatly help in reducing traffic congestion, which in turn helps control pollution and greenhouse gas emissions.

It is generally accepted that a reasonable walking distance to public transportation is up to 800 meters, which translates approximately to a 15 minute walk1[1]. Ideally the fit-out should be located within 800 meters from public transportation. Alternatively, the project can encourage occupants to use public transportation by providing shuttle services to the nearest public transit access point.

[1]http://www.fairfaxcounty.gov/planning/tod_docs/walking_distance_abstracts.pdf

Related credits: None

Documentation Required:

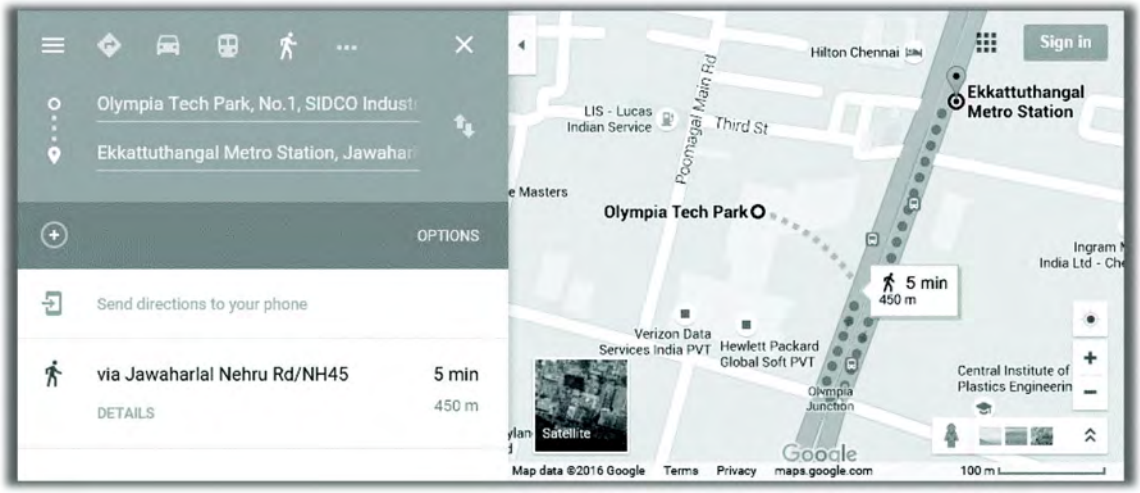
1. Provide a site vicinity map with scale showing the distance between project and nearest mass transit facilities (bus stations, metro, rail, water ways) within a walking distance of 800 meters from the site entrance.
2. Details of the shuttle services to the nearest public transit facility / Contract agreement for engaging shuttle services.

Exemplary Performance

This credit is not eligible for exemplary performance

Case Study

An interior fit-out is located in a certified green office complex in Chennai which is located approximately 450 meters (5 minute walk) from the Metro Rail Station. The nearest public bus stop is located at the entrance of the office complex. As per data provided by the fit-out, as much as 80% of the occupants use public transportation to commute.



Tenancy in Green Facility

EDA Credit 4 Points: 1

Intent:

Encourage tenants to occupy green spaces, thereby saving on resources and minimise environmental impacts

Compliance o ptions:

Select the interior office space in a certified Green project

Green Building Concerns:

The environmental sustainability of an interior fit-out and the effectiveness of the green features provided inside a fit-out can be heavily influenced by the facility in which the fit-out is located. For instance, the energy efficiency of a fit-out may be greatly compromised if the thermal efficiency of the facility's building envelope is poor. Therefore selecting a facility which is environmentally sustainable is important to ensure the effectiveness of the green features implemented inside the fit-out.

Approach and Methodology:

Locating the interiors fit-out project in a certified green building or campus allows the project to leverage the facility's green features and infrastructure to enhance occupant comfort and well-being as well as environmental sustainability inside the project's space. In other words, the interior fit-out can benefit from the green features which are typically implemented at the Core and Shell level.

Below are examples of benefits that an interior fit-out can avail from being located within a certified green facility:

- **Water Conservation**
    - **Reuse of harvested rainwater:** A facility having the provision of storing harvested rain water can supply this water to the fit-out for various purposes thereby conserving municipal/bore-well sourced potable water.
    - **Reuse of treated waste water for flushing:** A facility having the provision of a waste water treatment system can reuse the treated waste water for flushing purposes inside the fit-out thereby conserving potable water.

- **Energy Efficiency**
  - **Thermally insulated building envelope:** enhances energy efficiency by limiting heat ingress into the fit-out spaces and thereby reducing energy cost for cooling.
  - **Centralized h VAC systems** reduce cooling energy costs as the cooling efficiency of these large systems are much higher than smaller HVAC systems that are dedicated to individual fit-outs.
  - **Renewable energy systems** deliver clean energy to the fit-out.
- **Indoor Environment Quality and Occupant Well-being**
  - **Tobacco smoke control** limits the exposure of the fit-out's occupants to harmful contaminants.
  - **Access to natural light and views:** enhances the well-being and productivity of the fit-out's occupants.
  - **Indoor pollutant source control** measures implemented at Core and Shell spaces (e.g. entry-way mats, air curtains and use of low VOC finishes in common areas) helps limit the exposure of the fit-out's occupants to indoor pollutants.
  - **Facilities for differently abled persons** allow differently abled persons to access the fit-out easily.
  - **Landscaping and amenities** on site enhances the quality of life of the fit-out's occupants by providing break-out spaces and by limiting vehicular use. Also, the tree cover and natural vegetation on site decreases the heat island effect.

Related credits:

- Water Conservation – Credit 1: Water Conservation
- Energy Efficiency – Credit 2: Energy Efficient Interiors
- Indoor Environment – MR 1 / Credit 1: Fresh air ventilation
- Indoor Environment – Credit 2: Daylight
- Indoor Environment – Credit 8: Outdoor Views

Documentation Required:

Submit copy of Green building certificate or Project reference number

Exemplary Performance

This credit is not eligible for exemplary performance

Case Study

A technology park in Bengaluru is a certified green commercial office complex which houses several interior fit-outs, some of which are also certified green fit-outs. Being located within a certified green facility, the fit-outs can take advantage of the following green features implemented at the Core and Shell level:

- **Energy efficiency:** Efficient envelope, efficient common area lighting power density, efficient HVAC system meeting the ASHRAE 90.1 standard
- **Water conservation:** on-site waste water treatment and reuse for flushing
- **Indoor environment quality:** Daylighting and provision of fresh air ventilation as per ASHRAE 62.1 standard
- **Site planning:** access to basic amenities, site landscaping, adequate parking, storm water management and heat island mitigation – all of which serve to enhance quality of life of the occupants of the fit-out.

Commercial Lease Term (or) Ownership

EDA Credit 5 Points: 2

Intent:

Encourage long-term occupancy to reduce the materials consumption, thereby minimising environmental impacts

Compliance o ptions:

Tenant o ccupied Areas

Occupancy agreement mentioning tenancy tenure for atleast three or more years to reduce the environmental impacts associated with frequent refurbishment of fit-outs

(o r)

o wner o ccupied Areas

The interior fit-out shall not be disturbed for atleast three years. The fit-out may be refurbished after three or more years if required.

Points are awarded as below:

Tenure of Agreement	Points
3 years	1
5 years	2

Green Building Concerns:

Construction activity, even if executed in an environmentally sensitive way, will have environmental impacts on the interior fit-out as well as the facility where the fit-out is located. Some of the environmental impacts of interior refurbishment include:

- Construction waste generation and disposal
- Use of virgin material
- Indoor air quality deterioration due to construction
- Noise pollution due to construction
- Disturbances to occupants and disruption of normal activities due to construction

Approach and Methodology:

Ensuring a long-term tenancy lease is an effective way to avoid frequent changes to the fit-out. Interior fit-outs are ideally recommended to sign leases of at least 5 years. If a long-term lease is not feasible, fit-outs can consider signing a lease of at least 3 years.

Documentation Required:

Copy of lease agreement indicating the tenure. Incase of ownership, declaration from owner stating that interior fit outs shall be retained for atleast 3 or more years

Exemplary Performance

This credit is not eligible for exemplary performance

Water Conservation

Introduction

Our Earth or Blue Planet has only 3% of fresh water, of which 2/3rd is contained in glaciers and polar ice caps, leaving only 1/3rd or 1% of the Earth's water as usable water resources[1]. Of this, 90% consists of ground water and only a small fraction consists of fresh water on the Earth's surface and in air.

Specifically, India is estimated to have about 4% of the world's fresh water resources[2] whereas it has a population of 1.32 billion people (as of 2016) which is approximately 18% of the world's population[3].

A beautiful historic step-well in Gujarat

Given India's disproportionate access to fresh water vis-à-vis its population, water conservation is a major environmental and social priority for India. The recent water crisis in Latur, Maharashtra, where ground water was available just a few feet below ground a few years back now requires bore wells of hundreds of feet in depth to extract, demonstrates the urgent need for water conservation.

Similarly, while Mawsynram receives one of the highest annual rainfall in the world, it now paradoxically suffers from perineal water shortage. On the other hand, the increasing ground water table in Chennai, where rain water harvesting was made mandatory, shows that nature can recover quickly if suitable policies and practices are adopted. In fact, water conservation has always been a part of India's heritage as clearly seen from the beautiful step-wells of Rajasthan and Gujarat.

Green projects should take the lead in preserving this heritage of water conservation.

Green Interiors encourages water usage in a self-sustainable manner through 3 R's - Reduce-Recycle-Reuse; primarily through water use reduction as typically infrastructure for water recycling and reuse are beyond the scope and control of most interior fit-outs. In fact, while the per capita water consumption in commercial buildings is considered as 45 litres[4], it can be reduced to as low as 20 litres in green projects.

[1] Wikipedia – Fresh Water: https://en.wikipedia.org/wiki/Fresh_water

[2] India's Water Resources: http://base.d-p-h.info/fr/fiches/dph/fiche-dph-7825.html

[3] Wikipedia – Demographics of India: https://en.wikipedia.org/wiki/Demographics_of_India

[4] National Building Code of India – Part 9, Section 1, Clause 4.1.2, table 1 – Water requirements for buildings other than residences

Water Conservation

WE Credit 1 Points: 12

Intent:

Minimise dependence on municipal and bore water, thereby conserving water resources

Compliance o ptions:

Case 1: Install efficient water fixtures

(o r)

Case 2: 'Beyond the Fence' water efficiency initiatives

Case 1: Install efficient water fixtures

Use water efficient plumbing fixtures whose flow rates are 10% lower than the baseline criteria as specified in the Uniform Plumbing code of India.

Select efficient fixtures. Alternately, trade-offs are allowed in which case compliance shall be shown by considering daily usages and flow duration as shown in the table below:

Baseline Flow Rates / Consumption for Plumbing Fixtures

Fixture Type	Maximum Flow Rate/ Consumption	Duration	Estimated Daily Uses per FTE**
Water Closets (Full-flush)	6 LPF	1 flush	1 for male; 1 for female
Water Closets (Half-flush)	3 LPF	1 flush	2 for female
Urinals	4 LPF	1 flush	2 for male
Faucets / Taps	6 LPM	15 seconds	4
Health Faucet	6 LPM	15 seconds	1
Showerhead / Handheld Spray	10 LPM	8 Minutes	0.1

Source: Uniform Plumbing Code – India (UPC-I)

* Reporting pressure for these fixtures shall be at 3 bar.

**Full Time Equivalent (FTE) represents a regular building occupant who spends 8 hours per day in the building. Part-time or overtime occupants have FTE values based on their hours per day divided by 8.

Points are awarded as below:

Water Efficient Plumbing Fixtures (Individually or in aggregate)	**Points**
10%, 12.5%, 15%, 17.5%.....40% less than baseline criteria *(1 point for every incremental 2.5%)*	1-12

Notes:

- *Faucets / taps installed for hand wash in rest rooms and canteen shall be considered*
- *Rain showers (if any) need to be considered in the calculations under Showerhead*
- *The baseline flows can be demonstrated at a flowing water pressure of 3 bar. Flowing water pressure of 3 bar does not mean that the water supply in the building is at 3 bar. The building fixtures can operate at lower pressures, but to show compliance under this credit, the design flow rates are to be submitted at 3 bar*
- *Default occupancy shall be considered as 50% men & 50% women*
- *FTE occupancy shall be considered in calculation, including visitors*
- *Plumbing fixtures certified by GreenPro/IAPMO (The International Association of Plumbing and Mechanical Officials) under Product Certification Programme can also be installed to show the compliance*

Case 2: 'Beyond the Fence' water efficiency initiatives

(For spaces where restrooms are not in interiors scope) **(1- 12 points)**

The project team can show compliance by implementing 'beyond the fence' initiatives as mentioned below:

- **Rainwater h arvesting o n site**
  - Occupy a building which has implemented rain water harvesting for atleast 35% of runoff from roof areas

(o r)

- **Rainwater h arvesting o ff-site**
  - Install rainwater harvesting systems in any Government School or community centre to capture atleast 35% of runoff from roof areas.

(o r)

❖ **Maintain public Parks/Avenues**

➢ Maintain public parks or avenues so as to supply atleast 35% of estimated storm water runoff from the roof of the occupied space.

Points are awarded as below

(Applicable for areas where rainfall ≤1500mm in a year)

Rainwater h arvesting on-site / off-site, maintain public parks/avenues	**Points**
35%, 40%, 45%.....90% *(1 point for every incremental 5%)*	1-12

(Applicable for areas where rainfall ≥1500mm in a year)

Rainwater h arvesting on-site / off-site, maintain public parks/avenues	**Points**
5%, 10%, 15%, 20% .....60% *(1 point for every incremental 5%)*	1-12

Green Building Concerns:

Scarcity of water is a critical resource issue in most parts of Indian cities and towns. This has been aggravated by extraction of ground water and poor management of water resources. Today, most buildings purchase and transport water to meet the domestic requirements. A building that is able to minimise water use and manage water resources efficiently can significantly reduce dependence on external sources of water and therefore reduce its operational cost.

Approach and Methodology:

Conservation of water resources can be achieved through a variety of strategies such as:

- Reduction of water usage
- Treatment and reuse of waste water
- Rain water harvesting - collect runoff from roof & non-roof surfaces

The IGBC Green Interiors standard recognises that most interior projects do not have control over building or campus level services such as rain water harvesting or waste water

treatment and reuse. Therefore, the primary thrust of this credit is aimed at reducing water usage within the spaces which are in the project's scope and control as described under Case 1: Install Efficient Water Fixtures.

However, in few cases, the interiors project may not have rest rooms or toilets in its scope (for instance, where all toilets are located in common areas and managed by the building owner). In such cases, the project have an option to implement water conservation measures as described under Case 2: "Beyond the Fence" water efficiency initiatives that benefit the community at large.

Case 1: Install Efficient Water Fixtures

Water use reduction is achieved by installing flow and flush fixtures which have been designed to minimise water consumption.

1. **Water closets:** efficient dual flush water closets are widely available in the market and are typically available with the following flush volume options:

Large Flush Volume	Small Flush Volume	Reduction in water use
6 LPF	3 LPF	Meets baseline
4.5 LPF	3 LPF	Approx. 12.5% reduction
4 LPF	2 LPF	Approx. 33% reduction

Below are sample images of dual flush water closets / fixtures

Dual flush water closet cistern

Dual Flush Valves

2. **Urinals:** water efficient urinals are widely available in the market and are typically available in the following volume options:

Urinal type	Flush Volume	Savings in water over baseline
Urinal flush valves	1.5 – 2 LPF	Approx. 50 – 60 % savings
Sensor operated	0.35 – 0.75 LPF	Approx. 60 – 70 % savings
Waterless urinals	0 LPF	100% savings

Below are sample images of various types of water efficient urinals:

Sensor type urinal

Waterless urinal

flush valve

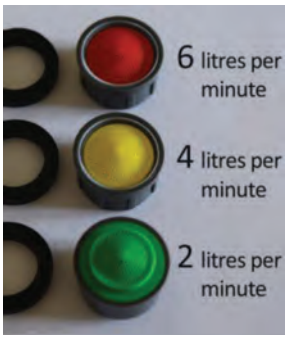
Note: If the interior fit out is located in a building which has a waste water treatment system, the project can also consider reusing the treated waste water for flushing.

3. **Faucets / taps / health faucets:** Water efficient flow fixtures are commonly known as "low-flow" fixtures and are typically fitted with aerators or flow restrictors. Alternatively, low-flow fixtures may have automatic controls to ensure minimal water use.

Faucet type	Flow Rate	Reduction in water use
With aerators or flow restrictors	1.5 – 6 LPM	Approx. 20-40% water savings
Sensor operated	0.1 Litre per second	High savings are expected
Press / push type	0.75 Litre per use	High savings are expected

Below are sample images of various types of low flow faucets and flow control technologies:

Aerator[1] Faucet with aerator



Faucet flow restrictors[2]

Sensor faucet

4. **Showerheads:** low-flow showerheads are also usually fitted with aerators or flow restrictors to conserve water.

Shower type	Flow Rate	Reduction in water use
With aerators or flow restrictors	6 – 8 LPM	Approx. 20% to 40% savings

Case 2: 'Beyond the Fence' water efficiency initiatives

Rain water can be harvested in several ways as listed below:

- Stored in sumps, tanks or wells and reused later
- Percolated into the ground via recharge pits or trenches, wells or bore wells.
- Combination of both ways listed above.

Rain water falling on the roof area is typically directed via down pipes into collection chambers containing filtration media that remove suspended impurities. A "first flush" provision, wherein the first rain of the season is let out so that the roof is washed, must also be made. From the filtering system, rain water is either directed into storage sumps or wells for reuse or recharged into the ground. Recharging can be done using percolation pits or trenches. The recharge method used is based on the percolation capacity of the soil on site.

[1] A faucet aerator or tap aerator is a device that mixes air with water and is fitted to the tip of faucets / taps. These are metallic or plastic meshes which break up the water stream into small streams mixed with air, which allows for a feeling of high pressure stream with less actual water consumption

[2] Flow restrictors use pressure compensating washers to deliver a uniform flow rate regardless of the water pressure.

Below are sample images of the typical components of a rain water harvesting system:

Rainwater down pipe with filter & first flush valve

Rainwater collection chamber with filtration media

Rainwater recharge pit

Rainwater recharge trench

Related credits: None

Documentation Required:

Case 1: Install efficient water fixtures

- Water reduction calculations to demonstrate the savings achieved
- Summary sheet of the installed plumbing flow and flush fixtures with flow rates (at 3 bar pressure, for flow fixtures).
- Manufacturer cut-sheets/ brochures/ letters indicating the flow rates of the installed plumbing flow and flush fixtures.
- Purchase invoice of the installed plumbing flow and flush fixtures highlighting the make & model.

Case 2: 'Beyond the Fence' water efficiency initiatives

- Declaration letter from the project owner stating that restrooms are not in the purview of the interior fit-out
- Calculations indicating Interiors roof area and storm water runoff considered Narrative and supporting documents highlighting the projects efforts in establishing rainwater harvesting systems in school/community centre (Or) documents highlighting the quantum of water contributed to the Public Parks / Avenue plantation

Exemplary Performance

This credit is eligible for exemplary performance under innovation in interiors

Case Study 1 with sample calculations – Water use reduction:

A small office project with 1000 sq.ft has an occupancy of 10 (5 male & 5 female). The project has proposed the following water efficient fixtures:

Fixture	Flush / Flow Rate
Dual flush water closets	4 / 2 Litres per Flush
Urinal flush valves with flow restrictors	1.5 Litres per Minute
Faucets with flow restrictors	2.5 Litres per Minute
Health faucets with flow restrictors	6 Litres per Minute
Showerheads with aerators	6 Litres per Minute

The water calculations submitted overleaf indicates that project achieves water savings of approximately 42% over the baseline through efficient plumbing fixtures and project meets the intent and achieves 12 points.

Water Conservation

WE Credit 1 Page 1-12

Case 1:Install Efficient water Fixtures

☑ I hear by Declare that water efficient plumbing fixtures whose flow rates meeting the base line has been Installed

Fixtire Type	Duration	Estimated Daily uses Per FTE	No: of occupants	Base Line		Proposed	
				Flow Rate / Capacity (LPF / LPM	Total daily Water	Flow Rate / Capacity (LPF / LPM)	Total Daily Water Use
Water Closets (Full Flush)	1 Flush	1Male	5	6LPF	30	4	20
		1Female	5	6LPF	30	4	20
Water Closets (Small Flush)	1 Flush	2 Female	5	3LPF	30	2	20
Urinals	1Flush	2Male	5	4LPF	40	1.5	15
Faucets / Taps	0.15	4	10	6LPM	36	2.5	15
Health Faucet	0.15	6	10	6LPM	9	6	9
Showerhead / Hand Held Spray	8	0.1	10	10LPM	80	6	48
Daily Volume from Flush Fixtures (Black Water)				Liters	130		75
Daily Volume from Flush Fixtures (Grey Water)				Liters	125		72
Total				Liters	255		147
Percentage (%)						42%	

Table 1 – Water use reduction

Case Study with sample calculations – 'Beyond the Fence' initiatives:

An interior fit-out project is located in a commercial office building in Chennai, where the average daily rainfall over 2008-2013 is approximately 24 mm (see table 2). The office building has a roof area of 500 sq.m, of which 100 sq.m consists of a roof garden and the remaining 400 sq.m of high SRI cement tile finish. This building will have an average daily roof runoff of approximately 9.72 cu.m (see table 3). The project has implemented a rainwater harvesting system that collects roof runoff and percolates the runoff into the ground via 6 percolation pits of 1m diameter and 3m depth, each with a percolation capacity of 1.41 cu.m per day considering a porosity factor [1] of 0.6 (see table 4). The total harvesting capacity of the RWH system is estimated to be approximately 8.48 cu.m which amounts to 87% of the average daily roof runoff.

[1] The porosity factor considered should be based on the percolation capacity of the soil on site.

Hence, this project will qualify for 11 points under this credit.

Average Normal Rain fall Caluculation
Please choose and enterdetails for either option 1 (or) Option 2 not Both if both options are entered option 1 will be considered as default
◉ Option 1: Last 5 years Average
○ Option 2: minimum 30years average
Not for rain fall informationrefer India Metrological Department date at http;//www.imd.gov.in
Last 5Years Average

Location (text is taken from dwelling unit details sheet)	Year Choose year from Drop down below	Peak Rainy Month (choose from Drop down below)	Total rain fall	Number of Rainy Days	Average Rain fall day
	2009	November	494	15	33
	2010	December	264	15	18
	2011	November	447	15	30
	2012	October	394	15	26
	2013	September	210	15	14
				Average Normal rainfall / Day (mm)	24
				Average Normal rainfall / Day (m)	0.024

Table 2 – Average rainfall calculation

Sl. no.	Surface Type	Run off Co - effecint	Roof Area Sqmts	Impervious Area
1	Concrete	0.95	400	380
2	Turf Flat	0.25	100	25
3				
4				
5				
6				
7				
8				
	Total impervious Area (Sq.m)			405

	Average normal rain fall (m)	0.024
	Total run off from roof area	9.72
	Total Harvesting Storage capacity	8,478
	Storage Capacity (Pond Etc)	
	Harvesting Capacity (Recharge Pit, Etc)	8,478
	Percentage	87.2%

Table 3 – Roof runoff calculation

RWh capacity calculation	
Diameter of each percolation pit	**1 m**
Depth of each percolation pit	**3 m**
Volume of each percolation pit ($\pi r^2 h$)	**2.36 cu.m**
Porosity factor considered	0.6
Harvesting capacity of each percolation pit	1.4 cu.m
Total harvesting capacity for 6 pits	8.4 cu.m

Table 4 – Rain water harvesting capacity calculation

Energy Efficiency

Introduction

Since the industrial revolution, the demand for energy has been incessant and has been powered primarily by means of fossil fuels such as coal, petroleum, diesel, etc. Globalization and the urge to achieve a high standard of living has further fueled the demand for energy. This reliance on fossil fuel based energy resources have resulted in significant environmental impacts such as climate change, ozone layer degradation and the rapid depletion of natural resources. While energy supply has been increasing globally, rapidly growing countries such as India face the additional problems of chronic shortages of energy and rapidly increasing energy cost.

The United Nations Environment Programme (UNEP) estimates that 40% of the energy produced globally is consumed in buildings. Ensuring energy efficiency in buildings therefore achieves the dual goal of reducing energy demand and, as a result, reducing the negative environmental impacts of energy production. Adopting clean and renewable energy resources helps in reducing the energy demand-supply gap without the harmful impact on the environment.

Interior fit-outs consume energy in the form lighting, space conditioning and other appliances. Therefore, a Green Interior should be energy efficient in order to minimize its environmental impact. This module therefore encourages the adoption of measures to achieve energy efficiency, to switch to clean energy sources and to eliminate the use of environmentally harmful substances.

A multi-pronged approach is required to effectively combat the negative impacts of the relentless demand for energy:

- **Eliminating environmentally harmful substances** such as greenhouse gases (GHGs) and substances with ozone depletion potential (ODP) and global warming potential (GWP) also help in containing environmental degradation.
- **Energy conservation measures** can further help contain energy demand. Proper monitoring of the sources of energy demand and taking corrective action is another key strategy in achieving energy efficiency and therefore operational cost reduction.
- **Energy efficient equipment and devices** imply that the same functions can be performed at lower energy consumption and cost.
- **Adopting clean and renewable energy sources** such as solar PV, solar thermal, wind, bio-mass, etc. can help replace inefficient and environmentally harmful sources of energy. Renewable energy sources also help mitigate depletion of

natural resources and the related issues of deforestation and environmental degradation.

- **Selecting construction materials with low embodied energy** is another way to promote energy conservation and mitigate related impacts. The embodied energy of a material refers to the life-cycle energy cost of using the material from extraction of raw materials to end-of-life disposal. Use of low embodied energy materials, especially renewable materials, can not only help conserve energy but also mitigate the problem of rapid depletion of natural resources.

Eco-friendly Refrigerants & Halons

EE Credit 1 Points: 1

Intent:

Avoid use of refrigerants and ozone depleting gases thereby reducing environmental impacts.

Compliance o ptions:

❖ **Refrigerants:**

Demonstrate that the base building Heating, Ventilation & Air-conditioning (HVAC) equipment and Unitary Air-conditioners installed in the building are Chloro Fluoro Carbons (CFC) and Hydro Chloro Fluoro Carbons (HCFC) free.

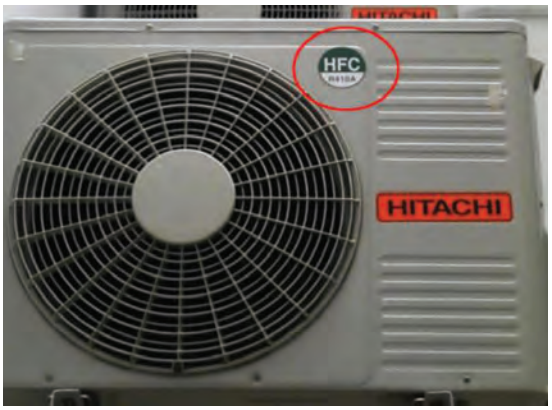
(And)

❖ **h alons:**

Demonstrate that fire suppression systems used in the building should be free from halons or any other ozone depleting substances.

Green Building Concerns:

CFC (e.g. R-11, R-12, etc.) and HCFC (e.g. R-22, R-123, etc.) refrigerants have a high ozone depletion potential (ODP) and have been one of the contributors to the depletion of ozone in the earth's atmosphere. Halon or halogenoalkane, refers to a group of chemicals consisting of alkanes with halogens. Specifically, halomethanes such as Halon 1301 / 13B1 were used in fire suppression systems for classes A, B, C and K type fires. However, due to their ozone depletion potential (ODP), halons have been phased out in India.



HVAC system with HFC refrigerant R-410A

Fire extinguisher with ABC dry chemical

Approach and Methodology:

In order to mitigate and, over time, eliminate ozone depletion, India phased out the use of CFCs in 2008 and has committed to phasing out HCFCs by 2030. Modern HVAC systems primarily use HFC (hydro fluoro carbons) refrigerants, such as R134-A and R410-A, which have zero ODP. Projects should keep in mind that even though HFC refrigerants have zero ODP, they have a significant global warming potential (GWP). As a result, India has proposed to phase out HFCs starting from 2031 and completing by 2050. While selecting an HVAC system, the project should check the ODP and GWP of the refrigerant. Ideally, the refrigerant should have zero ODP and a low GWP. Survey the market and procure HVAC systems which do not use CFC / HCFC based refrigerants. Below is a list of commonly used CFC / HCFC free refrigerants:

- R32
- R125
- R134A
- R143A
- R152A
- R407C
- R410A
- R717 (Ammonia)
- R744 (CO2)

Similarly, while procuring fire extinguishing equipment, the project should ensure that the equipment does not contain any halon. Replacements for halons include sprinklers, CEA-410 (Clean Extinguishing Agent), ABC dry powder, etc.

Related Credits:

- Energy Efficiency – Credit 2: Energy Efficient Interiors

Documentation Required:

1. Declaration letter signed by developer declaring the HVAC system(s) & Fire Suppression systems which are in developer's scope, if any.
2. Declaration letter stating CFC-free refrigerants and Halons free in the installed HVAC & Fire systems.
3. Manufacturer cut-sheet/ brochure indicating the type of refrigerant used in the installed HVAC system(s)

Exemplary Performance

This credit is not eligible for exemplary performance

Energy Efficient Interiors

EE Credit 2 Points: 10

Intent:

Enhance energy efficiency in the interior spaces, to optimise energy consumption and thereby reducing environmental impacts.

Compliance o ptions:

1. A: Non Air-conditioned spaces *(Points Available: 6)*

- 90% of the interior spaces shall meet the following:
  a. Have door and window openings that are atleast 5 % of the carpet area for ventilation. Such openings should be provided so as to be connected to exterior environment. (Openings: 5%, 6%, 7%....10% over baseline) *(1 point for every incremental 1%)*

(o r)

  b. Implementalternateefficientcoolingmethods like Evaporatingcooling systems, Air Ambiators (25%, 30%.....50% of the carpet area) *(1 point for every incremental 5%)*

Note 1: Projects showing the credit compliance through openable doors & windows should meet the thermal comfort criteria.

Note 2: Thermostatic controls must be provided for each space- conditioning zone to control the supply of heating and cooling energy within that zone. Continuous monitoring should be carried through thermostat and readings should be submitted for the critical months April-May & Nov-Dec (11.00 am to 3.00 pm) for existing interiors.

1. B: Conditioned spaces *(Points Available: 6)*

- Split/ Window Air-conditioners: Use Bureau of Energy Efficiency (BEE) 3 star[1] and above or equivalent Coefficient of Performance (COP) (or) Energy Efficient Ration (EER)[2]
- Projects using packaged Air-conditioning system: Meet the baselines specified in Energy Conservation Building Code (ECBC) 2009 – *refer Annexure B*
- Projects using Centralized Air Conditioning system: The chiller COP should meet the baselines specified in ECBC 2009 *refer Annexure B*
- Install new cooling technologies like Wind Towers, Earth tunnel Air conditioning, Geo-thermal Air conditioning.

[1] Database of BEE rated equipment: https://beestarlabel.com/Home/Searchcompare

[2] For unitary air-conditioners: EER ≥ 2.90 (until 12/31/2017)
For split air-conditioners: EER ≥ 3.10 (until 12/31/2017)

- ❖ Heating System: For projects that require heating systems, install minimum BEE 3 star rated heat pumps or systems that meet the COPs specified in ECBC *refer Annexure B*
- ❖ Project can show compliance through energy simulation, if the tenant is occupying more than 50% of the building. *(Baseline for Interiors, as applicable can be obtained from ASHRAE 90.1, 2010)*

Note: Projects requiring cooling and heating may accordingly consider the above systems

Points are awarded as below:

Conditioned spaces of regularly occupied areas	Points
50%, 55%, 60%,.....75% *(1 point for every incremental 5%)*	1-6

2. Lighting:

- ❖ Lighting Power Density (LPD): Demonstrate that the LPDs of the interiors space is reduced by atleast 20% over baselines specified in ECBC *refer Annexure C*

Points are awarded as below:

Lighting Power Density	Points
20%	1
25%	2

- ❖ Minimise artificial lighting in atleast 25% of the regularly occupied spaces* during the day. Project can consider strategies like Light pipes, other passive features (1 point)

or

Use Motion sensors, daylight sensors in the interior space to cover atleast 75% of the regularly occupied areas

3. Appliances:

- ❖ Use BEE 3 star rated / GreenPro[3] certified / Energy Star[4] 3 star rated appliances (e.g. Refrigerators, Photocopiers, Printers, Water coolers, UPS, Coffee vending machines, TVs, Fans, Ovens and others as appropriate)

(1 point for atleast 3 appliances)

[3] GreenPro certification: http://www.greenbusinesscentre.com/site/ciigbc/greenpro

[4] Energy Star rating: https://www.energystar.gov/

Green Building Concerns:

Energy is consumed within a fit-out for a range of functions such as lighting, space conditioning and for powering appliances and equipment. The energy required for these uses is predominantly supplied in the form of electricity generated from non-renewable sources such as fossil fuels (70% in 2016[5]) etc. Energy production from such sources results in significant and widespread impact such as environmental pollution, destruction of bio-diversity and natural habitat, and depletion of precious natural resources.

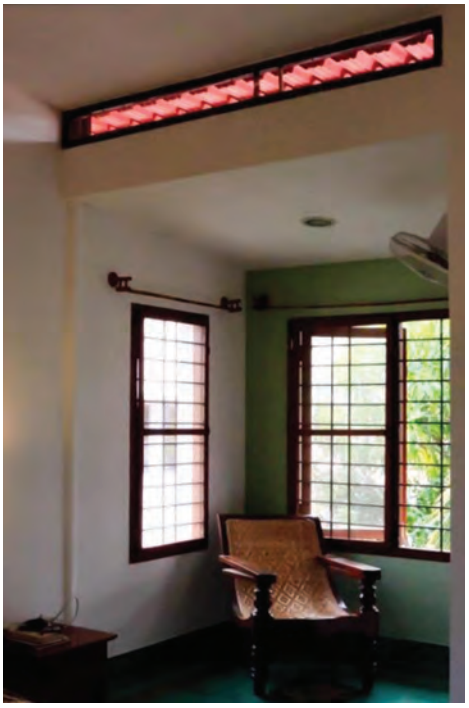
Furthermore, India currently faces an energy deficit, wherein the demand for energy outstrips the supply. In such a scenario, inefficient use of energy worsens the energy deficit and, in turn, impacts economic as well as human development.

Approach and Methodology:

Interior fit-out projects can achieve energy efficiency in their interior spaces by adopting a multi-pronged strategy of ensuring energy efficiency in each of the following areas: thermal comfort, lighting and efficient appliances.

Thermal comfort in non-air-conditioned spaces

o ption A – Adequate openings to the exterior environment: The best way to achieve thermal comfort in a non-conditioned space is to ensure adequate circulation of air within the space. Providing adequate openings to the exterior environment increases air circulation while ensuring that the air inside the space remains fresh. Projects must ensure that the openable area to the exterior environment is at least 5% of the floor areas of each interior space. The project can also consider providing openings in multiple orientations to achieve cross ventilation, which is very effective in enhancing air circulation. Also, providing high ventilators enhances natural air flow by allowing warm air to exhaust while pulling cool air into the space at a lower level, which further enhances thermal comfort inside the space.



Space with adequate exterior openings and a high ventilator.

[5] Wikipedia: https://wikipedia.org/wiki/Energy_policy_of_India

Option B – Alternate efficient cooling systems: Fit-outs with non-air-conditioned spaces can also consider installing low energy cooling systems which operate on principle of evaporative cooling. Desert coolers and air ambiators are examples of low energy cooling systems. Other low energy cooling systems include systems which use phase change materials that absorb or discharge heat as they change from one state to another.

Thermal comfort in conditioned spaces

Space conditioning is typically the highest source of energy consumption in buildings and energy use for space conditioning generally ranges from around 50% to as high as 70% of the total energy consumption of buildings. Studies in the United States and the European Union have also shown that the estimated peak electricity load due to air-conditioning is approximately 40% more than the non-coincident peak load. Therefore, fit-outs which have conditioned spaces must consider installing energy efficient air-conditioning systems to be energy efficient. The IGBC Green Interiors standard defines efficiency benchmarks for various types of air-conditioning systems:

- **Unitary window / split systems:** must be at least BEE 3 Star rated or must have an equivalent energy performance.
- **Packaged air-conditioning systems:** must meet efficiency benchmarks specified in ECBC (refer Annexure B)
- **Centralized air-conditioning systems:** must adhere to chiller efficiency benchmarks specified in ECBC (refer Annexure B)
- **h eating systems:** must be BEE 3 Star rated or adhere to efficiency benchmarks specified under ECBC (refer Annexure B)
- Projects can consider **alternate low cost cooling techniques** such as geo-thermal cooling, earth tunnels, wind towers, etc. if feasible. Projects can also explore installing energy efficiency measures such as heat exchangers and energy recovery wheels to their air-conditioning systems to improve efficiency.

Energy efficient chillers installed in a certified green project.

Lighting

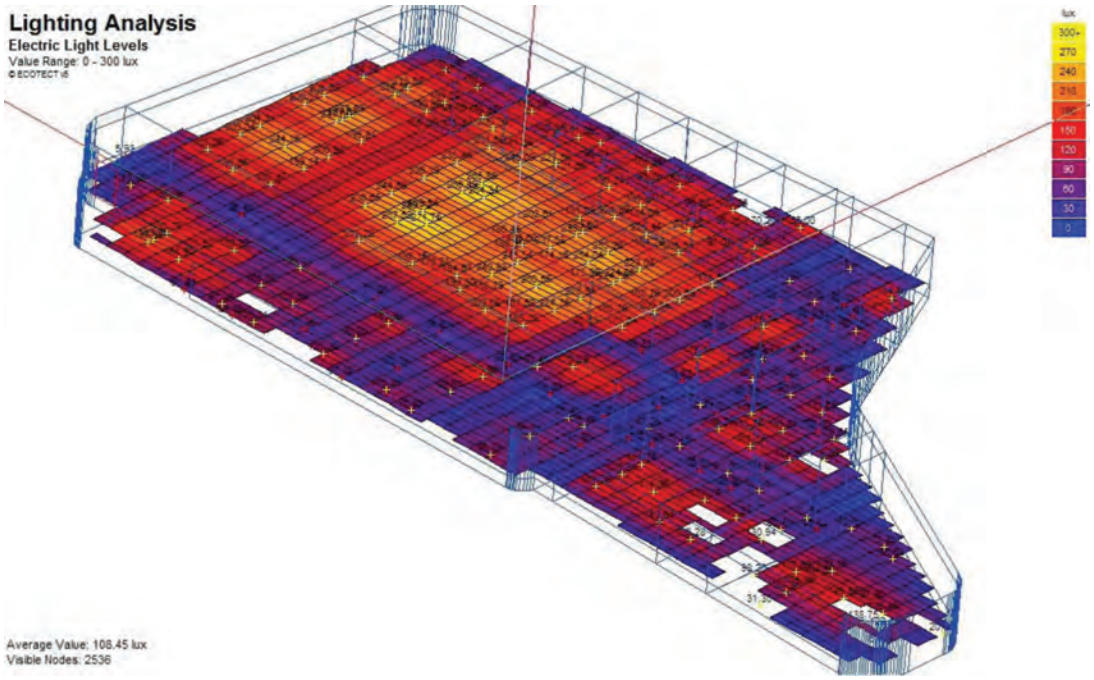
Energy efficiency in lighting can be achieved by avoiding over-design of lighting and by using energy efficient lighting fixtures and automatic lighting controls.

- **Optimal Lighting Design:** Optimal lighting design is achieved when lighting provided does not exceed the level required to safely and comfortably do the functions intended in the interior space. Oftentimes, lighting levels provided are much more than the optimal levels required, resulting in excess energy consumption. The National Building Code of India (NBC) specifies the lighting level (in lux) required for a number of functions and spaces. The lighting design should be formulated to provide the required lux level without exceeding it. Artificial lighting simulation can be conducted to ensure that the lux level achieved at the working plane in each space is as per the levels specified in the NBC.

Sample LPD calculation:

Space	Area (SQM)	Lighting Fixtures			Total Watts	LPD (Watts/SQM)
		Type	No.	Watts*		
Open office	200	LED	40	20	800	4
Meeting room	30	LED	5	20	100	3.33
Reception	20	CFL	5	21	105	5.25
Toilets	15	CFL	4	21	84	5.6

* Inclusive of ballast power consumption

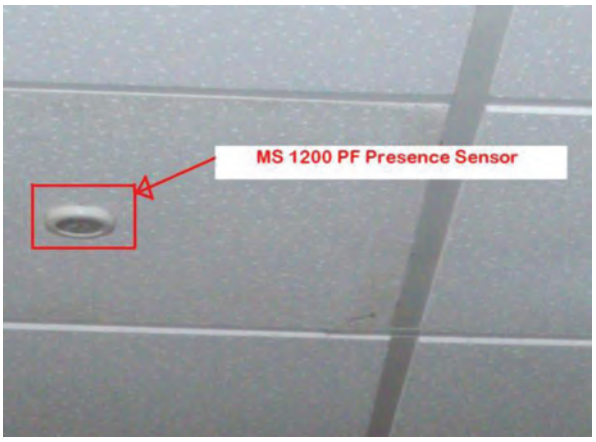


Screenshot showing the artificial lighting simulation analysis of a commercial office interior. The simulation demonstrates how the lighting design is aimed at delivering higher lux levels required above working areas and lower levels required in circulation spaces.

- **Energy Efficient Lighting Fixtures:** Once the lighting design is formulated to determine the number and types of light fixtures required to achieve the optimal lux levels in a space, the project can explore options for light fixtures which can produce the required lighting level with the least energy consumption. Projects can consider LED, CFL or BEE star rated TFL fixtures to achieve the required lighting levels. The project can then calculate the lighting power density (energy consumed per unit area) achieved by each design and compare it against the Green Interiors baseline (Annexure C). This analysis can help the project select appropriate fixtures that will achieve the targeted lighting power density reduction.
- **Automatic Lighting Controls:** Projects can also use automatic controls to ensure that artificial lighting is used only when required. Such controls can greatly help in reducing energy consumption by automatically turning light fixtures on and off as required. Some of the commonly used lighting controls include:
  - **Timer controls** automatically turn artificial lights on and off at pre-specified times based on the operating schedule of the project. For example, a timer control could be programmed to automatically turn lights on at 6pm and turn lights off at 9pm. Timer controls are often incorporated into building management systems which control a wide range of building systems and

allow timer programmes to be set by days of the week and by season.

- **Daylight / lux level sensors** can determine natural lighting levels in a space and adjust artificial lighting to provide for any shortfall in the lighting level required in a space. While lux level sensors are typically used to turn artificial lights on or off, some sensors can also be programmed to adjust the lighting levels of the fixtures to deliver incremental lighting as required.
- **Presence sensors** can detect the presence or absence of people in a space and automatically turn lights on and off. Presence sensors are typically used in spaces which are occupied intermittently; e.g. meeting / conference rooms, toilets, corridors, staircases, etc. These controls are programmed to turn lights on as soon as a person is detected in a space and turn lights off within a specified time after the last person has left the space.
- **Combinations:** Some controls combine the functions of presence and lux level sensors in a single unit.



Presence sensor

Appliances: Projects can further improve the energy efficiency of their interior spaces by opting for energy efficient appliances. The continual advances in appliance technology have resulted in significant reduction in energy consumption by appliances. The project must ensure that the appliances installed have been rated under one of these programmes: BEE Star rating (3 Star or above), GreenPro certification and Energy Star rating. Projects should keep in mind that for some appliances (e.g. ceiling fans) there might be a wide range of efficiency levels within the same rating level (e.g. BEE 5 Star level). Therefore, projects should use the above mentioned ratings to shortlist appliances and use additional parameters to select the most efficient appliances.

Related Credits:

- Energy Efficiency – Credit 1: Eco-friendly Refrigerants and Halons
- Energy Efficiency – Credit 3: Energy metering and management
- Energy Efficiency – Credit 4: On-site / Off-site Renewable Energy

Documentation Required:

1. Manufacturer cut-sheets/ brochures indicating the BEE 3 star rating/ 3 star Energy star rating of proposed appliances
2. Details of the installed air-conditioned system along with the manufacturer cut-sheets/ brochures
3. Layout indicating the location of energy efficient appliances in the project
4. Technical Specifications for all major equipment.
5. Technical Specifications and drawing & photographs of Wind towers/Earth tunnel/ Geo-thermal system.

Exemplary Performance

- Efficient air-conditioning above 95% in regularly occupied spaces
- Reduction of LPD above 30% over baseline

Case Study

A commercial interior fit-out in Pune occupies an area of 1,600 SQM. The fit-out is fully conditioned and has implemented the following energy efficiency measures:

- Energy efficient VRF HVAC system with a COP of 3.8 as against the baseline COP value of 3.05 specified in ECBC. The energy efficient HVAC system serves 100% of the regularly occupied spaces. – Qualifies for 6 points
- Energy efficient lighting consisting of LED fixtures with a resulting LPD of 4.8 W/SQM, which is 60% lower than the baseline LPD of 12 W/SQM specified for commercial offices in ECBC. – Qualifies for 2 points.
- Energy efficient appliances such as computer monitors, printers and televisions which are Energy Star rated. - Qualifies for 1 point.

Hence, this fit-out qualifies for 9 points under this credit.

Energy Metering & Management

EE Credit 3 Points: 4

Intent:

Encourage sub-metering and continuous monitoring to implement energy efficiency measures, thereby reducing environmental impacts.

Compliance o ptions:

1. Demonstrate sub-metering for atleast one of the following:

(1 point for each measure, max 2 points)

- Lighting circuits
- Power back up systems
- Elevators, escalators
- BTU meter for chilled water consumption
- Meters measuring renewable energy (generation / consumption)
- Any other major equipment and systems

2. Demonstrate that the building management system (BMS) is in place to control and monitor atleast one of the following systems as applicable:

(1 point for each measure, max 2 points)

- Air-conditioning management system
- Lighting management system
- Elevator management system
- Fresh air monitoring system
- CO_2 control & monitoring system

Alternate compliance path:

Projects having Central Monitoring System (CMS) to monitor the energy savings, thermal comfort, CO2 levels would be eligible for 1 point to meet the credit compliance.

Green Building Concerns:

Nowadays, buildings as well as fit-outs typically consist of a complex set of spaces and systems that have varying energy requirements and usage patterns. A space or system that is not energy efficient will adversely impact the overall energy efficiency of the fit-out. Corrective measures are difficult to identify and implement unless the energy use of specific systems and spaces (or groups of similar spaces) is independently monitored and tracked.

Approach and Methodology:

Monitoring and tracking energy use is key to optimizing energy use over the long-term and ensuring that energy conservation measures implemented in the fit-out are effective. In this regard it is essential that energy use is monitored and tracked in sufficient granularity – i.e. by specific spaces and / or systems. This allows the project to evaluate the energy efficiency of each space / system and take measures to improve efficiency as required. Sub-metering allows projects to analyze energy use per space / system and optimize settings and schedules.

A fit-out may have spaces which are differentiated by function, location, occupants, etc. By tracking and monitoring energy use of each space, the project can optimize energy use in each space. Typically, a fit-out may have open office layouts for workstations, cabins, meeting rooms, toilets, storage rooms, etc., each with its own energy use pattern and level. By providing sub-meters for each space type, a project can monitor the individual spaces and take specific action to improved energy efficiency in each space. For instance, a fit-out might install occupancy sensors in meeting rooms and toilets and daylight sensors in large open offices to turn lights on and off as required. Similarly, a fit-out can provide sub-meters to separately monitor specific systems to monitor their energy use and take corrective action or additional energy conservation measures if required.

Following are examples of commonly implemented sub-metering:

- Sub-meters for various types of energy use such as lighting, air-conditioning and for specific systems.
- Sub-meters for spaces occupied by various departments or teams
- Sub-meters for exclusive elevators / escalators for use of specific floors
- BTU meters which monitor how much chilled water is used by each tenant

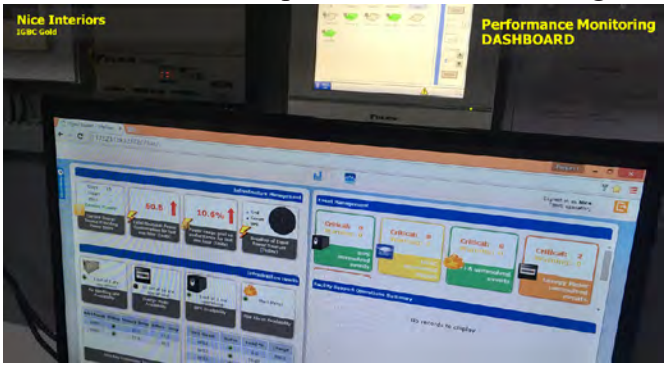
The project should analyze its spaces and systems and identify those which are likely to have unique energy use patterns or levels. Such spaces and systems should be provided with sub-meters.

A dedicated sub-meter installed for a fit-out to measure its space conditioning energy use at Platina Tech Park, Chennai

Building management systems (BMS) are used for monitoring and controlling various systems installed in a building such as lighting, air-conditioning, renewable energy systems and mechanical systems such as elevators. BMS typically collect data from sub-meters and sensors, which can be manually interpreted or automatically interpreted to take follow-up action. BMS allow easy monitoring of usage and performance of systems via dash boards and reports and allow projects to identify areas of energy wastage and take corrective action where needed.

Following are examples of automatic controls which are typically part of BMS:

- CO_2 sensing and automatic fresh air inflow in HVAC systems,
- • Precise control of schedule of lighting, air-conditioners, automatic blinds,
- • Lux level sensing and automatic control of lighting systems to ensure that lighting levels required for various functions,
- • Temperature settings that are used to automatically turn air-conditioning on / off to maintain temperature in a desired range.



Screenshots from BMS software installed in a certified green building

Related Credits:

- Energy Efficiency – Credit 2: Energy Efficient Interiors
- Energy Efficiency – Credit 4: On-site / Off-site Renewable Energy

Documentation Required:

1. On-site photographs of the installed sub-meters & BMS system
2. Single line diagram (SLD) schematic
3. Purchase invoice of the BMS & metering systems

Exemplary Performance

This credit is not eligible for exemplary performance

Case Study

A BMS was installed at the Godrej Green Business Centre in Hyderabad. After installing the BMS, energy use was monitored and areas for optimizing energy use were identified. As a follow-up action, operating schedules of various systems were adjusted to precisely fit the requirements of the occupants resulting in a 13% reduction in energy consumption.

o ff-site/ o n-site Renewable Energy

EE Credit 4 Points: 6

Intent:

Encourage the use of renewable energy technologies, to minimise the environmental impacts associated with fossil fuel energy use

Compliance o ptions:

Install On-site renewable energy systems (or) Invest in Off-site renewable energy systems (or) Demonstrate that the project has purchased Renewable Energy Certificates (RECs) with respect to total energy consumption of the interior space.

Points are awarded as below:

On-site Renewable Energy	Points
2%, 4%.....12% of the total energy consumption *(1 point for every incremental 2%)*	1-6

(And / o r)

Off-site Renewable Energy	Points
5%, 10%.....30% of the total energy consumption *(1 point for every incremental 5%)*	1-6

Note:

- *Renewable energy sources include solar energy, wind power, biomass, etc.*
- *The total annual energy consumption can be arrived either through Performance based approach or Prescriptive approach.*
- *The RECs purchased shall be valid for a period of two years.*
- *The RECs can be either solar or non-solar or both*
- *Type of renewable energy source shall be in compliance with the Ministry of New and Renewable Energy (MNRE), Government of India and respective State Regulatory Commissions.*
- *Off-site renewable energy so generated shall be counted only once.*
- *For credit calculations, RECs purchased in the last 6 months of building operation can also be considered, to show compliance.*

- *In case, the Project purchases RECs through an authorised agency of exchange, then a legal contract should exist between the authorised agency and the project.*

Green Building Concerns:

Approximately 81% of the primary energy and 70% of the electricity used in India are generated from non-renewable, fossil fuels such as coal, natural gas and crude oil[1]. This type of energy generation results in widespread environmental pollution that occurs during the extraction of raw materials as well as generation of power, depletion of resources and loss of bio-diversity.

Approach and Methodology:

Renewable energy mitigates environmental impact and the depletion of natural resources associated with fossil fuel energy use. India has a vast potential for renewable energy, solar as well as wind, which has largely been untapped as yet. The adoption of renewable energy is critical in combating climate change as well as ensuring that natural resources are available for future generations. A wide range of renewable energy systems are now available such as:

- Solar Photo-Voltaic systems (on or off-grid)
- Wind Turbines
- Solar PV-Wind Hybrid systems
- Small Hydro-electric Turbines
- Biomass
- Other types such as geo-thermal, fuel cells, etc. which are approved by the Ministry of New and Renewable Energy (MNRE)[2]

The project should estimate its annual energy consumption by conducting an energy simulation (Performance Method – suitable for new fit-outs) or by measuring its annual energy consumption (suitable for existing fit-outs). Please refer Annexure E for guidelines pertaining to the Performance Method. Projects may implement renewable energy systems on-site or offset energy use against renewable energy systems implemented off-site. Projects may also purchase Renewable Energy Credits (REC)[3] to offset energy use and achieve points under this credit.

[1] Wikipedia: https://wikipedia.org/wiki/Energy_policy_of_India

[2] http://www.mnre.gov.in/

[3] For more information on Renewable Energy Credits, please see https://www.recregistryindia.nic.in/

Related Credits:

- Energy Efficiency – Credit 2: Energy Efficient Interiors
- Energy Efficiency – Credit 3: Energy Metering and Management

Documentation Required:

1. Break-up of annual energy consumption details
2. Provide the Installed Capacity of the RE System
3. Provide the details of the off-site RE Generation
4. Scanned copy of the RECs purchased

Exemplary Performance:

This credit is eligible for exemplary performance under ID Credit 1 - Innovation in Design Process, if On-site renewable energy systems (or) Invest in Off-site renewable energy systems (or) Demonstrate that the project has purchased Renewable Energy Certificates (RECs)

Case Study:

A small fit-out hosting an architecture firm with 10 employees has an annual energy consumption of approximately 5000 KWh. The fit-out has installed a small solar PV system of 180 Watts capacity which generates 0.9 KWh per day or approximately 270 KWh per year, amounting to 5.4% of the annual energy use of the fit-out. The fit-out therefore qualifies for 2 points under this credit.

☑	Install on-site renewable energy systems equivalent to atleast 5% of the total energy consumption of the Interior Space	
	Or	
☐	Install in off -site renewable energy systems equivalent to atleast 5% of the total energy consumption of the Interior Space	
	Or	
☐	Demonstrate that the project has purchased Renewable energy certificates(REC's)	

Annual Energy Comsumption (kwh)	5000
Installed capacity of the RE system (kwh)	270
Percentage	5%

Embodied Energy

Not applicable for existing interiors

EE Credit 5 **Points: 1**

Intent:

Identify Materials or products with low embodied energy, to minimise the environmental impacts associated with extraction, manufacturing and packing

Compliance o ptions:

Source atleast five interior materials which have embodied energy equivalent or lower than the baseline indicated in the following table:

Material	Energy MJ per kg	Carbon kg CO_2 per kg	Density kg / m^3
Concrete (1:1.5:3)	1.11	0.159	2400
Aerated block	3.5	0.3	750
Marble	2	0.116	2500
Steel	20.1	1.37	7800
Timber	8.5	0.46	480-720
Glass wood insulation	28	1.35	12
Mineral fibre ceiling tile	37	2.7	1850
Aluminum	155	8.24	2700
MDF	11	0.72	680-760
Plywood	15	1.07	540-700
Plaster board	6.75	0.38	800
Gypsum Plaster	1.8	0.12	1120
Glass	15	0.85	2500
Vinyl flooring	65.64	2.92	1200
Ceramic Tiles	12	0.74	2000

Source: *Inventory of Carbon and Energy ('ICE') prepared by the University of Bath (UK)*

Alternate compliance path:

This credit refers to use of materials or products with low embodied energy, to minimize the environmental impacts associated with extraction, manufacturing, and packing.

Project need to meet the following two criteria

- Source local materials for at least 75% of total procured materials, by cost.

AND

- Source recycled content materials for at least 30% of total procured materials, by cost.

Green Building Concerns:

In addition to the energy consumed in an interior fit-out after occupancy, energy is also consumed by the materials and products used for constructing the fit-out. The energy consumed in the extraction, manufacture, packaging and transportation of products and materials is referred to as the "embodied energy" and this energy use has associated negative environmental impacts, which include pollution and depletion of natural resource.

Approach and Methodology:

In order to mitigate the negative environmental impact arising from the materials used for construction, the project should give preference to materials and products with low embodied energy. The project should ensure that the embodied energy of at least five materials is equivalent to or less than the benchmarks specified in the table above.

Related Credits:

- Eco Design Approach – Credit 1: Eco Vision for Interior Design
- Interior Materials – Credit 2: Local Materials
- Interior Materials – Credit 3: Materials with Recycled Content
- Interior Materials – Credit 4: Salvaged Materials
- Interior Materials – Credit 5: Eco-friendly Wood Based Materials

Documentation Required:

Submit declaration & supporting reports from the product manufacturer indicating the embodied energy measured in MJ / kg for atleast five products

Exemplary Performance

This credit is not eligible for exemplary performance

Interior Materials

Introduction

Building and construction activities worldwide consume 3 billion tons of raw materials each year or 40 percent of total global use (Roodman and Lenssen, 1995). In India, the Construction sector contributes towards 8% of the Indian GDP and is expected to remain buoyant due to increased demand from real estate and infrastructure projects. As a result, the demand for raw materials from the construction sector in India is also expected to grow rapidly in the coming years. Interior fit-out projects also tend to be material intensive, which has wide ranging environmental impacts such as the depletion of natural resources, deforestation and pollution arising from extraction, manufacturing and transportation of construction materials.

Going "Green" is the only way to address these challenges. One of the most effective strategies for going green is to reduce the consumption of virgin raw materials by reusing and recycling materials. Effective management of waste during construction and in the occupancy phase also helps mitigate the environmental impacts associated with the extraction, transport, processing, fabrication, installation, reuse, recycling, and disposal of these materials. Green products and materials are therefore expected to have a much wider application and demand in the future. Major product and equipment manufacturers are taking innovative steps to respond to this growing demand and are increasingly providing certified green products and materials that meet specific environmental criteria.

This module encourages the use of low energy and certified green products / materials while discouraging the consumption of virgin raw materials. For instance, salvaged materials substitute new materials and help reduce emissions due to extraction of raw materials and extend the life of such materials. The use of materials extracted and manufactured locally reduce the energy required for transportation. The use of rapidly renewable materials like bamboo, eucalyptus and bagasse in interiors also help mitigate the depletion of nonrenewable resources.

Segregation of Waste, Post Occupancy

IM Mandatory Requirement 1

Intent:

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

Compliance o ptions

Provide colour coded bins to collect three different types of waste

- **Dry Waste**
  - Paper, Card board
  - Glass
  - Plastics, Pet water bottles
  - Metals
- **Wet Waste**
  - Food waste, Tea bags
- **E-Waste**
  - Lamps, Batteries

Green Building Concerns:

As urbanisation has increased across the world, most communities have attempted waste management by simply dumping waste into landfills. Such practices have resulted in a range of environmental issues such as soil and water contamination, air pollution due to burning, fire hazards, health hazards, etc. Comingled waste is especially difficult to manage in an effective and environmentally sensitive manner.

Approach and Methodology:

Effective waste management is heavily dependent on wastes being segregated. If wastes are separated at source, i.e. separately collected, then each type of waste can be processed in the most appropriate and environmentally sensitive manner.

The most efficient way to ensure separation of waste at source is to provide adequate number of waste collection bins which are clearly marked for different waste types. Bins are typically colour coded and labelled to denote the type of waste. Wastes which are collected separately can then be processed appropriately:

- ***Wet waste or organic waste*** such as food and tea bags can be composted to produce manure or generate power by methanation (biogas production for use in kitchens or lighting).
- ***Recyclable wastes*** such as paper, plastics, glass and metals can be sent to recycling plants via scrap dealers or recyclers.
- ***E-waste*** such as electronic parts, lamps and batteries are very polluting if disposed in landfills and could be best processed by certified e-waste recyclers.

Hence, by implementing source separation of waste, minimal waste needs to be sent to landfills. The interior fit-out project should consider allocating space for temporarily storing the segregated waste until they can be processed and / or disposed-off as planned.

Kamal Arcade, IGBC Green Interiors Platinum

Sample image of colour coding and labelling which clearly denotes the waste type

Related credits:

- Eco Design Vision Credit 2: Optimize Circulation Spaces
- Indoor Environment Credit 14: Dedicated Dining Spaces

Documentation Required:

1. Narrative describing the strategies implemented to segregate and divert dry, wet and e- waste.
2. Provide interior layouts of each floor highlighting the location of color coded waste segregation bins.
3. Submit photographs of the measures implemented.

Exemplary Performance

This credit is not eligible for exemplary performance

Waste Management (During Installation)

Not applicable for existing interiors

IM Credit 1 Points: 3

Intent:

Encourage practices to manage material waste during installation, to avoid such waste being sent to landfills

Compliance o ptions:

Ensure that the waste generated (either by weight or volume) during installation is minimised. Following measures can be implemented:

- Explore reusing the waste within the same premises / building
- Sell the waste to a local recycler/ hauler
- Donate the waste to other projects for reuse

Points are awarded as below:

Percentage of Waste reused / sold / donated (by weight/ volume)	Points
20%	1
40%	2
60%	3

Green Building Concerns:

Construction and demolition works generate enormous quantities of waste. The Ministry of Urban Development, Government of India estimates that 10-12 million tons of debris is generated annually through construction activity. Construction waste directed to landfills results in several environmental impacts such as soil and water contamination, air pollution due to burning, fire hazards, health hazards, etc.

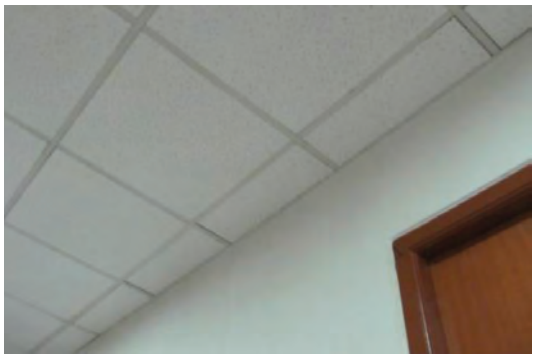
Approach and Methodology:

Diversion to landfill sites is one of the major issues in handling of construction waste. By proper management of construction waste, materials which are likely to be dumped in landfills can be converted into value added products.

A few guidelines that can help ensure effective construction waste reduction:

- **Planning for waste reduction**
  - **Pre-cut and pre-fabricated materials / products** reduce on-site interior material waste.
  - **o ptimal batch / lot sizes:** reduce waste by avoiding the ordering of excess quantity of materials.
- **Reuse of waste**
  - A construction waste reuse plan should be formulated to identify opportunities for reusing waste generated at various stages of construction. The reuse plan should be reviewed and updated regularly. Below are sample images that show reuse of construction waste in interior fit-outs:


Reuse of broken floor tiles for edges / transitions / to provide relief



Reuse of excess ceiling tiles for edges

Reuse of furnishing waste for carpets

- **Construction planning and staging**
  - Segregated waste collection: A well-maintained and segregated waste collection yard avoids mingling of waste and promotes the feasibility of reuse.
  - Storage of waste: A well-maintained storage with adequate space for storing waste makes it easy for the project to reuse waste when required.

- **Recycling of waste**
  - Engaging recycling vendors / scrap dealers right from the start of the project ensures that waste meant for disposal is not allowed to pile up on site. Scrap identified for disposal should ideally be disposed on a weekly basis.
  - Contractual agreements with specialized contractors / sub-contractors to include waste management ensures that materials which require special handling and processing are recycled safely and in an environmentally sensitive way. E.g. disposal of paint cans.
  - Donating waste materials in good condition or unused / excess materials to charitable organizations that require construction material is a socially responsible approach to waste management.

Related Credits: None

Documentation Required:

1. Calculations and comprehensive list of all interior materials and their respective waste generated
2. Narrative indicating the amount of waste generated and diverted from landfill, either by weight or volume
3. Letter from vendors/ recyclers stating donation / sale of the interior waste material
4. Photographs showing the interior waste management, segregation of waste materials during execution

Exemplary Performance

This credit is eligible for exemplary performance under innovation in interiors; if more than 80% of the waste is diverted from being sent to landfills.

Case study with sample calculations:

An interiors fit-out project implemented a construction waste management plan with the goal of diverting at least 90% of the waste generated from landfills. The waste management plan identified opportunities where waste could be processed as follows:

- Reused on site – such as tile pieces reused to create patterns at edges and transitions between space and pieces of furnishing used to create carpets;
- Sold to recyclers – such as gypsum board pieces, aluminum, glass and cardboard packaging; or

- Donated for reuse – such as wood waste and empty paint cans donated carpenters and painters who could reuse the waste in their trade.

Thus, the project was able to divert 93% of construction waste as demonstrated in the table below thereby achieving 3 points under this credit plus 1 additional point for exemplary performance.

Ensure that the waste generated(either by weight or volume) During Installation is minimized Following measures can be implemented	
☑	Explore Reusing the waste with the same premises / building
☐	Sell the waste to a local recycler / Hauler
☐	Donate the waste to other projects for reuse

Construction Material	Units Metric	Quantity Of Waste			Please Select Diversion category	Area of Application
		Generated	Reused / Recycled	Sent to Land Fills		
Glass	Tonnes	0.075	0.07	0.05	Resale	Sold to Scrap dealers for recycling
Wood	Tonnes	0.1	0.1	0	Donated	Donated to carpenter for personal use
Furnishing Pieces	Tonnes	0.08	0.08	0	Reused on site	Reused on site to make patch work carpet
Gypsum boards	Tonnes	0.1	0.08	0.02	Resale	Sold to scarp Dealers for recycling
Pacakaging Material	Tonnes	0.85	0.8	0.05	Resale	Sold to local old papervendor for recycling
Paint Cans	Tonnes	0.1	0.1	0	Donated	Taken back by Painters
Alluminium	Tonnes	0.3	0.3	0	Resale	Sold to scarp Dealers for recycling
Flooring Tiles	Tonnes	0.2	0.15	0.05	Reused on site	Reused for site on flooringborders
Total Quantity					1,805	
Total Quantity of Waste Diverted					1,68	
Percentage					93%	

GreenPro Directory: Project can download the latest information
Link: https://ciigreenpro.com/ecolabelled-products/categories

Local Materials

Not applicable for existing interiors

IM Credit 2 Points: 4

Intent:

Encourage use of locally available materials, thereby minimising the associated environmental impacts

Compliance o ptions:

Ensure local materials are sourced within a radial distance of 500 km for atleast 20% of procured materials, by cost*. Source local materials for interior applications such as (but not limited to) partitions, workstations, flooring, ceiling, furniture etc.

Points are awarded as below:

Percentage of Local Materials	Points
20 %	1
30 %	2
40 %	3
50 %	4

**Material cost = Construction cost – [Labour cost + installation cost]*

Note:

1. *If labour cost & cost of installing equipment is not known, cost of material can be taken as 60% of the construction cost, by default.*
2. *HVAC equipment, Water fixtures, Electrical fittings need not be considered for calculating the total cost of materials*

Alternative compliance path – Regional Priority

Projects in tier 3 & tier 4 cities not having access to local materials within 500 km radial distance get relaxation to procure within a radial distance of 800 km from the manufacturing unit to the project location.

Examples: Jammu & Kashmir, Leh, North East States, Hill stations, Andaman & Nicobar islands Lakshadweep, Diu & Daman etc.,

Approach and Methodology:

The procurement of locally manufactured civil and interior materials will not only reduce environmental impacts due to transportation, but will also reduce transportation costs for the interior fit-out. The availability of locally manufactured building materials is dependent on project location. In many cases, majority of building materials can be obtained within 500 km distance.

Survey and identify building materials which are in the specified distance, in early stages of project design. Prepare a master material data sheet listing out all the materials used in the project and then identify which of the materials are manufactured locally and specify the same. While selecting local materials, ensure that they perform better in terms of strength, maintenance and durability.

Note: Administrative offices, warehouses, stocking centers and minor fabrication centers should not be considered for measuring distance from the project site. The distance should be measured to the primary manufacturing facility of the material.

Related credits:

- Energy Efficiency Credit 5: Embodied Energy
- Interior Materials Credit 3: Materials with Recycled Content
- Interior Materials Credit 4: Salvaged Materials
- Interior Materials Credit 5: Eco-friendly Wood Based Materials
- Interior Materials Credit 6: Eco-certified Interior Furniture

Documentation Required:

1. Narrative describing the strategies implemented to source local materials.
2. Calculations indicating the percentage of local materials sourced (in terms of cost) with respect to the total materials cost of the project.
3. Manufacturer letters indicating the distance from manufacturing unit to the project site.

Exemplary Performance

This credit is eligible for exemplary performance under innovation in interiors; if more than 60% of the materials are sourced locally.

Case study with sample calculations:

An interiors fit-out project has a total actual material cost of Rs.25.66 Lakh. The project is located in Delhi, which has easy access to most of the construction materials. The project is therefore able to source the following materials which have been manufactured within a 500 km radial distance from the project location: fly ash bricks, glass, MDF (used for workstations) and PPC cement. The calculations are shown in the following image.

Total construction Cost	
Materials Cost (Actual)	2566500
Materials Cost (Default)	

Material / Product Name	Vendor Name	Quantity		Material / Product Cost		Distance Between Project size and Manufacturing Location	Information Source
		Number	Unit (Metric)	Cost Per Unit	Total Cost		
Fly ash Bricks	ABC Bricks	10,000	No:s	7	140000	50	Manufacturer Letter
Cement	XYZ Cement	300	No:s	320	96000	250	Others
Glass	DEF Glass	1500	Sqft	250	375000	30	Manufacturer Letter
Moduler Furniture	PQR Office Work Stations	3000	Sqft	230	690000	100	Manufacturer Letter

Total Local Material	130,1000
Percentage	51%

Hence, this project will achieve 4 points under this credit for ensuring that at least 50% of the materials used in the project were manufacture within a radial distance of 500 km from the project site.

Recycled Materials

Not applicable for existing interiors

IM Credit 3 Points: 4

Intent:

Encourage use of materials that have a high recycled content, thereby minimising the associated environmental impacts

Compliance options:

Select materials wherein a high quantum of recycled content is used during its manufacturing.

Source materials with recycled content (but not limited to) for interior applications such as glazing, partitions, false ceilings, tiles, metal railings, etc. The recycled content value** is based on the cost of materials*.

(or)

Ensure that the project uses atleast four materials certified by GreenPro Ecolabel

(1 point for each certified product)

Points are awarded as below:

Percentage of Materials with Recycled Content	Points
≥ 10%	1
≥ 15%	2
≥ 20%	3
≥ 25%	4

**Material Cost* = *(Cost of the product – Labour cost - Installation cost)*

***Recycled Content (RC) value* = *Material cost X Recycled content %*

Aggregate Recycled Content value = $\sum (RC_1 + RC_2 \ldots\ldots RC_N)$

Green Building Concerns:

A majority of materials typically used in construction projects, including interior fit-outs, are comprised of non-renewable, virgin materials. The raw material used in building materials are generally such that once mined or harvested, they can never be replenished (e.g. stone, petroleum, etc.) or require a long time for replenishment (e.g. hardwood). The rapidly growing demand for construction materials in recent years has resulted in an enormous depletion of natural resources, which if left unchecked, will leave future generations with minimal resources.

Approach and Methodology:

Materials with recycled content:

There is an increasing range of building materials with recycled content which can be considered for interior fit-outs. Formulate a procurement policy to ascertain the recycled content of materials and procure materials with high recycled content. Embodied energy of material also can be considered as some recycling process are very energy intensive. The overall recycled content of the project can be calculated as the weighted average of the recycled content across all materials.

Following is a list of materials with recycled content which can be considered for use in interior fit-outs:

- Wall
  - AAC blocks
  - Fly ash bricks / blocks
  - Blocks made from stone dust from quarries
- Partitions / interior walls / false ceiling
  - Gypsum boards
  - Cement boards
  - AAC panels
  - Glass
  - Bagasse / agri-fibre boards
  - Composite wood boards
- Flooring
  - Vitrified / ceramic tiles
  - Cement flooring using Pozzolana Portland Cement
  - Engineered marble
  - Engineered wood flooring
- Doors / windows
  - UPVC
  - Composite wood boards

Note: Some materials can have a wide range of recycled content even with the same make (and sometimes even model) based on the manufacturing location (i.e. proximity to availability of recycled raw material), product features / grade, etc. Hence, the procurement

team should ascertain the recycled content of the specific material that will be shipped to the site.

Certified green materials:

Interior fit-outs can also consider using materials which are Green Pro certified. The CII Green Pro certification evaluates products and materials on several parameters to ensure that the materials have been manufactured in an environmentally sensitive manner without compromising quality and performance. The parameters evaluated include product design, raw materials, energy and water use during the manufacturing process, transportation, performance during use and disposal/recycling process. The certification therefore ensures a life-cycle analysis of the product or material from a green perspective. This comprehensive and rigorous certification ensures that the certified products and materials are environmentally friendly and therefore automatically comply with the intent of this credit.

GreenPro Directory: Project can download the latest information
Link: https://ciigreenpro.com/ecolabelled-products/categories

Related credits:

- Energy Efficiency Credit 5: Embodied Energy
- Interior Materials Credit 2: Local Materials
- Interior Materials Credit 4: Salvaged Materials
- Interior Materials Credit 5: Eco-friendly Wood Based Materials
- Interior Materials Credit 6: Eco-certified Interior Furniture

Documentation Required:

1. Narrative detailing the strategies implemented to source materials with recycled content.
2. Calculations indicating the percentage of recycled content (in terms of cost) with respect to the total materials cost of the project.
3. Manufacturer letters/ cut-sheets/ brochures indicating the recycled content in the materials sourced

Exemplary Performance

This credit is eligible for exemplary performance under innovation in interiors; if materials sourced have recycled content more than 30%.

Case study with sample calculations:

A project located in Kolkata has a total actual material cost of Rs.25.66 Lakh. The key materials which contain recycled material include fly ash bricks, glass, floor / wall tiles, bagasse boards (used for partitions), MDF (used for workstations), gypsum board false ceiling and PPC cement. The overall recycled content, calculated as a weighted average of the recycled content of all materials, is 18%.

Calculations are shown in the following table:

Materials Cost (Actual)	2566500

Materials Cost (Default)	0

Material / Product Name	Vendor Name	Quantity		Material Products		Percentage of Recycled Content	Recycled Content Value (rs)	Information source
		Number	Unit Metric	Cost Per Unit (rs)	Total cost (rs)			
Flyash		10000	No.s	7	70000	55	38500	Manufacturer Letter
Glass		1500	Sqft	250	375000	18	67500	Manufacturer Letter
Gypsum		3000	Sqft	20	60000	40	24000	Manufacturer Letter
Tiles		2500	Sqft	100	250000	26	65000	Manufacturer Letter
Tiles		1000	Sqft	70	70000	24	16800	Manufacturer Letter
Wood		2000	Sqft	50	100000	100	100000	Manufacturer Letter
Furniture		3000	Sqft	230	690000	20	138000	Manufacturer Letter
Others		300	No:s	320	96000	24	23040	Manufacturer Letter

Total Recycled content	472840
Percentage	18%

Hence, this project will qualify for 2 points under this credit for achieving an overall recycled content of 18%.

Salvaged Materials

Not applicable for existing interiors

IM Credit 4 **Points: 2**

Intent:

Encourage the use of salvaged materials and products to reduce the demand for virgin materials, thereby minimising the environmental impacts

Compliance o ptions:

Source salvaged materials for a minimum 2.5% of procured materials by cost for interior application. The materials sourced must be permanently installed. Salvaged materials can include (but not limited to) beams & posts, doors, frames, flooring, furniture, etc.

Points are awarded as below:

Percentage of Salvaged Materials	Points
≥ 2.5%	1
≥5%	2

Notes:

1. *Materials considered for this credit are those that have lived their life and almost about to be sent to landfill.*
2. *Reuse of old furniture can also be considered under this credit.*
3. *Equipment, appliances and fixtures should not be considered since older equipment will have low efficiency issues*

Green Building Concerns:

Most construction materials typically use virgin raw materials which are either non-renewable (e.g. stone, petroleum, etc.) or which require a long time for replenishment (e.g. hardwood). The rapid increase in demand for construction materials in recent years has resulted in an enormous depletion of natural resources, which if left unchecked, will leave future generations with minimal resources.

Approach and Methodology:

Interior fit-out projects can consider a range of options to use salvaged materials. Materials such as used furniture, pillars and doors may be reusable with minimal refurbishment. India, with its rich cultural heritage, offers several possibilities for reuse of old or even antique furniture, pillars, doors, wall panels, etc., which can greatly enhance the aesthetic of the interior while preserving India's cultural heritage.

Some materials may require rework to make them applicable for a new function. For example, deal wood is commonly used to make shipping container boxes which are discarded after a few voyages. The wood from the discarded container boxes can be reused to make cabinets, shelves, workstations, furniture, etc. Similarly, discarded pallet wood and railway sleepers are often reused to make furniture. Projects may also consider purchasing refurbished office furniture, which is now widely available in India. Refurbished furniture is not only cost effective but also helps minimise resource use by avoiding new furniture purchase.

Waste ply sandwiched between 6 mm ply

Glass procurement from salvage dealer

Veneer sourced from showroom display lots

Sofas – Reuse, originally built in 1948

Related credits:

- Energy Efficiency Credit 5: Embodied Energy
- Interior Materials Credit 2: Local Materials
- Interior Materials Credit 3: Materials with Recycled Content
- Interior Materials Credit 5: Eco-friendly Wood Based Materials
- Interior Materials Credit 6: Eco-certified Interior Furniture

Documentation Required:

1. Narrative detailing the strategies implemented to source and reuse salvaged materials.
2. Calculations indicating the percentage of salvaged materials (in terms of cost) sourced by the project.
3. Declaration letters from vendors for salvaged material used.
4. Purchase receipts/ invoice from vendors for salvaged material used.
5. Photographs showing the application of salvaged materials (before & after)

Exemplary Performance

This credit is eligible for exemplary performance under innovation in interiors; for salvaged material applications which exceeds the threshold of 7.5% by cost of the total material cost.

Case study with sample calculations:

An interiors fit-out project has a total actual material cost of Rs.25.66 Lakh. The project uses salvaged deal wood to create cabinets and shelves. The project also uses salvaged decorative pillars in the reception and waiting area for visitors. The total cost of the salvaged wood and pillars is Rs.1.95 Lakh, which amounts to 8% of the actual material cost.

Materials Cost (Actual)	2566500

Materials Cost (Default)	

Salvaged Material	Quantity		Salvaged Material		Application Areas in the interiors	Information Source
	Number	Units (Metric)	Cost per unit (rs)	Total Cost (rs)		
Salvaged Deal wood	1100	kg	50	55000	Cabinets	Others
	4	nos	35000	140000	Decorative pillars	Others

Total Value of salvaged materials	195000
Percentage	8%

Hence, the project qualifies for 2 points under this credit as well as 1 additional point for exemplary performance.

Eco friendly wood based materials

Not applicable for existing interiors

IM Credit 5 **Points: 6**

Intent:

Minimise use of new wood based products, thereby reducing impacts of deforestation

Compliance o ptions:

Ensure new wood based products (by cost) used in the building are:

- Rapidly renewable*

(And/ Or)

- Composite / Agri based wood** / Recycled waste wood

Points are awarded as below:

Cost of alternate wood products / Total cost of wood based products	**Points**
20%,25%,30%.....45% of the total cost of wood based products *(1 point for each incremental 5%)*	1-6

Notes:

**Rapidly renewable materials are those that can be harvested and used within a ten year cycle. Example: Bamboo, Eucalyptus, Bagasse based materials, Jute based materials, cotton blinds; rubber wood*

***Composite / Agri based wood / Reclycled Waste wood examples include (but not limited to) MDF boards, particle boards, linoleum boards etc.*

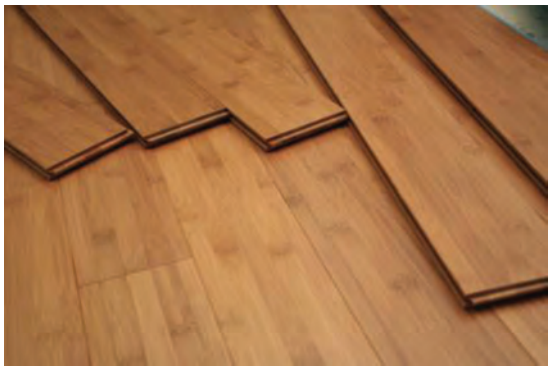
Applications to consider:

Projects that intend to use agri based wood or recycled waste wood should include all applications with respect to the wood viz., partition walls, flooring, false ceiling, doors & windows, furniture, and any other wood application (except for chairs)

Approach and Methodology:

Rapidly renewable materials: are natural, non-petroleum based materials with harvest cycles of 10 years or less. Some examples of rapidly renewable building materials:

- Bamboo / Cane / Rattan are widely used for furniture and interior partitions; compressed bamboo is used for flooring as an alternate to hardwood floors; bamboo mats are used for wall paneling; and bamboo boards are used as alternatives for plywood and particle boards.



Bamboo flooring

Bamboo blinds

- **Sugarcane waste (bagasse) / Jute / Straw:** are typically compressed into fibre-boards as alternatives for plywood and particle boards.
- **Linoleum (from linseed) / Cork:** are commonly used to produce flooring material
- **Eucalyptus / Acacia:** are examples of fast growing trees which provide soft wood suitable for making furniture, interior woodwork, doors and windows. In fact, eucalyptus and acacia are considered invasive foreign species in India.

Harvest cycle times of commonly used rapidly renewable material:

Rapidly renewable species	h arvest cycle
Acacia	8 – 10 years
Bagasse (sugarcane)	12 – 18 months
Bamboo	3 – 7 years
Cork	Typically 9 year harvest cycle after initial 25 – 30 year period for reaching harvest age. Only the bark is harvested from the tree, which lives on.
Eucalyptus	4 – 8 years
Jute	4 months
Linseed	100 days
Rattan	5 years
Straw	Generally under 1 year depending on the crop

Source: Wikipedia

Wood Substitutes:

- ***Composite wood boards:*** are typically made by compressing wood particles (typically waste wood dust) into boards as alternative for plywood.
- ***Agri-fibre boards:*** such as jute boards, bagasse boards and straw boards are also examples of rapidly renewable material.

Related credits:

- Energy Efficiency Credit 5 – Embodied Energy
- Interior Materials Credit 2: Local Materials
- Interior Materials Credit 3: Materials with Recycled Content
- Interior Materials Credit 4: Salvaged Materials
- Interior Materials Credit 6: Eco-certified Interior Furniture

Documentation Required:

1. Narrative describing the strategies implemented to source rapidly renewable materials or composite / agribased wood / recycled waste wood in the project
2. List of applications where rapidly renewable materials or composite / agribased wood / recycled waste wood are used
3. Unit calculations and total cost of wood free materials indicating the percentage of agri based or composite wood based products used in the project.
4. Purchase invoices of the sourced rapidly renewable material or agri based or composite wood products or recycled waste wood
5. Photographs showing applications of Eco friendly wood

Exemplary Performance

This credit is eligible for exemplary performance under innovation in interiors; if more than 50% of the new wood based materials are sourced are rapidly renewable or composite or agribased products

Case study with sample calculations:

An interiors fit-out project has a total actual material cost of Rs.25.66 Lakh, of which wood based applications such as partitions, modular furniture and salvaged wood account for Rs.9.85 Lakh. The project uses MDF boards which contain 100% rapidly renewable content in the form of agri-fibre saw dust for modular workstations. The value of the MDF boards is 20% of the cost of the modular work stations and hence the rapidly renewable

content is considered as 20% of the cost of the work stations. The project also uses bagasse board which contains 100% rapidly renewable content in the form of sugarcane waste for partitions. The overall rapidly renewable content is approximately 24% of the cost of wood based material as seen in the calculations overleaf. Hence, the project qualifies for 1 point under this credit.

Total wood material cost	985000

Material product Name	Manufacturer Vendor Name	Quantity		Material Product Cost		Percentage of Rapidly Renewable material	Value Qualifing as rapidly renewable	Appliaca-tion Areas in the project	Information source
		Number	Unit Metric	Cost Per Unit (rs)	Total Cost (rs)				
Partical board	MNO Bagassee Board	2000	Sqft	50	100000	100%	100000	Partitions	Manufacturer Letter
MDF Board	PQR Office Work Stations	3000	Sqft	230	690000	20%	138000	Moduler Furnitures	Manufacturer Letter
					0		0		
					0		0		
					0		0		
					0		0		
					0		0		
					0		0		

Total cost of rapidly Renewable Material	238000
Percentage	24%

Eco-certified Interior Furniture

IM Credit 6 Points: 4

Intent:

Encourage the use of eco-certified interior products that consider impacts through the life cycle, thereby resulting in lower environmental impacts

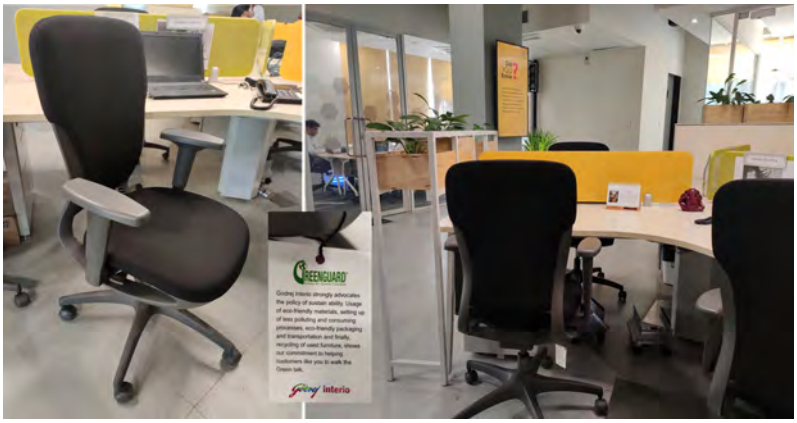
Compliance o ptions:

- Source eco-certified interior workstations, cabin furniture, chairs etc., that are Certified by GreenPro (or) BIFMA (or) Green Guard Certified

Points are awarded as below:

Eco-certified Furniture as % of total furniture cost	Points
10%, 20%, 30%, 40% of total furniture cost*	1-4

Total furniture cost* includes all new wood furniture item cost in the interior ft-outs
Examples: Chairs, Workstations, Cabin furniture, Meeting room tables, Storage units & Loose furniture



Approach and Methodology:

Interior fit-outs should survey the market and identify furniture which are certified under one of the referenced standards. Projects such as commercial office, banks, hotels, etc. which have intensive furniture requirement can procure furniture certified by one of the following standards.

The BIFMA[1] e3 Furniture Sustainability standard specifically pertains to business and institutional furniture and includes criteria for assessing a product's environmental sustainability across factors such as material selection, energy use during manufacture,

[1] BIFMA (Business + Institutional Furniture Manufacturers" Association): https://www.bifma.org/

human / ecosystem health and social responsibility[2]. The GreenPro[3] certification has a broader scope wherein products and materials are evaluated on several parameters to ensure that the materials have been manufactured in an environmentally sensitive manner without compromising quality and performance. The Green Guard[4] certification, on the other hand, focuses on ensuring that products and materials used in interior spaces comply with rigorous limits for volatile organic compounds (VOCs).

Related credits:

- Energy Efficiency Credit 5 – Embodied Energy
- Interior Materials Credit 2: Local Materials
- Interior Materials Credit 3: Materials with Recycled Content
- Interior Materials Credit 4: Salvaged Materials
- Interior Materials Credit 5: Eco-friendly Wood Based Materials

Documentation Required:

1. Submit copy of Certified by GreenPro or BIFMA or Green Guard Certificates of the proposed eco-certified interior product, clearly indicating the model & make
2. Purchase invoices of the eco-certified interior product

Exemplary Performance

This credit is eligible for exemplary performance under innovation in interiors; if more than 50% of the new furniture is eco-certified by cost.

Case Study with sample calculations:

An interiors fit-out project has a total furniture cost of approximately Rs.10 Lakh. Furniture considered in the calculation include modular workstations, office chairs, conference room chairs, one conference room table and reception furniture. The project has procured certified office chairs and conference chairs, which have an overall cost of Rs.2.73 Lakh, which amounts to 27% of the total furniture cost of the project. Thus, the project qualifies for 2 points under this credit.

[2] BIFMA certified products are listed here: https://level.ecomedes.com/

[3] GreenPro certification: http://www.greenbusinesscentre.com/site/ciigbc/greenpro - refer Annexure for GreenPro certified products

[4] Green Guard certification: http://greenguard.org

Total Furniture cost							1013000
Product name	Manufacturer / Vendor Name	Quantity		Material/ Product		Application Areas in the Project	Information Source *(Please choose from drop-down below)*
		Number	Units (Metric)	Cost per unit (Rs)	Total Cost (Rs)		
Office Chairs	123 Business Furniture	50	nos.	4500	225000	Chairs	Manufacturer Letter
Conference Chairs	123 Business Furniture	8	nos.	6000	48000	Chairs	Manufacturer Letter
					0		
					0		
					0		
					0		
					0		
					0		
Total value of Certified Interior Furniture							273000
Percentage							27%

Purchase of Green Consumables

Not applicable for new interiors

IM Credit 7 Points: 3

Intent:

Encourage the use of green consumables in the interior space that have low impacts on human health and the environment

Compliance o ptions:

- Source green consumables for the following applications

  (1 point for each measure, max 3 points)

  - Use of recycled paper for more than 50% requirement of consumption
  - Use of green eco-friendly house keeping cleaning products which are GreenPro certified
  - No use of plastics in Interior fit-outs

Green Building Concerns:

The extent of environment sustainability of an interior fit-out is significantly dependent on its design and construction. However, the lifestyle and processes adopted by the occupants also have an impact on the fit-out's sustainability. For instance, careless use of new paper or rampant use of plastics or the use of harmful cleaning chemicals all contribute to a negative impact on the environment.

Approach and Methodology:

The intent of this credit is to promote an environmentally sustainable lifestyle within the fit-out, which complements the various eco-friendly features incorporated in the fit-out. Use of recycled paper instead of new paper helps combat deforestation. Avoiding the use of plastics helps mitigate depletion of petroleum resources and reduces non-biodegradable wastes which cause immense pollution and adverse health impact. Use of eco-friendly cleaning supplies help enhance occupant well-being. The project can survey the market for eco-friendly housekeeping chemicals which have been certified under the GreenPro[1] or the Green Seal[2] standard. Green Seal has several categories that are relevant to the IGBC Green

[1] GreenPro certification: http://www.greenbusinesscentre.com/site/ciigbc/greenpro

[2] Green Seal certification: http://www.greenseal.org/

Interiors standard, such as GS 37, GS41, GS 53, etc.

Paper reduction initiative at Latent View's interior fit-out in Chennai wherein used printer papers are reused.

Documentation Required:

1. Submit a narrative on the practices demonstrating the above, post occupancy.
2. Submit photographs / certificates as applicable.

Exemplary Performance

This credit is not eligible for exemplary performance under innovation in interiors.

Indoor Environment

Introduction

As humans tend to spend as much as 90% of their time indoors, it is essential that the indoor environment is conducive to human health and well-being. Several studies have demonstrated the link between indoor environment quality & occupants health, happiness and productivity. Spending time in spaces with poor indoor environment quality often results in human health issues is referred as the ‘‘sick building syndrome’ (SBS). Therefore, good indoor environment quality is essential to the health, happiness and productivity of occupants.

Ensuring the well-being and comfort of occupants is an essential parameter in the IGBC Green Interiors rating system. There are several factors which impact the quality of the indoor environment such as:

- access to daylighting
- quality of the indoor air
- availability of fresh air
- thermal comfort
- cleanliness and hygiene
- CO_2 monitoring
- Ergonomics & acoustics
- connection to the outdoor environment

Access to adequate natural light and outdoor views is a key in establishing a connection with the exterior environment which promotes the well-being & productivity of occupants and use of non-toxic and non-emitting finishes helps enhance the air quality in interior spaces.

Ergonomically designed furniture as well as ensuring good acoustic performance and providing access to recreational facilities helps to enhance the well-being and satisfaction levels of occupants.

Tobacco Smoke Pollution

IE Mandatory Requirement 1

Intent:

Minimise exposure of non-smokers to adverse health impacts from passive smoking

Compliance o ptions:

Demonstrate that smoking is prohibited in the building, and is in accordance with the regulations of Ministry of Health & Family welfare, Government of India

In case the project has assigned outdoor smoking areas, locate such areas at a minimum of 7.6 meters from all outdoor air intakes (entrance doors, window openings etc.)

Alternately, compliance can be shown through designated smoking rooms which capture and remove tobacco smoke from the interior office floor.

Notes for Designing a Smoking Room:

- *The smoking room will be completely sealed*
- *The conditioned air entry into the smoking zone shall not return back or be transferred to the air-handling units. This air shall be completely exhausted.*
- *The smoking room shall be maintained at a negative pressure of 5 Pascals (0.00005 bar)*

Approach and Methodology:

Firstly, it is recommended to completely prohibit smoking within the premises or provide designated smoking areas/ smoking zones, 25 feet away from all fresh air intakes with signages. Secondly, if there is a need to have smoking room within the premises, the smoking room should have sealed deck-to-deck partition and maintained at negative pressure of 5 pascal's.

The 'No Smoking policy' should be clearly communicated to all the occupants.

Sample signages are shown below:

Sample images of "No Smoking" signage.

Related credits:

- Indoor Environment MR 1 / Credit 1 – Fresh Air Ventilation
- Indoor Environment Credit 5 – CO_2 Monitoring
- Indoor Environment Credit 6 – Indoor Plants
- Indoor Environment Credit 8 – Minimise Indoor Pollutant Contamination
- Indoor Environment Credit 10 – Low Emitting Materials
- Indoor Environment Credit 12 – Interior Flush Out

Documentation Required:

1. A declaration letter from the tenant stating that smoking will be prohibited in all the common areas of the building.
2. Photographs of the designated smoking areas, details of exhaust
3. A plan showing the location of the educative signages
4. Photographs showing the installed educative signages

Exemplary Performance

This credit is not eligible for exemplary performance

Fresh Air Ventilation

IE Mandatory Requirement 2

Intent:

Provide adequate outdoor air ventilation, so as to avoid pollutants affecting indoor air quality.

Compliance o ptions:

❖ **For Mechanically Ventilated Spaces:**

Demonstrate that the fresh air ventilation in all regularly occupied areas shall meet the minimum ventilation rates, (illustrative table below)

outdoor Air Rates for different Space types

Space Type	Area – Outdoor Air Rate (cfm/sq.ft) (R_a)
Restaurant Dining rooms	0.18
Cafeteria/ fast food dining	0.18
Conference/ meeting	0.06
Hotels – bed/ living rooms	0.06
Office space/ Reception area/ telephone/ data entry/ main entry lobby	0.06
Libraries	0.12
Retail spaces	0.06
Super Market	0.06
Auditorium	0.06
Health club	0.06
Corridors	0.06
Computer lab	0.12

Alternative Compliance Path:

Projects with Unitary Air-conditioning units and not meeting the required threshold for Fresh Air Ventilation (openable area (or) mechanical Treated fresh air provision), can meet the mandatory by installing any two of the following: *(Applicable to projects with less than 1,500 sq.ft only)*

1. Install fresh air inline fans
2. Mechanical Air purifiers
3. Install CO2 sensors *(refer IE Credit 5 criteria)*

(And/ o r)

For Non Air-conditioned Spaces:

Provide operable windows or doors to the exteriors, in all regularly occupied areas, such that the operable area is designed to meet the criteria as outlined in the table below:

Design Criteria for Openable Windows and Doors to the Exteriors

Category	Percentage of o penable Area to the Total Carpet Area
Regularly Occupied Area (≤150 sq.m)	4 %
Regularly Occupied Area (≥150 sq.m)	6 %

Notes:

- *Doors/ windows should not have any obstruction within 2 m from the exterior surface. Shading devices can be excluded.*
- *For sliding windows / doors, only openable area to the exteriors shall be considered in calculations.*

General Notes:

- *Regularly occupied areas are those where people sit or stand as they work, irrespective of the number of days occupied in a year.*
- *Regularly occupied areas include work stations, cabins, meeting rooms, conference rooms, waiting areas, cafeteria, etc.,*
- *Non-regularly occupied spaces include toilets, store rooms, etc.,*

❖ Example to calculate fresh air requirement:

Minimum ventilation rates in breathing zone

Considering a project with floor Area of 10,000 sq.ft and an occupancy of 100 staff. The outdoor airflow rate required per unit area is 0.06 cfm/sq.ft (from the table 1A) Hence a minimum ventilation rate in breathing zone for meet the mandatory requirement will be arrived as follows:

Minimum ventilation rate required	= outdoor airflow rate/unit area x floor area = 0.06 x 10,000 = 600 cfm

Green Building Concerns:

Poorly ventilated spaces result in a build-up of impurities and toxins inside the spaces and the indoor air becomes "stale". Spending time in poorly ventilated spaces with stale air typically results in occupants suffering from ''sick building syndrome".

Approach and Methodology:

It is essential that indoor spaces are well ventilated, either through adequate openings to the exterior environment (natural ventilation) or by using well-designed mechanical ventilation systems. A well-designed fresh air ventilation system ensures thermal comfort and well being of the occupants.

Natural Ventilation: Ensure that the openable windows or doors to the exteriors in all regularly occupied areas, such as office areas, meeting rooms, conference rooms, etc., is designed as per the criteria.

Mechanical Ventilation: A well-designed mechanical ventilation system will not only bring in adequate quantity of fresh air when needed, but can also ensure that dust, other impurities, allergens such as pollen and microbes are kept outside by using appropriate filters and microbial eliminators such as UV-lamps. The mechanical ventilation system should be designed as per ASHRAE 62-1:2010 standard (please refer to the "Outdoor Air Rate" table under "Compliance Options").

Few strategies for enhancing the natural ventilation:

- Casement versus sliding windows: Casement (hinged) windows provide more openable area for a given window size than do sliding windows. For sliding windows to achieve the same openable area as casement windows, the window size has to be larger, which increases the window-to-wall ratio (WWR) of the space and allows more heat to enter the space.
- High ventilators: Providing openable ventilators close to the ceiling allows hot air to exhaust out and creates a natural draft inside the space which pulls in fresh air from the lower openings.
- Cross ventilation: Providing openings to the exterior environment in different orientations (directions) results in cross ventilation which helps improve air circulation inside the space and also brings in more fresh air.

Related credits:

- Energy Efficiency Credit 2 – Energy Efficient Interiors
- Indoor Environment Credit 5 – CO_2 Monitoring
- Indoor Environment Credit 6 – Indoor Plants
- Indoor Environment Credit 10 – Low Emitting Materials
- Indoor Environment Credit 12 – Interior Flush Out

Documentation Required:

Air-conditioned Spaces:

1. Calculations indicating minimum ventilation rates in all regularly occupied areas.
2. Floor plans of the zone and occupancy calculations

Non Air-conditioned spaces

1. Calculations indicating the openable area (i.e. window/ door) as a percentage of carpet area in each regularly occupied spaces.
2. Floor plans showing the door and window schedules

Exemplary Performance

This credit is not eligible for exemplary performance

Case study with sample calculations – mechanical ventilation:

Minimum ventilation rates in breathing zone:

Considering a project with floor Area of 10,000 sq.ft and occupancy (Pz) of 100 staff. The outdoor airflow rate required per unit area is 0.06 cfm/sq.ft. (from table 1A). Hence a minimum ventilation rate in breathing zone to meet this mandatory requirement is arrived at as follows:

Minimum ventilation rate = outdoor airflow rate / unit area x floor area
= 0.06 x 10,000
= 600 cfm

Case Study with sample calculations – natural ventilation:

A clinic occupies a fit-out with floor area of approximately 1,600 sq.ft in a commercial building. The centre consists of the following spaces: office area, 2 therapy rooms, training hall, kitchen and staff dining room. The office is naturally ventilated with openable windows, french windows and french doors. The clinic complies with this mandatory requirement as demonstrated by the fresh air calculations shown below.

Category	Space	Percentage of openable area to the total carpet area	Floor Area (sqmts)	Openable Window Area (towards exterior sq.m)	Openable Door Area (towards exterior sq.m)	Total Openable	Openable area as a percentage of total carpet area (designed)	Meeting Criteria (yes/no)
Regularly occupied Area (<100 Sq.m)	Office	4%	17	1.86	2.6	4.46	26%	Yes
Regularly occupied Area (<100 Sq.m)	Therapy Room 1	4%	7	1.86		1.86	27%	Yes
Regularly occupied Area (<100 Sq.m)	Therapy Room 1	4%	10	1.86		1.86	19%	Yes
Regularly occupied Area (<100 Sq.m)	Kitchen	4%	6	1.5		1.5	25%	Yes
Regularly occupied Area (<100 Sq.m)	Staff Dining Room	4%	6.6	1.86		1.86	28%	Yes
Regularly occupied Area (<100 Sq.m)	Training Hall	8%	110	13	10	23	21%	Yes

Enhanced Fresh Air Ventilation

IE Credit 1 Points: 2

Intent:

Provide adequate outdoor air ventilation, so as to avoid pollutants affecting indoor air quality.

Compliance o ptions:

❖ **For Mechanically Ventilated Spaces:**

Demonstrate that the fresh air ventilation in all regularly occupied areas to meet the minimum ventilation rates, as prescribed in ASHRAE* Standard 62.1 – 2010 (illustrative table below)

o utdoor Air Rates for different Space types (Table 2A)

Space Type	People - Outdoor Air Rate (cfm / person) ($R_{p)}$	Area – Outdoor Air Rate (cfm/sq.ft) (R_a)
Restaurant Dining rooms	7.5	0.18
Cafeteria/ fast food dining	7.5	0.18
Conference/ meeting	5	0.06
Hotels – bed/ living rooms	5	0.06
Office space/ Reception area/ telephone/ data entry/ main entry lobby	5	0.06
Libraries	5	0.12
Retail spaces	7.5	0.06
Super Market	7.5	0.06
Auditorium	5	0.06
Health club	20	0.06
Corridors	-	0.06
Computer lab	10	0.12

Points are awarded as below:

Mechanically Ventilated Spaces	Points
Design as per baseline	1
≥10% of baseline criteria	2

(And/ o r)

For Non Air-conditioned Spaces:

Provide operable windows or doors to the exteriors, in all regularly occupied areas, such that the operable area is designed to meet the criteria as outlined in the table below:

Design Criteria for o penable Windows and Doors to the Exteriors

Category	No points	o penable Requirement	Points
Regularly Occupied Area (≤150 sq.m)	4 %	6%, 8%	1, 2
Regularly Occupied Area (≥150 sq.m)	6 %	8 %, 10%	1, 2

Notes:

- *Doors/ windows should not have any obstruction within 2 m from the exterior surface. Shading devices can be excluded.*
- *For sliding windows / doors, only openable area to the exteriors shall be considered in calculations.*

General Notes:

- *Regularly occupied areas are those where people sit or stand as they work, irrespective of the number of days occupied in a year.*
- *Regularly occupied areas include work stations, cabins, meeting rooms, conference rooms, waiting areas, cafeteria, etc.,*
- *Non-regularly occupied spaces include toilets, store rooms, etc.,*

❖ Example to calculate fresh air requirement:

Considering a project with floor Area of 10,000 sq.ft and an occupancy of 100 staff. The outdoor airflow rate required per person is 5 cfm/person (from table 2A) plus outdoor airflow rate required per unit area is 0.06 cfm/sq.ft. Hence a minimum ventilation rate in breathing zone is arrived as

Minimum ventilation rate required for meeting this credit compliance

= (total occupancy x outdoor airflow rate/person) + (outdoor airflow rate/unit area x floor area)

= (100 x 5) + (0.06 x 10,000) = 1,100 cfm

Green Building Concerns:

Poorly ventilated spaces result in a build-up of impurities and toxins inside the spaces and the indoor air becomes "stale". Spending time in poorly ventilated spaces with stale air typically results in occupants suffering from ''sick building syndrome".

Approach and Methodology:

It is essential that indoor spaces are well ventilated, either through adequate openings to the exterior environment (natural ventilation) or by using well-designed mechanical ventilation systems. A well-designed fresh air ventilation system ensures thermal comfort and well being of the occupants.

Mechanical Ventilation: A well-designed mechanical ventilation system will not only bring in adequate quantity of fresh air when needed, but can also ensure that dust, other impurities, allergens such as pollen and microbes are kept outside by using appropriate filters and microbial eliminators such as UV-lamps. The mechanical ventilation system should be designed as per ASHRAE 62-1:2010 standard (please refer to the "Outdoor Air Rate" table under "Compliance Options").

❖ **Formula to calculate fresh air requirement:**

Minimum ventilation rates in breathing zone (Vbz):

Vbz = Rp x Pz + Ra x Az (Table 6-1 ASHRAE 62.1-2010)

Rp = Outdoor airflow rate required per person

Ra = Outdoor airflow rate required per unit area

Az = Zone floor area in sq.ft

Pz = Zone occupancy

A well designed mechanical ventilation system will not only bring in adequate quantity of fresh air when needed, but can also ensure that dust, other impurities, allergens such as pollen and microbes are kept outside by using appropriate filters and microbial eliminators such as UV-lamps.

Natural Ventilation: Ensure that the openable windows or doors to the exteriors in all regularly occupied areas, such as office areas, meeting rooms, conference rooms, etc., is designed as per the criteria.

Few strategies to enhance the natural ventilation:

- Casement versus sliding windows: Casement (hinged) windows provide more openable area for a given window size than do sliding windows. For sliding windows to achieve the same openable area as casement windows, the window size has to be larger, which increases the window-to-wall ratio (WWR) of the space and allows more heat to enter the space.
- High ventilators: Providing openable ventilators close to the ceiling allows hot air to exhaust out and creates a natural draft inside the space which pulls in fresh air from the lower openings.
- Cross ventilation: Providing openings to the exterior environment in different orientations (directions) results in cross ventilation which helps improve air-flow inside the space and helps bring in more fresh air.

Related credits:

- Energy Efficiency Credit 2 – Energy Efficient Interiors
- Indoor Environment Credit 5 – CO_2 Monitoring
- Indoor Environment Credit 6 – Indoor Plants
- Indoor Environment Credit 10 – Low Emitting Materials
- Indoor Environment Credit 12 – Interior Flush Out

Documentation Required:

Air-conditioned Spaces:

1. Calculations indicating minimum ventilation rates in all regularly occupied areas.
2. Floor plans of the zone and occupancy calculations

Non Air-conditioned spaces

1. Calculations indicating the openable area (i.e. window/ door) as a percentage of carpet area in each regularly occupied spaces.
2. Floor plans showing the door and window schedules

Exemplary Performance

This credit is not eligible for exemplary performance

Case study with sample calculations – mechanical ventilation:

Considering a project with floor Area (Az) of 10,000 sq.ft and an occupancy (Pz) of 100 staff. The outdoor airflow rate required per person (Rp) is 5 cfm/person (from table) plus outdoor airflow rate required per unit area (Ra) is 0.06 cfm/sq.ft. Hence, the minimum ventilation rate in breathing zone (Vbz) is calculated as follows:

Vbz = Rp x Pz + Ra x Az

= 5 x 100 + 0.06 x 10,000

= 1100 cfm

A mechanical ventilation designed to deliver the above mentioned airflow will help the project achieve 1 point under this credit. In order to achieve 2 points under this credit, the mechanical ventilation system must be designed to deliver at least 1,210 cfm.

Case Study with sample calculations – natural ventilation:

A clinic occupies a fit-out with floor area of approximately 1,600 sq.ft in a commercial building. The centre consists of the following spaces: office area, 2 therapy rooms, training hall, kitchen and staff dining room. The office is naturally ventilated with openable windows, french windows and french doors. The clinic complies with the credit requirement as demonstrated by the fresh air calculations shown in the following table and achieves 2 points under this credit.

☑ I hereby declare that openable windows or doors to the exteriors, in all regularly occupied spaces, are designed such that the openable area is designed to meet the criteria

Category	Space	Percentage of Openable Area to the Total Carpet Area	Floor Area (sq.m)	Openable Window Area (towards exterior) (sq.m)	Openable Door Area (towards exterior) (sq.m)	Total Openable	Openable Area as a Percentage of Total Carpet Area (Designed)	Meeting Criteria (Yes/No)
Regularly Occupied Area (< 100 sq.m)	Office	4%	17	1.86	2.6	4.46	26%	Yes
Regularly Occupied Area (< 100 sq.m)	Therapy Room 1	4%	7	1.86		1.86	27%	Yes
Regularly Occupied Area (< 100 sq.m)	Therapy Room 2	4%	10	1.86		1.86	19%	Yes
Regularly Occupied Area (< 100 sq.m)	Kitchen	4%	6	1.5		1.5	25%	Yes
Regularly Occupied Area (< 100 sq.m)	Staff Dining Room	4%	6.6	1.86		1.86	28%	Yes
Regularly Occupied Area (> 100 sq.m)	Training Hall	8%	110	13	10	23	21%	Yes
							–	
							–	
							–	
							–	
							–	
							–	
							–	
							–	

Daylighting

IE Credit 2 Points: 4

Intent:

Provide connectivity between the interior and exterior spaces, to achieve visual delight to occupants

Compliance o ptions:

The project can choose any one of the following options or a combination, to show compliance:

- ❖ Option 1 – Measurement Approach
- ❖ Option 2 – Simulation Approach

Notes:

- *Regularly occupied areas are those where people sit or stand as they work, irrespective of the number of days occupied in a year.*
- *Regularly occupied spaces include work stations, cabins, meeting rooms, conference rooms, waiting areas, cafeteria, etc.,*
- *Open / Private Office Spaces include, but not limited to, Work stations, Cabins, etc.,*
- *Shared/ Multi-occupied Spaces include, but not limited to, Meeting rooms, Conference rooms, Cafeteria, etc.,*
- *Regularly occupied spaces which are used for multi-purposes, such as cafeteria-cum meeting room, can be considered as separate spaces based on the function. The room boundary need not be a physical boundary.*

o ption 1: Measurement Approach

1. Demonstrate through daylight illuminance measurement that 25 % of the regularly occupied spaces in the building achieve daylight illuminance levels as per the table below:
2. Measurements shall be taken after installation of furniture, equipment & systems at work plane height during 9 a.m. to 3 p.m., on a 10 foot square grid. The hourly average measurements between 9 a.m. to 3 p.m. shall be taken to show compliance.

Points are awarded as below:

Percentage of Regularly o ccupied Spaces with Daylight	Points
≥ 25%	1
≥ 50%	2
≥ 75%	3
≥ 95%	4

Illuminance Levels for Various Spaces

Space Type	Average Illuminance (in lux)
General Offices	300
Deep Plan General Offices	500
Computer Work Stations	300
Conference Rooms, Executive Offices	300
Computer and Data Preparation Rooms	300
Drawing Boards	500
Print Rooms	200
Counter, Office Areas	300
Super Markets/ Hyper Markets	300
Showrooms for Large Objects example Cars, Furniture	300
Hotel – Entrance Halls	50
Hotel – Reception/ Cashiers	200
Hotel – Bed room	30
Hotel – Bathrooms	50
Food Preparation & Stores, Cellars, Lifts & Corridors	100

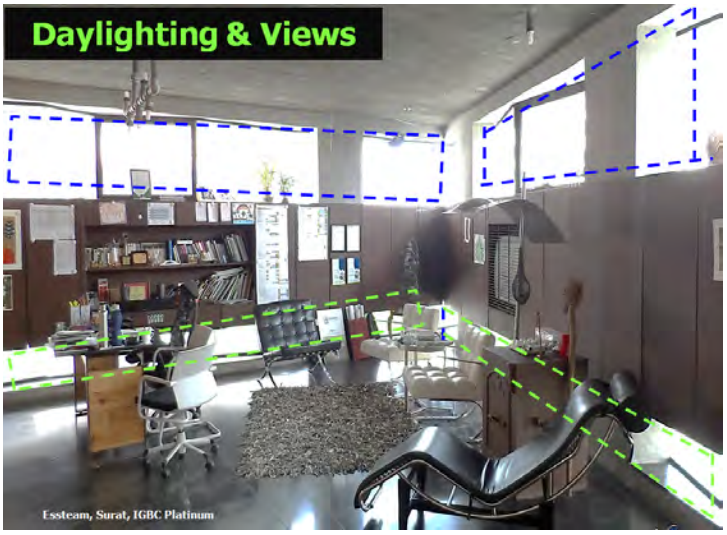
**Reference: Bureau of Energy Efficiency Code – Lighting, 2006*

o ption 2: Simulation Approach

Demonstrate through computer simulation that 25 % of the regularly occupied spaces in the building should achieve daylight illuminance minimum 300 lux in a clear sky condition on equinox (21st March or 21st September) at 12 noon, at working plane.

Points are awarded as below:

Percentage of Regularly o ccupied Spaces with Daylight	Points
≥ 25%	1
≥ 50%	2
≥ 75%	3
≥ 95%	4



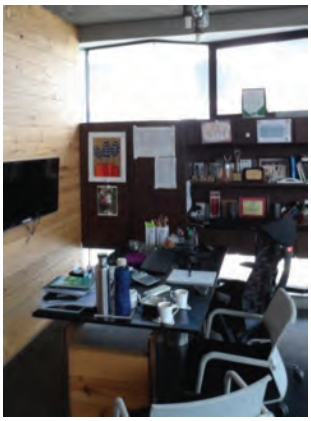
Approach and Methodology:

It is important to ensure that adequate openings to the exterior environment are provided to bring in natural light into interior spaces. It is also imperative to strike a balance between the light and heat that could be let into the buildings via these openings – especially in hot-dry and warm-humid climatic regions. Sensible planning of the orientation & sizes of window openings and the provision of adequate sun-shades can help reduce ingress of heat while allowing natural light. Solar control glass can also be used in the windows to reduce heat ingress while allowing natural light.

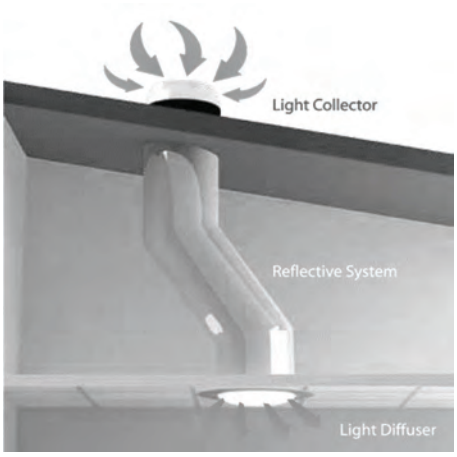
For large floor plates, to allow adequate penetration of natural light, horizontal openings such as skylights and courtyards can be planned to bring in light. Innovative products such as light pipes can also be considered to bring natural light deep into areas.

Examples of interior spaces which are well lit by natural light

[1] http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2290997/ - Moderate exposure to sunlight delivers a wide range of health benefits to humans including boosting of vitamin D production which in turn enhances immunity and strength of bones. Lack of exposure to natural light has also been linked to depression.



Offices with abundant natural light at Kamal Arcade, New Delhi & Essteam, Surat.

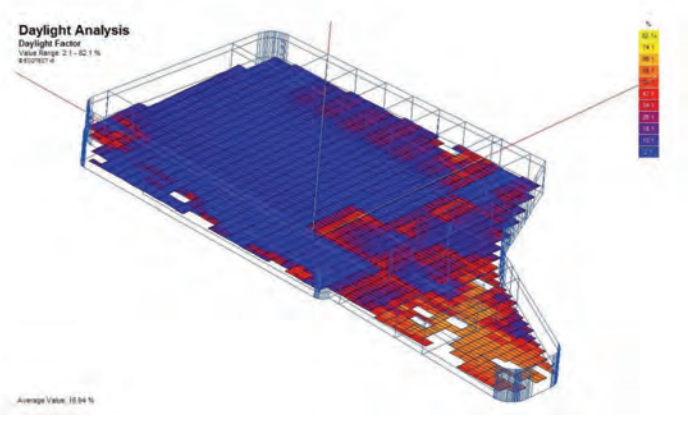


Light pipes can be used to bring in natural light into interior spaces with large floor plates.

Skylights and courtyards to bring in light

Projects can demonstrate that the fit-out has adequate exposure to natural light by either measuring the lux levels of natural light or by conducting a daylight simulation as described under section “Compliance”.

Sample image of a lux level meter



Example of a daylight simulation of a commercial office

Related credits:

- Eco Design Approach Credit 1 – Eco Vision for Interior Design
- Energy Efficiency Credit 2 – Energy Efficient Interiors
- Indoor Environment MR 2 / Credit 1 – Fresh Air Ventilation
- Indoor Environment Credit 3 – Thermal Comfort
- Indoor Environment Credit 8 – Outdoor Views

Documentation Required:

1. Measurement Approach

- Detail floor plans with window and skylight schedule.
- Daylight calculations for all regularly occupied spaces in the project.
- Manufacturer brochure/ cut-sheet/ letter of the installed glass showing the visual light transmittance (VLT).
- Photographs showing the interior spaces with daylight.

2. Simulation Approach

- Detail floor plans with window and skylight schedule.
- Daylighting simulation report stating the sky conditions (such as date & month; time; ambient lux levels; wall, floor & roof reflectance properties; etc.,) and showing the daylight analysis for all regularly occupied in the project. During simulation, consider shading devices and 'shadow effect' of adjacent neighboring buildings.
- Manufacturer brochure/ cut-sheet/ letter of the installed glass showing the visual light transmittance (VLT).
- Photographs showing the interior spaces.

Exemplary Performance

This credit is not eligible for exemplary performance

Case Study

An existing interior fit-out in Kolkata conducted lux level measurements of its regularly occupied spaces. The measurements are tabulated below:

Space	Area (SQM)	Benchmark Lux Level	Achieved Lux Level	Area with adequate daylight
Executive Offices, Conference Rooms	400	300	375	400
Deep Plan General Offices	1000	500	450	0
Computer Workstations	1500	300	350	1500
Total	2900			1900

In this fit-out, 1900 SQM out of a total regularly occupied area of 2900 SQM achieves adequate daylight (65%). Hence, the project is eligible for 2 points under this credit.

Thermal Comfort

Not applicable for new interiors

IE Credit 3 Points: 1

Intent:

Provide good working environment so as to enhance the productivity and well-being of occupants

Compliance o ptions:

- ❖ Meet thermal comfort requirement as under, to cater to more than 75% of the regularly occupied areas
  - Temperature of 26 ± 2 deg C
  - Relative Humidity of 50 – 60 %

Note: Project should install thermostat to monitor the temperature & Relative Humidity throughout the year

Green Building Concerns:

"Thermal comfort" refers to a person's state of mind in terms of whether they feel too hot or too cold [1]. Thermal comfort depends on a range of factors such as the temperature, humidity and airflow inside the environment to factors such as the type of clothing worn and the physical exertion required of the work. People working in uncomfortably hot or cold conditions are less likely to function at their full potential as their ability to perform tasks and make decisions suffers.

Approach and Methodology:

Studies have shown that providing thermal comfort for occupants enhances productivity and satisfaction levels. Thermal comfort is achieved through the right combination of temperature, humidity and air flow [2]. Maintaining a comfortable temperature and humidity range (as specified under the section "Compliance Options") inside the interior spaces enables the occupants to achieve an acceptable level of thermal comfort. Thermal comfort can be achieved by natural or mechanical means depending on whether the interior space is conditioned or not.

[1] http://www.hse.gov.uk/temperature/thermal/index.htm

[2] http://www.hok.com/thought-leadership/workplace-strategies-that-enhance-human-performance-health-and-wellness/

There are many solutions that can be deployed to achieve thermal comfort i.e. temperature range of 26 + 2 degree C and Relative humidity between 50 – 60%. Thermostats can be used in conditioned spaces to ensure that the temperature is maintained within the desired range. Adequate air flow can be achieved by using fans or blowers of adequate capacity or by providing adequate openings to the exterior. Humidity can be controlled by using dehumidifiers.

Related credits:

- Eco Design Approach – Credit 1: Eco Design Vision
- Energy Efficiency – Credit 2: Energy Efficient Interiors
- Indoor Environment – MR 2 / Credit 1: Fresh Air Ventilation

Documentation Required:

Submit measurement of temperature & RH in the interior fit-out spaces and demonstrate how this is achieved all through the year

Exemplary Performance

This credit is not eligible for exemplary performance under innovation in interiors.

Ergonomic Design

IE Credit 4 Points: 2

Intent:

Encourage ergonomic design to address occupants' health and well-being

Compliance o ptions:

Ensure that the Interior fit-out meets the following ergonomic standards as per ISO TC159 (or) Metric Handbook –Planning & Design Data (or) equivalent reference standard to design interior spaces based on the function.

Project can attempt atleast one measure as appropriate interior area based on function.

(1 point for each measure, max 2pts)

Measures include, not limited to:

- Height / angle adjustable chairs
- Height / angle adjustable workstations
- Height / angle adjustable monitor arms

Examples for interior typologies *(not limited to)*

1. **Office**
   - Workstations, Cabin furniture, Soft furniture, Over-head storage unit, chairs
2. **Bank**
   - Cubicals, Manager desk, Storage units, Loose furniture, Staff chairs
3. **Retail**
   - Racks, Display furniture, stools, seating spaces, cabinetry
4. **h otel**
   - Reception desk, Visitor Lounge, dining tables, suites, chairs
5. **h ospital**
   - Reception area, visitor lounge, doctor desk, visitor seats, stools, pharmacy

Approach and Methodology:

Ergonomically designed work spaces can greatly enhance the comfort and well-being of the occupants. The furniture design should meet the needs of the people occupying the

fit-out. For instance, a task that requires a person to frequently access manuals or records should be supported by easily accessible cabinets.

Sedentary tasks should be supported by chairs that offer good lumbar support and whose height can be adjusted. In general, providing adjustable furniture (chairs, task lights, keyboard trays, etc.) that allows people to set the furniture as per their individual needs can greatly enhance workplace comfort.

It is recommended to use certified furniture which normally complies with the ergonomics standards.

Examples of ergonomic furniture at Aeiforia Architects, Delhi and Over head storage in Essteem, Surat.

Related standards:

- ISO 6385:2004 – Ergonomic Principles in the Design of Work Systems

Related credits:

- Eco Design Credit 2 – Optimize Circulation Spaces
- Interior Materials Environment Credit 6 – Eco-certified Interior Furniture
- Indoor Environment Credit 10 – Low Emitting Materials

Documentation Required:

1. Narrative describing the ergonomic design of the furniture based on interior space and furniture type.
2. Submit conceptual sketches & photographs as applicable

Exemplary Performance

This credit is not eligible for exemplary performance

Co $_2$ Monitoring

IE Credit 5 Points: 2

Intent:

Install monitoring systems to measure and control air quality to ensure occupant health and well-being.

Compliance o ptions:

Mechanically Ventilated spaces:

- Non-Densely occupied Spaces: Install CO_2 sensors in return air ducts. Maintain differential CO_2 level of 530 ppm in all regularly occupied areas.
- Densely Occupied Spaces*: Install CO_2 sensors at breathing level of 1.20 meters (4 feet)

*Areas with a design occupant density of 25 people or more per 1000 sq.ft

Points are awarded as below:

Co 2 level in regularly occupied areas	Points
50%	1
95%	2

Non Air-conditioned spaces:

Interior spaces which are not air-conditioned can comply with the following requirement.

Space Type	% of openable area to total carpet area	Points
Regularly Occupied Spaces ≤150 sq.m	10%, 12%	1, 2
Regularly occupied spaces ≥150 sq.m	12%, 14%	1, 2

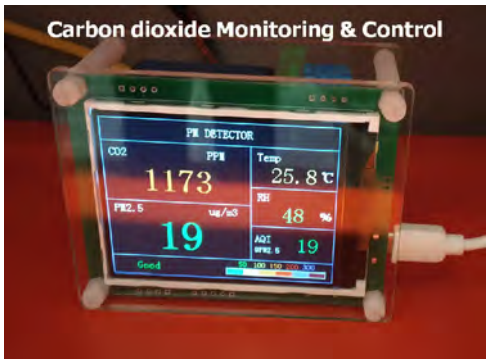
Approach and Methodology:

Mechanical Ventilation: In mechanical ventilated fit-outs, CO2 sensors can be installed to monitor differential CO2 level of 530 parts per million (ppm) in all regularly occupied areas. In densely occupied spaces such as conference rooms, meeting rooms, class rooms, etc. the CO2 sensors should be placed at a breathing level of 4 feet from the finished floor level. In the case of non-densely occupied spaces, the CO2 sensors can be installed in return air ducts.

Natural Ventilation: In naturally ventilated fit-outs, the openable area to the exterior environment for each regularly occupied indoor space should meet or exceed the design criterion specified under "Compliance Options". The design criterion for this credit requires

a higher operable window area than required under IEQ Credit 1 (Enhanced Fresh Air Ventilation).

CO_2 monitor, Aeiforia Architects, Delhi



CO_2 monitor, Team One Architects, Mumbai

Related credits:

- Indoor Environment MR 2 / Credit 1 – Fresh Air Ventilation
- Indoor Environment Credit 6 – Indoor Plants
- Indoor Environment Credit 10 – Low Emitting Materials
- Indoor Environment Credit 12 – Interior Flush Out

Documentation Required:

1. Floor plans showing the location of CO_2 sensors.
2. Manufacturer cut-sheets/ purchase invoice of the installed CO_2 sensors.
3. Photographs showing the installed CO_2 sensors
4. Floor plans showing doors & windows (for non-air-conditioned spaces)

Exemplary Performance

This credit is not eligible for exemplary performance

Case Study with sample calculations:

A clinic occupies a fit-out with floor area of approximately 1,600 sq.ft in a commercial building. The centre consists of the following spaces: office area, 2 therapy rooms, training hall, kitchen and staff dining room. The office is naturally ventilated with openable windows, french windows and french doors as illustrated in the table below

Category	Space	Percentage of Openable Area to the Total Carpet Area	Floor Area (sq.m)	Openable Window Area *(towards exterior) (sq.m)*	Openable Door Area *(towards exterior) (sq.m)*	Total Openable	Openable Area as a Percentage of Total Carpet Area (Designed)	Meeting Criteria (Yes/No)
Regularly Occupied Area (< 100 sq.m)	Office	4%	17	1.86	2.6	4.46	26%	Yes
Regularly Occupied Area (< 100 sq.m)	Therapy Room 1	4%	7	1.86		1.86	27%	Yes
Regularly Occupied Area (< 100 sq.m)	Therapy Room 2	4%	10	1.86		1.86	19%	Yes
Regularly Occupied Area (< 100 sq.m)	Kitchen	4%	6	1.5		1.5	25%	Yes
Regularly Occupied Area (< 100 sq.m)	Staff Dining Room	4%	6.6	1.86		1.86	28%	Yes
Regularly Occupied Area (> 100 sq.m)	Training Hall	8%	110	13	10	23	21%	Yes
							–	
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Indoor Plants

IE Credit 6 Points: 2

Intent:

Encourage usage of indoor plants to enhance indoor air quality, thereby improving the health and wellbeing of occupants

Compliance o ptions:

Select indoor plant species suitable to indoor environment. The requirement is to have atleast one plant in every 100 sq.ft of total carpet area

Plants like these help in absorbing toxins like formaldehydes. This can improve the indoor air quality inside the space, besides enhancing the aesthetics.

Points are awarded as below:

Indoor Plants in total carpet area %	Points
50%	1
95%	2

Educational Note:

1. *NASA research indicates the following:*

   The champion plants in removing benzene are ivy, gerbera daisies, pot mums, peace lily, bamboo palm, and Mother-in-law's Tongue. Trichloroethylene (TCE) is largely employed in the metal degreasing and dry cleaning industries, printing inks, paints, lacquers, varnishes, and adhesives. The best TCE removers are:

   - *Peace lily (for TCE from cleaning products)*
   - *Dracaena (TCE from adhesives, ink, dyes, lacquers, paints and varnishes)*
   - *Gerbera daisy (TCE from adhesives)*
   - *Bamboo palm*

2. *Please refer to examples of indoor plants illustrated in Annexure-A*

Green Building Concerns:

Volatile organic compounds (VOCs) such as formaldehydes, benzene, trichloroethylene, etc. are the most common contaminants that are often present in enclosed spaces which

causes common short-term effects namely irritation of the eye, nose, allergies, headaches and nausea [1]. Long-term effects include damage to the liver, kidney and the central nervous system.

Approach and Methodology:

Studies indicate that indoor plants can improve the indoor air quality inside the space by absorbing VOCs besides enhancing aesthetic values. A list of indoor plants identified for improving the indoor air quality are listed in Annexure- A.

Related credits:

- Indoor Environment MR 2 / Credit 1 – Fresh Air Ventilation
- Indoor Environment Credit 2 – Daylighting
- Indoor Environment Credit 5 – CO2 Monitoring
- Indoor Environment Credit 10 – Low Emitting Materials

Examples of indoor plants

[1] https://www.epa.gov/indoor-air-quality-iaq/volatile-organic-compounds-impact-indoor-air-quality

Documentation Required:

1. List of indoor plant species proposed in the interiors with description
2. Photographs showing the indoor plants taken at different interior locations

Case Study with sample calculations:

An office fit-out with floor area of approximately 1,600 sq.ft in a commercial building. the project has 12 indoor plants which comprises of money plant, areca palm plant, snake plant and aloe vera. Considering 1 plant per 100 sq. ft, the project is able to demonstrate 75% of the regularly occupied space with indoor plants.

Total Regularly Occupied Office Space (Sq.ft)	1600
Number of Indoor Plants	12
Total Regularly Occupied Office Space with Indoor Plants (Sq.ft)	1200
Percentage	75%

Material Acoustic Performance

Not applicable for existing interiors

IE Credit 7 **Points: 3**

Intent:

Enhance acoustical experience for the occupants to promote productivity and wellbeing.

Compliance o ptions:

Design all occupied spaces in the building to meet the acoustical, sound insulation and noise control requirements as per NBC part 8, Building Services Section 4 - Acoustics Sound Insulation and Noise Control

Acoustic design should meet the following criteria: (1 point for each measure)

Type of Material	Criteria	Minimum levels
Ceiling Systems	Noise Reduction Coefficient (NRC)*	≥ 0.65
Flooring Systems	Noise Reduction Coefficient (NRC)	≥ 0.3
Office types 1. Enclosed offices 2. Open office	Noise Criteria	 35 (dB) 40 (dB)

**Noise Reduction Coefficient (NRC) is a single figure descriptor of the sound absorption property of a material*

Note: Ceiling Systems, Partition Systems, Flooring systems can be certified by agencies like GBC, Blue Angel, Carpet & Rug Institute (CRI) etc.

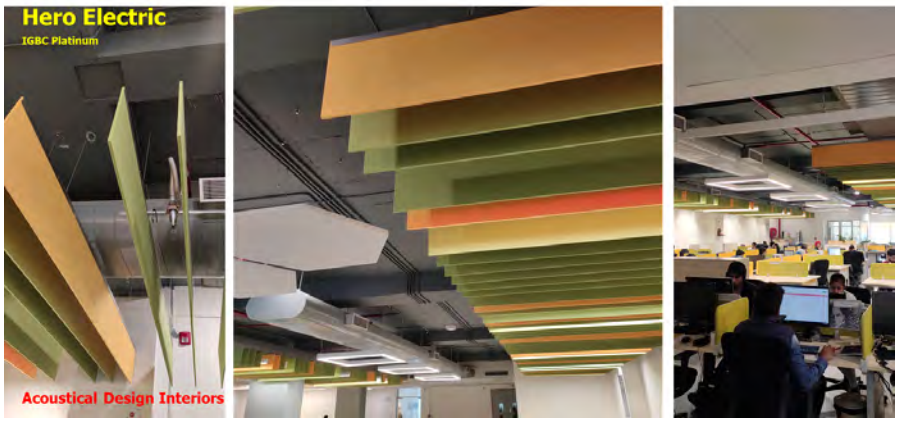
Green Building Concerns:

Noise interruptions impact concentration levels of occupants and can be disruptive to concentration and productivity.

Approach and Methodology:

Interior fit-outs should also give due importance to acoustics in the indoor spaces. The possible examples like double glazed fenestration, partitions with glasswool/ rockwool infill, masonry with air gaps, acoustic panel insulation, acoustic ceiling and flooring tiles & carpets,

The fit-out project should select flooring and false ceiling materials which comply with the noise reduction co-efficient limits specified under “Compliance Options”. The project should also measure noise levels in open office areas as well as enclosed offices and ensure compliance with the noise level limits specified under “Compliance Options”.



Ceiling acoustic panels & flooring systems with high noise reduction coefficientswhich help mitigate indoor noise at Hero Electric, Delhi office.

Related Credits:

- Indoor Environment MR 2 / Credit 1 – Fresh Air Ventilation

Documentation Required:

1. Narrative on approach to acoustical design in the interiors with respect to ceiling systems, partitions and within office spaces
2. Provide details of product certification

Exemplary Performance

This credit is not eligible for exemplary performance

Outdoor Views

IE Credit 8 Points: 4

Intent:

Design interiors to provide connectivity between the interior and exterior spaces

Compliance o ptions:

Achieve direct line of sight to vision glazing between 0.9 meters (3 feet) and 2.1 meters (7 feet) above the finished floor level for building occupants in at least 40% of all regularly occupied spaces.

Also, the project shall comply with the following criteria:

- The building occupants must not have any obstruction of views at least 8 meters (26.2 feet) from the exterior vision glazing.

(o r)

- The building occupants must have access either to sky or flora & fauna or both.

Points are awarded as below

% of Views to Exteriors & Interior courtyards	Points
≥ 40%	1
≥ 50%	2
≥ 60%	3
≥ 70%	4

Notes:

- *Regularly occupied areas are those where people sit or stand as they work, irrespective of the number of days occupied in a year.*
- *Regularly occupied spaces include work stations, cabins, meeting rooms, conference rooms, waiting areas, cafeteria, etc.,*
- *Open / Private Office Spaces include, but not limited to, Work stations, Cabins, etc.,*

- *Shared/ Multi-occupied Spaces include, but not limited to, Meeting rooms, Conference rooms, Cafeteria, etc.,*
- *Regularly occupied spaces which are used for multi-purposes, such as cafeteria-cum meeting room, can be considered as separate spaces based on the function. The room boundary need not be a physical boundary.*
- *Internal courtyards with vegetation can be considered for this credit calculation*
- *Non-regularly occupied spaces include toilets, store rooms etc;*

Green Building Concerns:

Studies have shown that humans have an instinctive connection with nature. Being cut-off from nature results in a feeling of isolation and unhappiness.

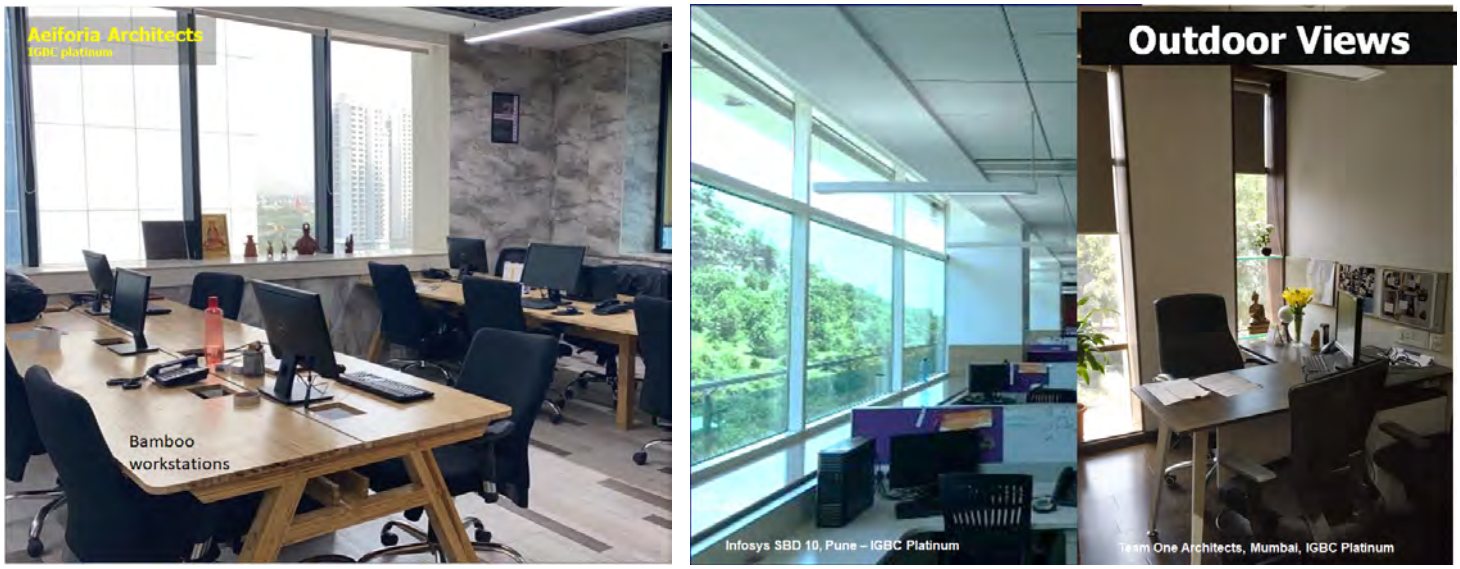
Approach and Methodology:

Recent research indicates that outdoor views to greenery, blue sky, water bodies, landscape shall enhance the well-being and productivity of building occupants. Access to long distance views allow eyes to refocus away from computer screens and work planes which helps reduce fatigue, eye strain and headaches [1].

The design of the interior layout of a fit-out also plays a key role in providing access to views to building occupants. For providing effective access to exterior views, the work station height should not be more than 1050 mm from the finished floor or can have transparent partition for better views. It is always recommended to have open office seating arrangement all around the periphery and have meeting rooms, conference room, storage units centrally located, which will help in hindrance free views.

It is also important to ensure that windows which provide views of the exterior environment have no obstructions for at least 8 meters away from the glazing – which allows adequate distance for the eyes to refocus.

[1] http://www.worldgbc.org/files/6314/1152/0821/WorldGBC__Health_Wellbeing__productivity_Full_Report.pdf



Example of views to the exterior environment. Low partitions aid in extending lines of sight throughout the office space.

Related credits:

- Eco Design Vision Credit 1 – Eco Vision for Interior Design
- Indoor Environment Credit 2 – Daylighting
- Indoor Environment Credit 5 – CO2 Monitoring
- Indoor Environment Credit 10 – Low Emitting Materials

Documentation Required:

1. Drawing showing the connectivity between the interior and outdoor spaces.
2. Photographs of the exterior spaces
3. Section of interior floor with furniture, ceiling sections & glazing level

Exemplary Performance:

This credit is eligible for exemplary performance under Innovation in Design Process, if more than 80% of the regularly occupied spaces achieve direct line of sight to vision glazing.

Case Study with Sample Calculations:

An interiors fit-out project has an estimated occupancy of 350 people. The fit-out primarily consists of open office layouts with no partitions or partitions of low height. Also, the floor plate occupied by the fit-out is not very large, thereby allowing 90% of the occupants a direct line of sight to peripheral windows with external views. Hence, the project will qualify for 4 points under this credit.

Total Occupancy	350
Occupants having External Views	315
Percentage	90%

Minimise Indoor Pollutant Contamination

IE Credit 9 Points: 2

Intent:

Minimise the exposure of building occupants and maintenance team to hazardous indoor and outdoor pollutants, thereby enhancing indoor air quality and occupant health

Compliance o ptions:

Demonstrate that the project complies with atleast two of the following criteria, as applicable*: (1 point for each measure, maximum 2 points)*

- ❖ Fresh air supply should be atleast 25 feet away from any source of contamination in order to ensure fresh air supply.
- ❖ Install entryway systems (grates or slots / grilles/ rollout mats which allow for easy cleaning) of minimum 6 feet in length, at all the main entrances.
- ❖ Isolate areas exposed to hazardous gases or chemicals (such as printer rooms, chemical storage rooms, janitor rooms) from regularly occupied areas, as per owner / developer's scope.
- ❖ Also, design such areas with exhaust system, self-closing door, deck-to-deck partition.
- ❖ Clean air-conditioning ducts, filters (once in a year)

Notes:

- *Printers/ Copier machines: Floor-mounted printers/ copier machines shall be considered to show compliance; whereas, tabletop printers/ copier machines need not be considered.*
- *The Printer / Chemical storage / Janitor rooms shall be maintained at a negative pressure of 5 Pascals (0.00005 bar).*

Printer Rooms

Green Building Concerns:

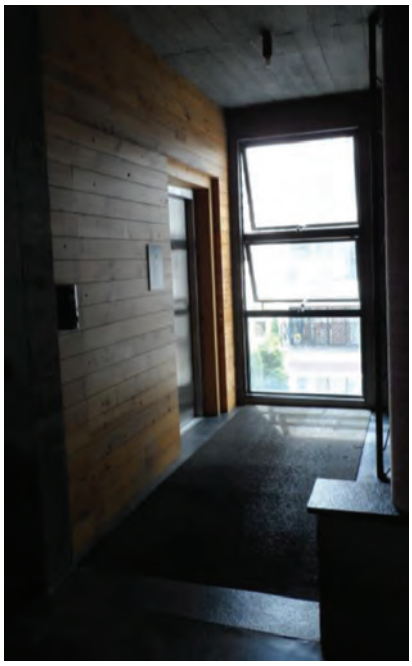
Common pollutants which pervade interior spaces include dust, smoke, housekeeping / cleaning chemicals, chemicals used in printers. Such pollutants cause a range of health issues such as allergies, shortness of breath, watering of eyes, etc.

Approach and Methodology:

Interior fit-out projects can implement the following measures to ensure that common pollutants are kept out of the indoor environment:

- Entryway systems such as mats, grilles or grates can be used at the primary entrances into the fit-out to ensure that dirt and dust from footwear is scrapped off. This keeps dust and dirt from pervading into the fit-out. Ideally, such entryway systems must be installed at the building entrances so that dust and dirt does not enter the indoor environment. Entryway systems must have a minimum length of 6 feet to ensure that dust and dirt are adequately removed.
- Isolated spaces which independently and directly ventilate into the exterior environment are ideal for use as copier / printer rooms or for storing hazardous chemicals or chemicals which are used for housekeeping, printing, etc., Such spaces should have self-closing doors and floor to ceiling partitions which will seal these spaces effectively. It is also recommended that such spaces are provided with exhaust systems.
- Locating designated smoking areas at least 25 feet away from windows (for naturally ventilated fit-outs) and fresh air intakes (for mechanically ventilated fit-outs) can greatly help in keeping tobacco smoke out of the fit-out. As tobacco smoke has a wide range of negative health impact, including being carcinogenic, minimising the exposure of the fit-out's occupants to tobacco smoke is critical in ensuing their long-term well-being.
- The project can also consider adopting eco-friendly, certified housekeeping cleaning chemicals which do not affect human health or well-being. The project can identify housekeeping chemicals which have been certified under the Green Seal [1] or GreenPro or an equivalent standard. The list of GreenPro[2] certified products can be referred under Annexure-F

[1] Green Seal certification: http://www.greenseal.org/
[2] GreenPro certification: http://www.greenbusinesscentre.com/site/ciigbc/greenpro



Entryway mat, Essteem, Surat

Related credits:

- Indoor Environment MR 2 / Credit 1 – Fresh Air Ventilation
- Indoor Environment Credit 10 – Low Emitting Materials

Documentation Required:

1. Narrative describing the strategies adopted to minimise the indoor pollutant contamination
2. Submit photographs of the proposed measures

Exemplary Performance:

This credit is not eligible for exemplary performance.

Low-Emitting Materials

Not applicable for existing interiors

IE Credit 10 **Points: 4**

Intent:

Encourage use of materials and systems with low emissions, so as to reduce adverse health impacts on building occupants.

Compliance o ptions:

❖ **Paints & Coatings:** ***(1 point)***

Use paints and coatings (including primers) with low or no VOC content (as specified in given below) for 95% of interior wall and ceiling surface area

VOC Limits for Paints & Coatings

Type of Paints & Coatings	VOC Limit (g/L less water)
Non-flat (Glossy)	150
Flat (Mat)	50
Anti-corrosive/ Anti-rust	250
Clear Wood Finish: Varnish	350
Clear Wood Finish: Lacquer	550
Floor Coatings	100

Note:

- *Paints & Coatings certified by GreenPro can be used by the project to show compliance, as and when the certified materials are available.*

❖ **Adhesives:** ***(1 point)***

For adhesives used within the interiors, ensure that the VOC content does not exceed the limits as specified in Table given below.

VOC Limits for Adhesives

Type of Adhesives	VOC Limit (g/L less water)

Glazing adhesives	100
Ceramic tile adhesives	65
Drywall and panel adhesives	50
Wood substrata adhesives	30
Wood flooring adhesives	100

Type of Adhesives…	VOC Limit… (g/L less water)
HVAC duct insulation	850
Indoor Carpet adhesives	50
Multipurpose construction adhesives	70

Note:

- *Adhesives certified by GreenPro can be used by the project to show compliance, as and when the certified materials are available.*

Notes for Paints & Coatings and Adhesives:

- *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 vaporize at normal room temperatures.*
- *If the project has used small quantities of non-complying paints & coatings and/or adhesives, a VOC budget can be calculated to demonstrate that the weighted average VOC of all products (based on litres of each applied) is below the allowed limit, by each type.*

❖ **Flooring Systems: (1 point)**

Project installating below flooring systems should meet the relevant standards:

1. Wooden flooring – GreenPro/ Floorscore or equivalent Ecolabel
2. Carpets - GreenPro or CRI Green Label Plus
3. Vinyl flooring - GreenPro or equivalent Ecolabel

•Projects opting for carpet flooring, should install in atleast 10% of the total carpet area to qualify

❖ **Composite Wood:** ***(1 point)***

Composite wood and Agri-fiber materials used in the building must not contain added urea-formaldehyde resins.

Notes:

- *Composite wood consists of wood or plant particles or fibers bonded together by a synthetic resin or binder. Examples include plywood, particle-board, and medium-density fiberboard (MDF).*
- *Composite wood certified by GreenPro can be used by the project to show compliance, as and when the certified materials are available.*

Green Building Concerns:

Exposure to VOC's cause short and long term health issues, commonly known as the "Sick Building Syndrome". Some of the common short-term effects of VOCs include irritation of the eye and nose, allergies, headaches and nausea [1]. Long-term effects include damage to the liver, kidney and the central nervous system.

Approach and Methodology:

VOCs are most often found in paints, adhesives, resins, solvents, wood preservatives, air fresheners, insect repellants, etc., and tend be concentrated in indoor spaces. Therefore, keeping indoor spaces free from VOCs plays a major role in quality of indoor environment. An effective way to control VOC contamination is to select finishes, furnishings and furniture used in interior spaces which has NO or very low concentration of VOCs.

The project should carry a market survey of all products which have zero or low VOC content. For example select GreenPro certified paints or adhesives which indicate low VOC on their tins, use flooring systems which are GreenPro certified with low VOC adhesive, particle boards for work station should use resins which are free from urea formaldehyde. They can be based on melamine based resins.

[1] https://www.epa.gov/indoor-air-quality-iaq/volatile-organic-compounds-impact-indoor-air-quality

Related credits:

- Indoor Environment MR 2 / Credit 1 – Fresh Air Ventilation
- Indoor Environment Credit 6 – Indoor Plants
- Indoor Environment Credit 12 – Interior Flush Out

Documentation Required:

1. List of low VOC content materials in interiors i.e. paint & coatings, adhesives, carpets, composite wood & new wood furniture.
2. Manufacturer brochures/ cut-sheets/ Material Safety Data Sheet indicating the VOC content of the all materials used in the project.
3. Purchase invoice/ payment receipts of all the low VOC content materials / Certified Carpet / Composite wood sourced in the project.

Exemplary Performance:

This credit is not eligible for exemplary performance.

Indoor Air Quality Management, During Installation

Not applicable for existing interiors

IE Credit 11 **Points: 2**

Intent

Reduce indoor air quality problems resulting from construction activities, and promote comfort and well-being of construction workers and building occupants.

Compliance o ptions:

Develop and implement an Indoor Air Quality (IAQ) management plan during construction and pre-occupancy phase, addressing the following measures, as applicable:

(1point for two measures, max points :2)

Note: *Consider 'During Construction Indoor Air Quality Management Guidelines' from National Building Code (NBC) of India, Part 7 - Constructional Practices and Safety.*

❖ **Scheduling**

- Coordinate construction activities to minimise disruption of occupied spaces.
- Carefully sequence construction activities to minimise IAQ issues.
- Protect stored on-site and installed absorptive materials from moisture damage. Do not install moisture-damaged materials unless they have been properly dried.

❖ **Electrical & Mechanical Equipment & Systems Protection**

- Store equipment & systems in a clean, dry location.
- Protect ducts and equipment by sealing openings.
- Clean air plenums before use.

❖ **h ousekeeping**

- Provide protective dust masks for workforce
- Implement practices to ensure a clean job site to control potential contaminants such as dirt, dust and debris.
- Clean up spills, and keep work areas dry.

❖ **Isolate Clean Areas**

- Isolate areas to prevent contamination of clean or occupied spaces using

physical separation.

- Debris Management plan should be integral part of interior construction, manage the debris generated on during installation.

❖ **Source Control**

- Avoid use of finish materials with high VOC and formaldehyde levels.
- Isolate and ventilate, as appropriate, when using any toxic materials or creating exhaust fumes.
- Implement measures to avoid the tracking of pollutants into the work area and occupied portions of the building.




Approach and Methodology:

The negative impacts of indoor construction can be mitigated by carefully planning and managing construction activities. Projects can adopt the strategies and guidelines listed under "Compliance Options" to minimise pollution arising from construction activities.

Strategies to achieve this include scheduling construction activities after working hours and on weekends and holidays. Proper construction planning and staging can also help contain disruptions and pollution. For instance, isolating construction areas from the other work areas and providing separate access ways for construction workers are strategies that can be considered.

Providing dedicated spaces for storing construction material and construction waste also help minimize pollution. Hazardous construction material should be stored in isolated spaces with direct ventilation to the exterior environment. Ventilation provision should be made for construction equipment and tools which operate on fossil fuels.

Protecting equipment, furniture and materials within the fit-out is also essential to minimize pollution and contamination due to construction activities. HVAC equipment, especially ducts and grilles, should be properly covered and sealed. Equipment should be cleaned before reuse and, specifically, HVAC filters should be replaced at the end of construction. Furniture and materials which are porous and prone to absorbing moisture should be

properly covered until the end of construction. Conducting a flush out of the fit-out and the HVAC system are essential in ensuring that pollutants and contaminants are cleared from interior spaces.

Related credits:

- Eco Design Approach Credit 5 – Commercial Lease Term / Ownership
- Interior Materials Credit 1 – Waste Management during Installation
- Indoor Environment Credit 10 – Low Emitting Materials
- Indoor Environment Credit 12 – Interior Flush Out

Documentation Required:

Submit photographs taken at different stages of interior installations addressing the compliance options

Exemplary Performance:

This credit is not eligible for exemplary performance.

Interior Flush out

Not applicable for existing interiors

IE Credit 12 Points: 1

Intent:

Avoid occupant's exposure to indoor airborne contaminants before occupying the premises, so as to reduce the adverse health impacts on building occupants

Compliance o ptions:

Perform a building flush-out for ten days by keeping all windows open before the building is occupied. Flushing is to be carried out after installing interior fit-outs and applying paints & coatings.

(o r)

If the Project team prefers to carry out the flush-out using forced ventilation systems, the flush-out can be carried out for five days.

Green Building Concerns:

It is inevitable that pollutants are released during the construction or renovation of fit-outs. These pollutants are typically emitted by paints, solvents, adhesives and other finishes. Indoor pollution also happens due to construction activities themselves where dust and wastes are generated.

Approach and Methodology:

In order to clear the interior spaces from the pollutants generated and accumulated during construction, it is essential to flush out the interior spaces after the completion of all interior works, just before occupancy. The project can conduct a flush-out by keeping all windows open for ten days before the building is occupied. Alternatively, if the fit-out has a mechanical ventilation system, the flush out should be carried out by conducting a dry run of the mechanical ventilation system for five days, preferably using MERV filter 7 or 8. It is essential that flushing is carried out after installing all interior fit-outs and applying paints, coatings, adhesives, sealants and other finishes.

Building flush-out being carried out in a new fit-out by keeping windows open prior to occupancy.

Related credits:

- Eco Design Approach Credit 5 – Commercial Lease Term / Ownership
- Interior Materials Credit 1 – Waste Management during Installation
- Indoor Environment Credit 10 – Low Emitting Materials
- Indoor Environment Credit 11 – Indoor Air Quality Management, During Installation

Documentation Required:

1. Narrative stating the flush-out procedure followed.
2. Declaration letter from the owner/ developer indicating the dates and number of days for completing flush-out.

Exemplary Performance

This credit is not eligible for exemplary performance

Occupant Well-being Facilities

IE Credit 13 Points: 2

Intent:

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

Compliance o ptions:

Have recreational / multipurpose space to accomodate activities for employees such as indoor games, yoga, meditation, or any other games catering to atleast 5% of building occupants.

Points are awarded as below

Recreational spaces For Building occupants	Points
5%	1
10%	2

Green Building Concerns:

Long working hours, low physical activity and increasing stress levels have compounded the risk factors faced by working adults to physical and mental chronic diseases. There is also a wealth of research that shows that employee satisfaction and productivity suffer if employee health and well-being is not maintained.

Approach and Methodology:

Studies have shown that providing building occupants with opportunities for recreation results in a host of benefits such as relaxation of mind resulting in reduced stress and improved concentration as well as enhanced health, self-esteem and morale [1]. These benefits, in turn, result in higher job satisfaction which helps improve employee productivity as well as customer retention. Hence, providing recreational opportunities not only enhances occupant well-being and happiness but also results in economic benefits for the project itself.

[1] Effects of Workplace Recreation on Employee Performance – Samuel Mokaya & Jackylene Gitari, International Journal of Humanities and Social Sciences

Interior fit-out projects can provide recreational facilities such as gymnasium, meditation/ yoga hall, indoor games, reading lounge / library, etc., catering to at least 5% of the fit-out's permanent occupants. In other words, the total capacity of the recreational facilities should be at least 5% of the fit-out's permanent occupancy.

Related credits:

- Eco Design Approach Credit 1 – Eco Design Vision
- Eco Design Approach Credit 2 – Optimize Circulation Spaces

Recreational facilities provided in interior fit-outs for the well-being of occupants at Latent View, Chennai and Hotel Gandharv, Jaipur.

Documentation Required:

1. Calculations showing the recreational facilities provided based on the number of occupants.
2. Floor plans of the recreational facilities provided.
3. Photographs of the proposed recreational facilities

Exemplary Performance

This credit is not eligible for exemplary performance

Case Study with Sample Calculations:

An interiors fit-out project has an estimated permanent occupancy of 350 people. The fit-out contains several recreational facilities including a table tennis and mini basketball room, an indoor games room with table-top games such as carom, chess, board games etc., a television lounge, a resting lounge and a cafeteria. The total capacity of the recreational spaces is 50 persons, which amounts to 14% of the occupancy of the fit-out. Hence, the project will qualify for 2 points under this credit.

Total Number of Occupants	350
No: of occupants with recreational affairs	50
Percentage	14%

Dedicated Dining Spaces

Not applicable for new interiors

IE Credit 14 **Points: 1**

Intent:

Encourage people not to dine in working areas so as to avoid contamination of indoor spaces, thereby enhancing health and hygiene

Compliance o ptions:

Provide a dedicated dining space for the employees / occupants within the interior space.

Green Building Concerns:

Leftover food and spilt morsels can easily result in the contamination of indoor spaces. Contamination typically occurs in the form of bacterial / fungal growth which results in bad odour and causes a health issues such as allergies and infections. Contamination also occurs in the form of infestation of insects such as cockroaches, ants, etc.

Approach and Methodology:

Existing fit-outs should assign dedicated spaces to be used for dining purposes. The project should also consider using materials and furniture which are easy to clean and/or have anti-microbial properties. A well designed segregated waste collection system can also help in maintaining cleanliness and hygiene.

Dedicated dining spaces provided inside Latent View, Chennai.

Related Credits:

- Eco Design Approach Credit 1 – Eco Design Vision
- Eco Design Approach Credit 2 – Optimize Circulation Spaces
- IM Mandatory Requirement 1 – Separation of Waste, Post Occupancy

Documentation Required:

Submit photographs of the dedicated dining space

Exemplary Performance

This credit is not eligible for exemplary performance under innovation in interiors.

Innovation in Interior Design

Innovation in Interior Design

IID Credit 1 Points: 1- 4

Intent:

Provide design teams an opportunity to innovate and implement measures that demonstrate reduced environmental impacts.

Compliance o ptions:

Credit 1.1: Innovation in Interior Design

Option 1:

Implement measures that are not addressed in the rating system but have significant reduction in environmental impacts.

(Or)

Option 2: Exemplary performance

Implement measures that far exceed the credit requirements of this rating system.

Note: Credits that are eligible for exemplary performance are highlighted in the respective credit categories.

Credit 1.2: Innovation in Interior Design

Same as credit 1.1

Credit 1.3: Innovation in Interior Design

Same as credit 1.1

Credit 1.4: Innovation in Interior Design

Same as credit 1.1

Notes:

- *Measures implemented should have quantitative and measurable impacts*
- *Measures that are mandated by the local bye-laws and not addressed in the rating system, are not eligible for Innovation.*

Documentation Required:

1. Submit a narrative describing the following:
   - Intent
   - Measures implemented
   - Potential reduction in environmental impacts
2. Supporting documents such as drawings, illustrations, cut-sheets, test reports as applicable.

IGBC Accredited Professional

IID Credit 2 Point: 1

Intent:

Encourage involvement of a green design professional to facilitate incorporating sustainable measures and thereby reduce environmental impacts.

Compliance o ptions:

Atleast one participant in the project team shall be an IGBC Accredited Professional.

Documentation Required:

A copy of IGBC Accredited Professional certificate of the participant.

Annexures

Annexure – A

Indoor Plants				
S No.	**Botanical Name**	**Common name**	**Photo**	**Benefits**
1	Dypsis lutescens	Bamboo palm/ Areca palm		1. Cleans air borne toxins 2. Removes formaldehydes, benzene, trichloroethylene
2	Raphis excelsa	Lady Palm		1. Improves Indoor air Quality 2. Resistant to pathogens
3	Ficus elastica	Rubber Plant		1. Emits high oxygen 2. Removes formaldehydes, benzene, trichloroethylene

Annexure - A : Indoor Plants

4	Spathiphyllum wallisii	Peace Lily		1. Removes air pollutants 2. Removes formaldehydes, benzene, trichloroethylene 3. Removes household chemicals & carcinogens
5	Ficus Alii	Ficus A1 Gold		1. Overall air purifier 2. Resistance to insects
6	Chlorophytum comosum	Spider Plant		1. Removes formaldehydes, and xylene
7	Gerbera daisy	Daisy plant		1. Absorbs Carbon dioxide 2. Gives off Oxygen during night 3. Removes benzene

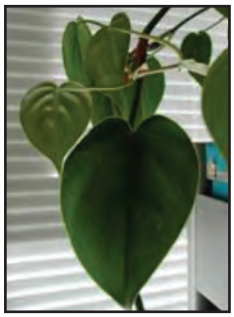
8	Epiremnum aureum	Money plant		1. Removes formaldehydes, benzene, benzene
9	Howea forsteriana	Kentia palm		1. Removes VOC concentrations 2. Removes benzene and n- hexane from indoor air
10	Schefflera actinophylla	Queensland Umbrella		1. Removes benzene and carcinogenic substances from air
11	Dracaena deremensis	Janet Craig		1. Removes trichloroethylene from the air, emitted by photocopier 2. Absorbs VOC concentrations
12	Nephrolepis exaltata	Boston fern		1. Removes formaldehydes 2. Adds humidity to indoor environment

Annexure - A : Indoor Plants

13	Sansevieria trifasciata	Snake Plant/ Mother in law's tongue		1. Absorbs toxins such as nitrogen oxides & formaldehyde
14	Aloe barbadensis	Aloe Vera		1. Sun loving succulent helps clear formaldehyde & benzene
15	Aglaonema sp	Chinese Evergreen		1. Emits high oxygen & purifies indoor air 2. Removes formaldehydes, benzene
16	Epipremnum aureum syn. Scindapsus aureus	Golden Pothos		1. Removes formaldhyde 2. Removes Carbon monoxide and increases indoor air quality
17	Dracaena marginata	Marginata or Dragon tree		1. Purifies air from carcinogen, benzene 2. Removes formaldehyde, xylene from paints & varnishes

18	P. cordatum, P.scandens or P. selloum	Philodendron		1. Removes formaldehydes especially higher concentrations
19	Chrysanthemum sp. or Chrysanthemum morifolium	Mums		1. Removes benzene and carcinogenic substances from air
20	Gerbera sp. or Gerbera jamesonii	Gerbera Daisy		1. Removes benzene 2. Absorbs Carbon dioxide and gives oxygen during night - helps in improving sleep
21	Hedera helix	English Ivy		1. Removes benzene, pesticides and off-gasing of other synthetic materials 2. Removes formaldehyde

Annexure - A : Indoor Plants

22	Philodendron oxycardium	Heart leaf philodendron		1. Removes all kinds of VOCs, particularly from particle board
23	Ficus benjamina	Weeping fig		1. Filters pullutants from carpeting, furniture
24	Dracaena deremeusis or Dracanea deremensis warneckei	Warneckii or Dracanaena warneckei		1. Removes trichloroethylene from the air, emitted by photocopier
25	Phoenix roebelenii	Pygmy date, miniature date palm		1. Removes formaldehyde, xylen and tolune

26	Dracaena fragrans	Corn or cornstalk plant		1. Removes benzene, formaldehyde, xylene 2. Purifies environment
27	Gerbera Jamesonii	Gerbera Daisy		1. Removes tricholorethylene, benzene from air
28	Dracaena Marginata	Dragon Tree		1. Reduces benzene, formaldehyde, xylene and toluene from air

Annexure – B

1. Projects using Centralized Air Conditioning System

Equipment Class	Minimum Co P	Minimum IPLV	Test Standard
Air Cooled Chiller <530kW (<150 tons)	2.90	3.16	ARI 550/590-1998
Air Cooled Chiller ≥530 kW (≥150 tons)	3.05	3.32	ARI 550/590-1998
*Centrifugal Water Cooled Chiller < 530 kW (<150 tons)	5.80	6.09	ARI 550/590-1998
*Centrifugal Water Cooled Chiller ≥ 530 and < 1050 kW (≥150 and < 300 tons)	5.80	6.17	ARI 550/590-1998
Reciprocating Compressor, Water Cooled Chiller all sizes	4.20	5.05	ARI 550/590-1998
Rotary Screw and Scroll Compressor, Water Cooled Chiller <530 kW (<150 tons)	4.70	5.49	ARI 550/590-1998
Rotary Screw and Scroll Compressor, Water Cooled Chiller ≥530 and < 1050 kW (≥150 and < 300 tons)	5.40	6.17	ARI 550/590-1998
Rotary Screw and Scroll Compressor, Water Cooled Chiller ≥ 1050 kW (≥ 300 tons)	5.75	6.43	ARI 550/590-1998

Source: Table 5.2 ECBC User Guide 2009

2. Projects using packaged Air-conditioning system

Cooling Capacity		Maximum Power Consumption in Watts	
Watts	Tons of Refrigeration	Water Cooled	Air Cooled
10,000	3	3,750	4,750
17,500	5	6,000	7,000
26,250	7.5	9,000	10,000
35,000	10	11,500	13,500
52,000	15	17,000	20,000

Source: ECBC user guide 2009;
Code No.: IS 8148: 2003

3. Projects using Unitary and Split system

Rated Cooling Capacity		Maximum Power
(kcal/h)	kW	Consumption (kW)
1,500	1.7	1.1
2,250	2.6	1.4
3,000	3.5	1.6
4,500	5.2	2.4
6,000	7.0	3.2
7,500	8.7	4.25
9,000	10.5	5.2

Source: ECBC user guide 2009 table 5.3 & 5.4
Code No.: IS 1391 (Part-1): 1992 (amendment No. 2 Dec.2006)

Annexure-C

1. Interior Lighting Power – Building Area Method (ECBC Table 7.1)

Table 7.1: Interior Lighting Power – Building Area Method (ECBC Table 7.1)

Building Area Type	LPD (W/m^2)	Building Area Type	LPD (W/m^2)
Automotive Facility	9.7	Multifamily Residential	7.5
Convention Centre	12.9	Museum	11.8
Dining :Bar Lounge / Leisure	14.0	office	10.8
Dining :Cafeteria / Fast Food	15.1	Parking garage	3.2
Dining: Family	17.2	Performing Arts Theater	17.2
Dormitory / Hostel	10.8	Police / Fire Station	10.8
Gymnasium	11.8	Post Office / Town Hall	11.8
Health Care Clinic	10.8	Religious Building	14.0
Hospital / Health care	12.9	Retail / Mall	16.1
Hotel	10.8	School / University	12.9
Library	14.0	Sports Arena	11.8
Manufacturing Facility	14.0	Transportation	10.8
Motel	10.8	Ware House	8.6
Motion Picture Theater	12.9	Workshop	15.1

2. Lighting Power – Space Function Method (ECBC Table 7.2)

Table 7.2:Interior Lighting Power – Space Function Method (ECBC Table 7.2)

Space Function	LPW (W / m^2)	Space Function	LPW (W / m^2)
Office Enclosed	11.8	For Reading Area	12.9
Office Open Plan	11.8	Hospital	
Conference/Meeting/Multi Purpose	14.0	For Emergency	29.1
Classroom / Lecture / Training	15.1	For Recovery	8.6
Lobby*	14.0	For Nurse Station	10.8
• For Hotel	11.8	For Exam Treatment	16.1
• For Performing Arts Theater	35.5	For Pharmacy	12.9
• For Motion Picture Theater	11.8	For Patient Room	7.5

Space Function	LPW (W / m^2)	Space Function	LPW (W / m^2)
Audience /Seating Area*	9.7	For Operating Room	23.7
• For Gymnasium	4.3	For Nursery	6.5
• For Convention Center	7.5	For Medical Supply	15.1
• For Religious Buildings	18.3	For Physical Therapy	9.7
• For Sports Arena	4.3	For Radilogy	4.3
• For Performing Arts Theatre	28.0	For Laundry - Washing	6.5
• For Motion Picture Theater	12.9	Automotive Service Repair	7.5
• For Transportation	5.4	Manufacturing Facility	
Atrium – First Three Floors	6.5	For Low Bay(<8m Celing)	12.9
Atrium Each additional floor	2.2	For High Bay(<8m Celing)	18.3
Lounge / Recreation*	12.9	For Detailed Manufacturing	22.6
• For Hospital	8.6	For Equipment Room	12.9
Dining area	9.7	For Control room	5.4
• For Hotel	14.0	Hotel / Motel Guest Room	11.8
• For Motel	12.9	Dormitory Living quarters	11.8
• For Bar Lounge / Leasure Dining	15.1	Museum	
• For Family Dining	22.6	For General Exhibition	10.8
• Food Preparations	12.9	For Restorations	18.3
Lobaratory	15.1	Bank Office bank Activity Area	16.1
Rest Rooms	9.7	Retail	
Dressing /Lockers /Fitting Room	6.5	For Sales Area	18.3
Corridor Transition	5.4	For mall Concourse	18.3
• For Hospital	10.8	Sports Arena	
• For Manufacturing Facility	5.4	For ring sports Area	29.1
Stairs Active	6.5	For Court Sports Area	24.8
Active Storage	8.6	For Indoor Field area	15.1
• For hospital	9.7	Ware House	
Inactive Storage	3.2	For Fine Material Storage	15.1
• For Museum	8.6	For Medium bulky Material storage	9.7
Electrical / Mechanical Facility	16.1	Parking Garage – Garage Area	2.2

Annexure - D

Standards referred in IGBC Rating system for Green Interiors

- IGBC – Indian Green Building Council
- NBC – National Building Code 2005
- The BEE – Bureau of Energy Efficiency
- ECBC – Energy Conservation Building Code
- UPC-I : Uniform Plumbing Code of India
- IAPMO - The International Association of Plumbing and Mechanical Officials: Developed Plumbing Code of India along with Indian Plumbing Association
- GreenPro Ecolabel (India) : GreenPro encourages the product manufacturers to implement green measures in areas including product design, raw materials, manufacturing process, product performance during use, recycling/disposal, etc. Focus areas of GreenPro include - green building products, industrial products, technologies, consumer products and services); www.ciigreenpro.in
- Green Guard: Certification to verify air contaminants for furniture and seating
- BIFMA – Standard to verify indoor air contaminants for furniture and seating
- MNRE : Ministry of New and Renewable Energy
- ASHRAE: American Society of Heating, Refrigerating, and Air-Conditioning Engineers
- ASHRAE 62.1.2010:– standard for Fresh Air Ventilation
- ASHRAE 90.1.2010: - standards for Energy Efficiency
- Green Seal Standard 36 (GS-36) : Regulates VOC content for Commercial adhesive
- Green Seal Standard 11 (GS -11): Regulates VOC content for architectural paint
- Green Seal Standard 3 (GS -03): Regulates VOC content for anti-corrosive paint and anti-rust paint
- South Coast Air Quality Management District (SCAMQMD) Rule 1168: Regulates VOC content for : adhesives, sealants, sealant primers, tile setting adhesive and grout.
- Carpet and Rug Institute Green Label Plus: Regulates indoor air contaminants for carpet

Annexure E
Project Case Studies

Case Studies – IGBC Green Interiors

Name of the Project – M/s ESSTEAM

Location – Surat

Rating level – Platinum, existing interiors

Occupancy: 55

Concept – An architect & interior designer office on 4 & 5th floors with approx. 5200 sq.ft and partly on terrace. The building is finished in RCC both inside & outside and to allow daylight a 450-mm ribbon window at top & bottom in each floor is running all-round on 3 sides. The 'C' shaped architectural projection created possibilities of storage all along the periphery inside which also takes care of the vertical circulation, sanitation, electrification, plumbing, HVAC & IT. The project has done extremely well on easy to maintain aspect, the fact that all the metal partitions in the studio floor are just stuck with magnet and supports very easily any kind of repairs or replacement / addition of cabling for electrical or LV applications during post occupancy. The project is designed by Ar. Snehal Shah.

The floor plan of 4th floor

Case Studies – IGBC Green Interiors

The floor plan of 5th floor

Example – Salvaged Materials – Old timber is used as conference table top without any polishing avoiding VOC's. The room is designed to access natural daylighting, natural ventilation and with external connectivity as part of outdoor views to occupants.

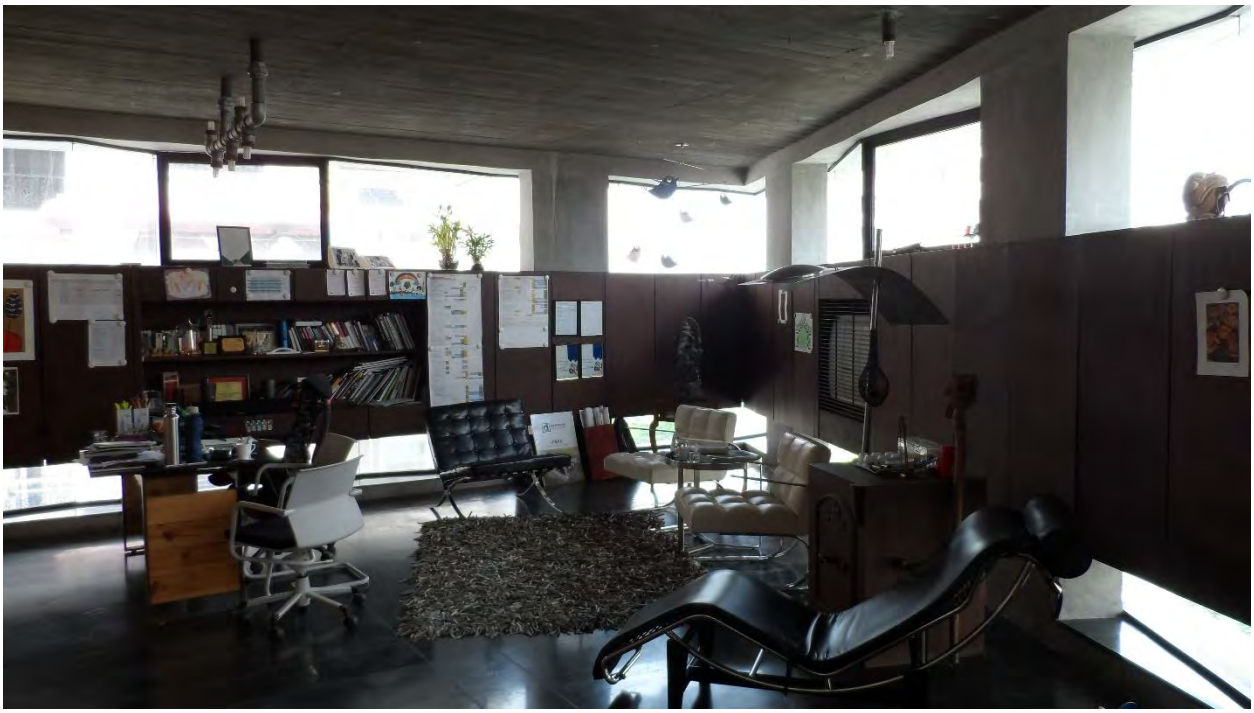
Example – Salvaged Materials – The waste old paint cans have been innovatively used as pigeon holes at the reception.

Example – Salvaged Materials – The reinforcement steel waste pieces left over from construction have been welded and used as unique railing to internal staircase in all the floors

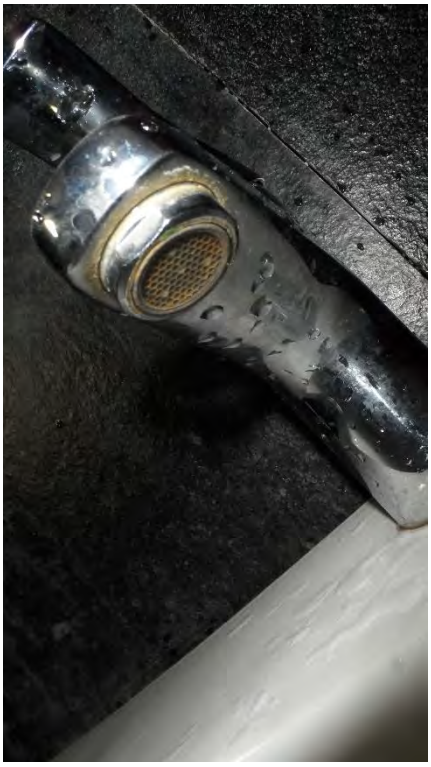
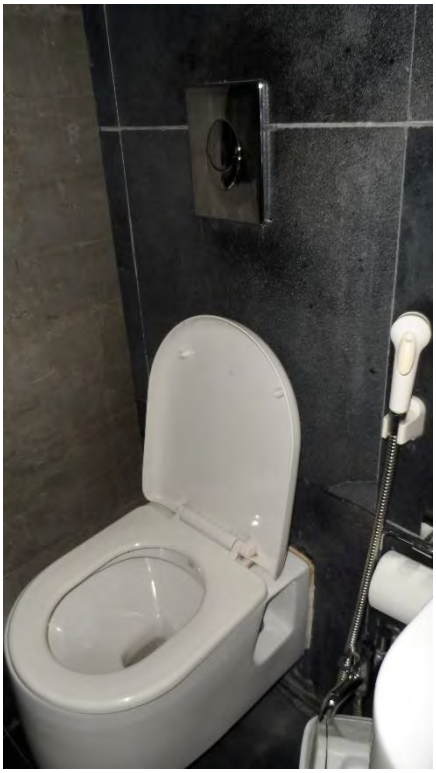
Project has installed BEE 5 Star rated unitary air-conditioners in all spaces

100% of the floor plate is fully daylit through top & bottom ribbon windows. This is unique to this building.

100% of the floor plate is fully daylit through top & bottom ribbon windows. The central portion is used as storage space and all the services run behind this magnet partitions, which can be easily removable in the case of repairs or alterations.



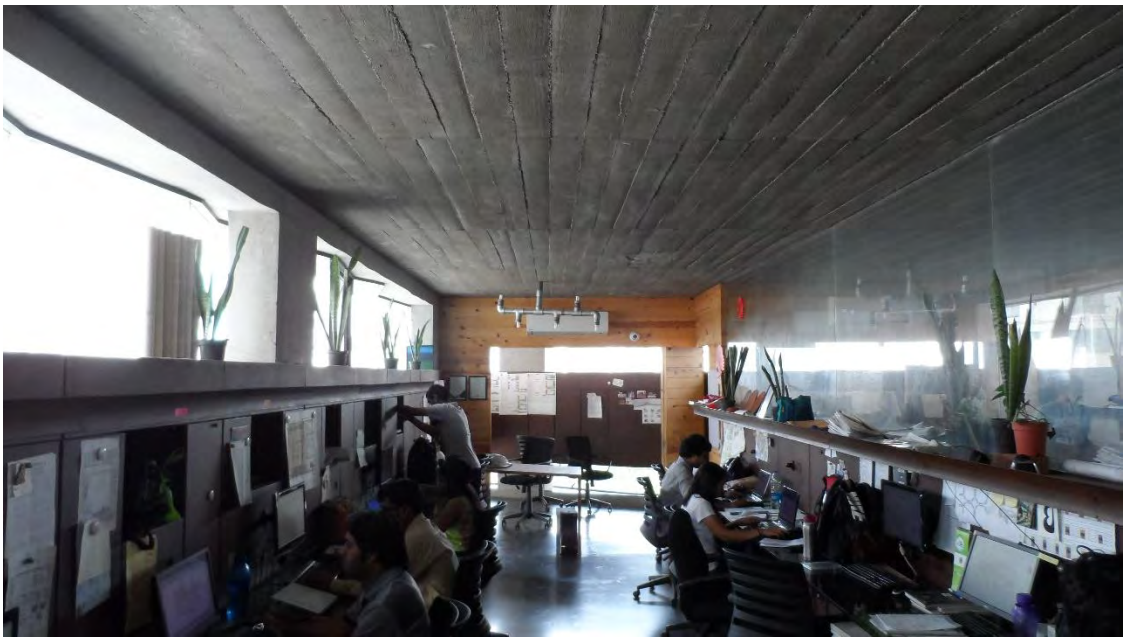
Lighting is uniquely connected through GI pipes without compromising on the lux levels.


Water Efficient Plumbing Fixtures – Taps fitted with aerators, dual flush toilet 6/3, shower fitted with aerators and able to give more than 20% water savings over baseline.

All partitions and doors are made from shuttering timber which was used during construction of the roof. Unique counter weight technique is used as door closer for 100mm thick heavy doors for smooth operation.

The below picture is an example for indoor plants, ergonomics and circulation efficiency. The workstations & overhead storage is designed to suit the studio requirements without compromising on the daylighting. The ceiling is without painting and left RCC finish.



Visitors lounge area. The columns are decorated with rope which is leftover at the construction of this site. Ceiling & wall is not painted left RCC finish.

Case Studies – IGBC Green Interiors

Name of the Project – ASADI Architectural Studio Lecture Hall

Location – Kochi, Kerala

Rating level – Platinum, New Interiors

Occupancy: 120 students (Studio) 40 students (Lecture Hall)

Architect: B.R. Ajit, Ajit Associates Architectural Consultants Pvt Ltd.

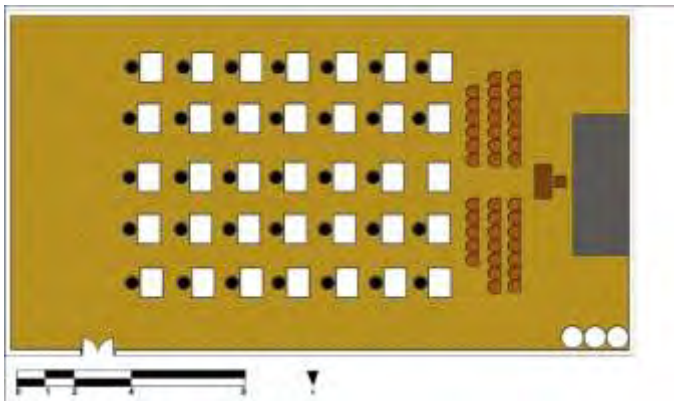
Concept – An Architecture Studio cum Lecture hall is built on the Asian School of Architecture and Design Innovations. The studio built on the 1st Floor comprises an area of 260 sq.m is uniquely designed to satisfy the requirements of comfortable working conditions through a very close incorporation of the different elements of nature right from daylight through to ventilation with a distinct approach.

The White Colour Tensile fabric roof by the virtue of its inclination towards north and property of material allows good penetration of light yet blocking the solar heat which gets reflected. The light coming from the roof not only helps while drawing and studies but also enhances the feel of space.

The southern wall is made out of bamboo which shields the heat from entering but at the same time allows the wind to squeeze through the small gaps of bamboo's arranged amongst each other while adding a serenity and natural feel to the environment. The openings towards east and west have been designed in a way to allow the direct penetration of sunlight into the studio.

Flooring has been done with the coconut coir which is a local material and gives a unique aesthetic feel to the space. The coir mat adds good tactile and acoustical property to the space. The project has extensively used salvaged materials that include the cement boards in making the teaching platform and other seating spaces. The studio consumes minimum electricity (for fans, which is rarely used because of good wind round the year and lights required only at night) has been sufficed with a renewable source of energy (Solar power).

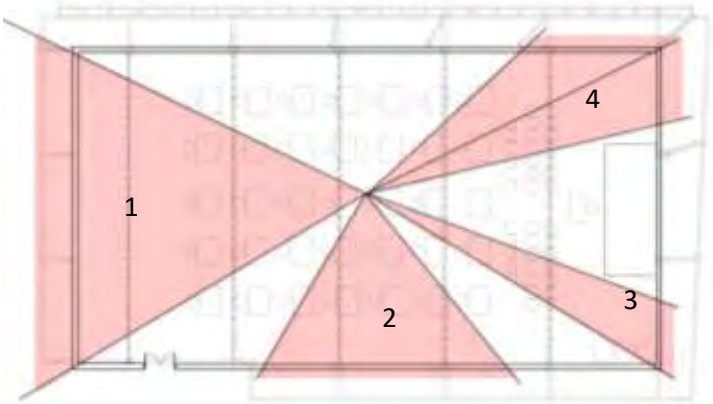
Case Studies – IGBC Green Interiors



Floor Plan

Outdoor Views :

View 1: Picturesque view of flora and fauna with serene backwaters



View 2: College campus on the Northern Side

View 4: Greenery and limitless sky on the Southern Side

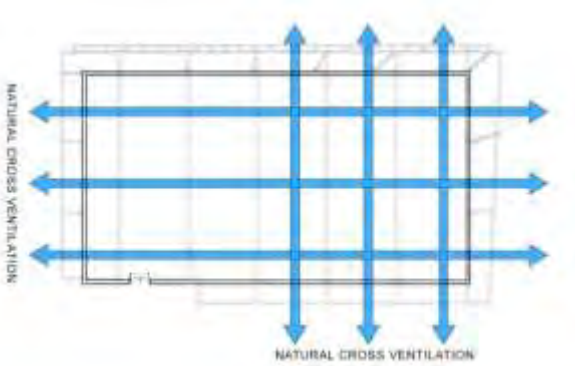
View 3 : Greenery on the Western Side

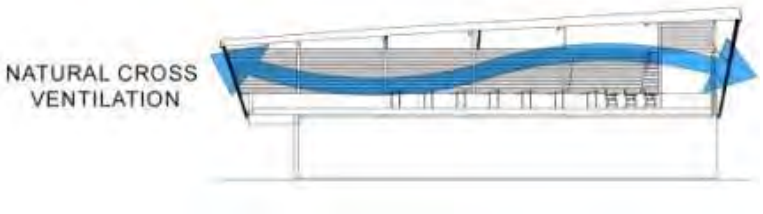
Fresh Air Ventilation:

The use of natural ventilation is definitely an advantage with the raising concerns regarding the cost and environmental impact of energy use.

Since the studio has numerous openings, natural ventilation occurs. Natural ventilation consumes less energy than a comparatively mechanical ventilation system.

With natural ventilation, optimum utilization of the building floor plate and floor to ceiling height, since there is no need for space for large air handling units and equipment rooms.





Materials:

The usage of local materials have been extensively practiced in terms of materials like bamboo, but not limited to it. Bamboos have been used to make walls on the Southern facade & also partially on the East. But other than that materials like Coir Carpets have been used to lay on the floor. These carpets are made out of Coconut Coir, which is a predominant form of Vegetation in the Region being coastal areas. Moreover, the processing of these materials to be converted to a building material & component takes place much locally adding to the lesser carbon footprint in terms of Transportation.

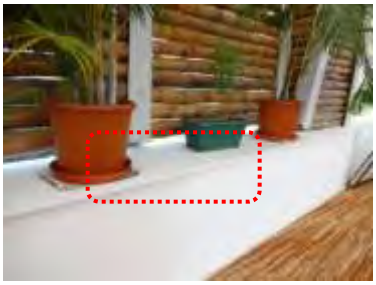
Bamboos were sourced from nearby areas in the range of 25 kms & the Coir Mats from areas within a range of 5 kms.

Wall with Bamboo on Southern side

Coir flooring

Energy Efficient Fans

Residual Bamboos used as craft elements



Seating platform designed out of waste shera board

Case Studies – IGBC Green Interiors

Teaching Platform with Salvaged materials

Bamboo Wall

3 kW - Solar Panels installed to meet 100% of Studio energy requirements

Annexure F

GreenPro Ecolabel Directory

Project can download & get the information on latest GreenPro Ecolabel products list from the link below:

Link: https://ciigreenpro.com/ecolabelled-products/categories

Confederation of Indian Industry

IGBC

List of GreenPro Ecolabelled Product Manufacturers

S No	Manufacturer	Category	Contact	Email	Phone
1	AB Ceramic Services	Tiles	G.Arivazhagan	abc@abceramic.in	9047573230
2	ACC Limited	Ready Mix Concrete	Pralhad Mujumdar	pralhad.mujumdar@acclimited.com	9987578836
3	ACC Limited	Cement	Ashish Prasad	ashish.prasad@acclimited.com	9833999971
4	Aeropure	IAQ Solution	Avinash	dradk@hotmail.com	9822022921
5	AET Building Products (WI) Pvt. Ltd	Tiles	Nusrat Rasiwala	clarence.pereira@flexiblespace.in	9765778594
6	Akzo Nobel	Paints & Coatings	Mohit Aggarwal	mohit.aggarwal@akzonobel.com	9619238368
7	Anutone Acoustics Limited	Insulation Products	Gopinath	qa@anutone.com	9886523789
8	Aquatron International AB	Waste Water Treatment System	Raita Mocherla	Raita.mocherla@pangaea.co.in	9885921703
9	Armstong World Industries	Boards, Panels, False Ceiling & Plaster	Riddhi Desai	desai.riddhi@knaufarmstrong.com	8879134429
10	Asahi India Glass	High Performance Glass	Garima Kamra	garima.kamra@aisglass.com	9022111787
11	Ashok Chemicals	Cleaning Solutions	Anuj Shah	lustofab@gmail.com	9967688898
12	Berger Becker Coatings (P)Limited	Paints & Coatings	Umesh Vishwakarma	Umesh.Vishwakarma@beckers-group.com	9999164970
13	Berger Paints India Ltd.	Paints & Coatings	Sudipto Mukherjee	sudiptomukherjee@bergerindia.com	9038098326
14	Berger Paints India Ltd. - ETICS Division	Insulation Products	Barun Sanki	barunsanki@bergerindia.com	7603041014
15	Bio-Microbics Inc	Waste Water Treatment System	Shahaveer Jamshedji	shahaveer@biowater.in	9377666568
16	Bonphul Air Products Private Limited	IAQ Solution	Narendra Bisht	narendra.bisht@bonphulapl.com	9999884886
17	British Paints	Paints & Coatings	Ranjit Singh	rs@britishpaints.in	9822393769
18	Dalmia Cement	Cement	R.Rajamohan	r.rajamohan@dalmiacement.com	9842994067
19	Deeya Panels	Boards, Panels, False Ceiling & Plaster	Subhash Khadse	deeyapanels@gmail.com	9724440005
20	EcoRain Systems India Pvt Ltd	Innovative Products	Vikas Rane	vikas@vikasindus.com	9821036215
21	Eden Innovations India Pvt. Ltd.	Innovative Products	Manish Dixit	mdixit@edenenergyindia.com	9898069956
22	Ekam Eco Solutions	Cleaning Solutions	Uttam Bannerjee	uttam@ekameco.com	9999807207
23	Emerson Commercial & Residential Solutions	Innovative Products	Sandeep Srikanti	Sandeep.Srikanti@Emerson.com	8390071157
24	Furaat Earth Pvt Ltd	Innovative Products	Habil Attarwala	habil@furaat.com	9099944055
25	Godrej & Boyce – Construction Division	Construction Blocks	Shweta Bhoyar	shwetab@godrej.com	8806111668
26	Godrej & Boyce – Construction Division	Ready Mix Concrete	Shweta Bhoyar	shwetab@godrej.com	8806111668
27	Godrej & Boyce – Electrical Division	Innovative Products	Kiron Pande	kcp@godrej.com	9820348824
28	Godrej & Boyce Mfg.Co.Ltd. - Godrej Interio Division	Furniture	Vinay Sarode	interiogreen@godrej.com, vinaygs@godrej.com	8898291336
29	Green Build Products (I) Pvt Ltd.	Construction Chemicals	Shilpa Joshi	shilpa.joshi@greenbuildproduct.com	9552580896
30	Grenove Services Private Limited	Cleaning Solutions	Sheetal Chatur	sheetal.chatur@grenove.com	9561190008
31	Gujarat Guardian Ltd	High Performance Glass	Vivek Buch	vbuch@guardian.com	7043483007
32	Hafele India Private Limited	Architectural Ceilings, Cladding, Facades, Sun Control Systems	Pratheek Agarwal	pratheek.agarwal@hafeleindia.com	8655929594
33	Haylide Chemicals Pvt. Ltd.	Cleaning Solutions	Nitin Bhatnagar	nitinbhatnagar@haylide.com	9826159995
34	Herbocare	Cleaning Solutions	Tejveer Sharma	herbocleanz@gmail.com	9690777885
35	Hindalco Industries Limited	Construction Chemicals	Sachin Gupta	sachin.gupta@adityabirla.com	7722093919
36	Hindcon Chemicals	Construction Chemicals	Satyajit Dey	satyajit@hindcon.com	9836855567
37	Honeywell	IAQ Solution	Gaurav NS	Gaurav.NS@Honeywell.com	9686567126
38	HSIL Limited	Plumbing Fixtures and Sanitaryware	Narendra	narendra.kumar@hindware.in	7665003180
39	Hunter Douglas India Private Limited	Architectural Ceilings, Cladding, Facades, Sun Control Systems	Sundaram	sundar@hunterdouglas.in	9840582176
40	Indian Insulation & Engineering	Paints & Coatings	Rakesh Koul	indianenggs@gmail.com	9915080488

S No	Manufacturer	Category	Contact	Email	Phone
41	Indian Metals & Ferro Alloys	Construction Aggregate	Ashok Behera	mail@imfa.in	9937288066
42	Indian Timber Products (P) Ltd.	Doors & Windows	Karthik	itpdoors@gmail.com	9849218531
43	IQUBX Pvt Ltd	Architectural Ceilings, Cladding, Facades, Sun Control Systems	Amit Garg	amit@creativewizards.in	9811204811
44	JK Lakshmi Cement Ltd	Cement	Dr. Mukesh Kumar	mukeshkumar@lc.jkmail.com	8059777258
45	JK Lakshmi Cement Ltd	Construction Blocks	Dr. Mukesh Kumar	mukeshkumar@lc.jkmail.com	8059777258
46	JSW Cement Limited	Cement	Lopamudra Sengupta	lopamudra.sengupta@jsw.in	022-42863017
47	JVS Comatsco Industries Pvt. Ltd.	Construction Blocks	Vipul V Patel	jigneshpatel@jvscomatsco.com	02551227700 / 09 / 30456511
48	KD Infra (Brikolite)	Construction Blocks	Manoj Bihani	projects@brikolite.com	9401412000
49	Kesoram Industries Industries Limited	Cement	Chandrabhan	chandrabhan@vasavadattacement.com	9618906665
50	Lemmens Shardlow India Pvt Ltd	Cleaning Solutions	Hiren Pancholi	contact@lemmensshardlow.com	9371061789
51	Magneto Environmental Grouppe	IAQ Solution	Himanshu Aggarwal	ceo@magneto.in	9810066504
52	Multiversal Industries Private Limited	Plumbing Fixtures and Sanitaryware	Murali	multiversal9@gmail.com	9047365548
53	Natural Insulation Co Ltd	Insulation Products	R Manjunath	manjunath.r@inframart.com	9886345066
54	Nippon Paint India	Paints & Coatings	Mahesh Anand	mahesh@nipponpaint.co.in	9176550031
55	Orient Cement Limited	Cement	Tripti Jain	Tripti.jain@orientcement.com	9010409111
56	Panache Greentech Solutions Pvt. Ltd.	Paints & Coatings	Neetu Jain	panachegreen@gmail.com	9825135651
57	Prism Johnson Limited	Tiles	Jayavant Naik	naik.jayavant@hrjohnsonindia.com	9594023837
58	Rajeev Chemicals Pvt. Ltd.	Cleaning Solutions	Rajeev	rcl631@rediffmail.com	9212724410
59	Ramco Industries Limited	Boards, Panels, False Ceiling & Plaster	Preston Davis	cpd@ril.co.in	8838118563
60	Richie Raffle Biotech (P) Limited	Cleaning Solutions	P. Chandrashekar Reddy	chandra@richieraffle.com	9652255959
61	Rockwool India	Insulation Products	Kevin Pereira	kpereira@rockwoolindia.com	040-30408650
62	ROXUL ROCKWOOL Insulation India Pvt. Ltd.	Insulation Products	Vimal Paul	vimal.paul@rockwool.com	9167200811
63	RUR GreenLife Pvt. Ltd.	Innovative Products	Monisha Narke	monishanarke@gmail.com	9820136101
64	Sagar Cement Limited	Cement	Anji Reddy	anjireddyo@sagarcements.in	9912229219
65	Sahyadri Industries Limited	Boards, Panels, False Ceiling & Plaster	Mayuresh Joshi	mayureshjoshi@silworld.in	9404965624
66	Saint Gobain India Pvt Ltd – Gyproc	Boards, Panels, False Ceiling & Plaster	Niharika Gujar	Niharika.Gujar@saint-gobain.com	9867260445
67	Saint-Gobain India Private Limited - Glass Business	High Performance Glass	Soumya Haridas	Soumya.Haridas@saint-gobain.com	9008969970
68	Saras Plywood Products Pvt Ltd.	Boards, Panels, False Ceiling & Plaster	Hitesh	hiteshkalsariya@core-value.in	9913008830
69	Savita Polymers Limited	Innovative Products	Amey Kulkarni	apkulkarni@savita.com	9920690908
70	Shakti Hormann Pvt Ltd	Doors & Windows	Vikram Manthena	vikram.manthena@shaktihormann.com	9866077407
71	Shree Ram Equitech Pvt. Ltd.	Insulation Products	P Srivastava	psrivastava@shreeramequitech.com	9329636514
72	Shubh Composites	Architectural Ceilings, Cladding, Facades, Sun Control Systems	Paresh Bhimani	info@shubhwood.com	9925200723
73	Sinicon Controls (P) Limited	Construction Chemicals	Revindran	revi@sinicon.net, marketing@sinicon.net	9497112211
74	Soujanya Color Pvt Ltd	Paints & Coatings	Amol Mulajkar	amol@soujanya.com	8828405124
75	Spacewood Furnishers	Doors & Windows	Shirish Bhatt	shirishbhatt@spacewood.in	9168133388
76	Spacewood Office Solutions	Furniture	Aniket Deshpande	aniket@spacewood.in	8007778973
77	Srikar Enterprises Private Limited	Construction Blocks	Suresh Babu	drsuresh@fusionblock.com, sales@fusionblock.com	7032992034
78	Star Wadding	Insulation Products	Sudarshan v s	starwadding@gmail.com	9945275995
79	Sterling & Wilson Pvt. Ltd.	IAQ Solution	Sean Menezes	seanmenezes@sterlingwilson.com	9892288888
80	Surfa Coats	Paints & Coatings	Sudarshan	surfamarketing@gmail.com	9448283526
81	Tata BlueScope Steel Pvt. Ltd.	Architectural Ceilings, Cladding, Facades, Sun Control Systems	Swapnil Dandi	swapnil.dandi@tatabluescopesteel.com	7875550253
82	Tata Steel - Pravesh Doors & Windows	Doors & Windows	Alok Kumar	alok3@tatasteel.com	8092086419
83	TATA Steel - TATA Structura	Architectural Ceilings, Cladding, Facades, Sun Control Systems	V Murali Krishna	vmurali.krishna@tatasteel.com	8885512530
84	Tata Steel Limited	GGBS	Amit Kumar Mahato	amitkumar.mahato@tatasteel.com	8092086463
85	The Ramco Cements Limited	Cement	M. Srinivasan	ms@ramcocements.co.in	9841080493

S No	Manufacturer	Category	Contact	Email	Phone
86	The Supreme Industries Limited (PPD)	Insulation Products	Atul Khanna	atul_khanna@supreme.co.in	9810676116, 020-6660060
87	TurboTech Precision Engineering Pvt Ltd	Innovative Products	Karthick Rajender	karthick@turbotechindia.com	9448285600
88	U.P.Twiga Fiberglass Limited	Insulation	Biswajit Roy	biswajit@twigafiber.com	11 26460860
89	UAL Industries	Construction Blocks	J Das	jdas_kgp@ualind.com	8584897592
90	Ugam Chemicals	Paints & Coatings	Nitin Shah	ugamchem@hotmail.com	8600100275
91	UltraTech Cement Ltd	Construction Blocks	Santosh V Kori	santosh.vkori@adityabirla.com	9164010326
92	UltraTech Cement Ltd – Unit Birla White	Paints & Coatings	Kalyan Chakravarty	kalyan.c@adityabirla.com	8494937668
93	Visaka Industries Limited	Boards, Panels, False Ceiling & Plaster	Sunil	sunil.thatiparthy@visaka.in	9121012024
94	Zuari Cement Limited	Cement	Rajesh Vasudev	V.RAJESH@zcltd.com	9741151178
95	Ashish Bags & Fashions Ltd	Consumer Products	Piyush Maskara	piyush@ashishbags.com	91 9831686484
96	Waaree Energies Ltd	Solar Photovoltaic Module	Mukul Harne	mukulharne@waaree.com	7211181177
97	Euronics Industries Private Limited	Plumbing Fixtures and Sanitaryware	Piyush Rampal	piyush@euronics.co.in	9650407731
98	Diamond Cements (Prop: HeidelbergCement India Ltd)	Cement	Ravindra Shukla	ravindra.shukla@heidelbergcement.in	9377666568
99	UltraTech Cement Ltd - Cement Division	Cement	Sandeep	sandeep.k@adityabirla.com	9702096103
100	Greenrich Grow India Pvt Ltd	Innovative Products	Manoj Nair K	solutions@mygreenbin.in	044 2378 1844
101	UltraTech Cement Ltd - BPD Division	Construction Chemicals	Santosh V Kori	santosh.vkori@adityabirla.com	9164010326
102	UltraTech Cement Ltd - RMC Division	Ready Mix Concrete	Devendra Pandey	Devendra.Pandey@adityabirla.com	9702001387
103	CERA Sanitaryware Limited	Plumbing Fixtures and Sanitaryware	Bhushan Yerpude	byerpude@cera-india.com	8511115852
104	Emmvee Photovoltaic Power Pvt. Ltd.	Solar Photovoltaic Module	Srikanth MN	srikanth.mn@EMMVEE.IN	9945530219
105	Everest Industries Limited	Boards, Panels, False Ceiling & Plaster	RK Arora	rkarora@everestind.com	9068005666
106	InterfaceFlor India Pvt Ltd.	Carpet Tiles	Rohit Tiwari	rohit.tiwari@interface.com	9740712255
107	NCL Buildtek Ltd	Doors & Windows	Omkar Ram	omkar@nclseccolor.com	7893617771
108	Paharpur Cooling Towers Ltd	Cooling Towers	Varun Swarup	varunswarup@paharpur.com; sales@paharpur.com	9836798320
109	Sloan India Private Limited	Plumbing Fixtures and Sanitaryware	Anup Kumar Tripathi	Anup.Tripathi@sloan.com	9871255599
110	Vidya Ply and Board Pvt Ltd	Doors & Windows	Ankit Singhal	ankit@kanchanply.com	9650816969
111	Polybond Insulation Pvt. Ltd.	Insulation Products	Praveen Mishra	polybond.sales@gmail.com	0788 2293392 / 4010525 / 4050525
112	E3 Extrusion Inc	Architectural Ceilings, Cladding, Facades, Sun Control Systems	Ganesh	ganesh@e3wood.com	8722206921
113	Proklean Technologies Pvt Ltd	Cleaning Solutions	Radhika Buddavarapu	radhika@proklean.in	9884067009
114	Welspun Flooring	Carpet Tiles	M.N.Ananda Krishna Iyer	anand_iyer@welspun.com	9846077032
115	Daiki Axis India Pvt Ltd	Waste Water Treatment System	Kamal Tiwari	kamal@daiki-axis.com	9810367527
116	Koshish Sustainable Solutions Private Limited	Cleaning Solutions	Ratnesh Tiwari	ratnesh.tiwari@koshishindia.in	9871086410
117	Bayer CropScience	Consumer Products	Jitendra Gawade	jitendra.gawade@bayer.com	9920835192
118	Bonton Technomake Pvt Ltd	Furniture	Shelke Ji	ysshelke@bontonfurniture.net	8269522501
119	Johnson Controls (I) Pvt Ltd	IAQ Solutions	Sujit Pawar	sujit.pawar@jci.com	7447445448
120	Indowud Polymers	Boards, Panels, False Ceiling & Plaster	Varun Bengani	varun@indowud.com	9884758586
121	Durlum India Pvt Ltd	Architectural Ceilings, Cladding, Facades, Sun Control Systems	Rajesh Kalonia	rajesh.kalonia@durlumindia.com	9899693208
122	Greentek Plast	Architectural Ceilings, Cladding, Facades, Sun Control Systems	Swapnil Potey	info@greentekplast.com / Swapnil.potey@greentekplast.com	8956792411 / 12
123	Schevaran Laboratories	Cleaning Solutions	Benjamin Alexander	benjamin@schevaran.com	9819146467
124	NCL Buildtek Ltd	Construction Blocks	B Vishnuvardhan	vishnuvardhan.b@nclbuildtek.com	98660 15188
125	Camfil India Private Limited	IAQ Solutions	Anil Chopra	anil.chopra@camfil.com	9667007734
126	Pure Organics Industries	Cleaning Chemicals	Geethanjali R	r.geethanjali@pure-chemical.com	8939444268
127	Cipy Polyurethanes Pvt Ltd	Construction Chemicals	Amit Dane	amit.dane@cipypolyurethane.com	9765493978

S No	Manufacturer	Category	Contact	Email	Phone
128	Hindustan Unilever Ltd.	Cleaning Solutions	Mr Aneesh	aneesh.handa@unilever.com	7018445588
129	Methodex Systems Private Limited	Furniture	Aditya Sharma	aditya.sharma@methodexsystems.com	9303249529
130	Novenco Building & Industry	Innovative Products	Mr Devendra Mishra	dbm@novenco-building.com	9987546472
131	VINAYAK INDUSTRIES	Paints & Coatings	Mr Mohit Agarwal	mohit@vinayakcorp.com	9810077530
132	Herbal Strategi Homecare Pvt Ltd	Cleaning Solutions	Mr Balan	herbal@herbalstrategi.com	9901427427
133	Signum Fire Protection India Pvt. Ltd.	Furniture, Doors & Windows	Bhagyashri	technicalrnd@signum.co.in	9822908510
134	TechFab India Ltd.	Innovative Products	Anant Kanoi	anant@techfabindia.com	022 - 2287 6224/6225 /22839733
135	USG Boral Building Products (India) Pvt. Ltd.	Boards, Panels, False Ceiling & Plaster	Prashant Dev	Prashant.dev@usgboral.com	9742306389
136	Bondada Engineering Pvt Ltd	Construction Blocks	Mr Varaprasad	vara@beplsmartbrix.com	7799658833
137	Nexon Paints Private Limited	Paints and Coatings	Mr Amrit Kumar Panda	amrit@nexonpaints.com	9000011650
138	Eukpro Biotech Pvt Ltd	Cleaning Solutions	Dr Ramprasath	info@eukpro.com	8760123457
139	Impression Furniture Industries Pvt. Ltd.	Furniture	Antriksh Kumar	sales12@impression.net.in	6263191955
140	Tata Steel Limited	Steel Rebars	Biswajit Ghosh	BISWAJITG@TATASTEEL.COM	7763807334
141	Marmo Solutions Pvt. Ltd.	Construction Chemicals	Sunil Rathor	marmosolutions01@gmail.com	9599054502
142	Aliferous Technologies Pvt. Ltd (Clairco)	IAQ Solutions	Darshini	darshini@clairco.in	9980531190
143	JSW Steel Limited	Steel Rebars	KSV Dhanush	DHANUSH.KSV@jsw.in	8919099919
144	Hansgrohe India Private Limited	Plumbing Fixtures and Sanitaryware	Mangesh Ganjale	mangesh.ganjale@hansgrohe.in	9607949285
145	Featherlite	Furniture	Mr Anbunathan	anbunathan@greenpositive.in	9841339293

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About CII
(Confederation of Indian Industry)

The Confederation of Indian Industry (CII) works to create and sustain an environment conducive to the development of India, partnering industry, Government, and civil society, through advisory and consultative processes.

CII is a non-government, not-for-profit, industry-led and industry-managed organization, playing a proactive role in India's development process. Founded in 1895, India's premier business association has over 7,200 members, from the private as well as public sectors, including SMEs and MNCs, and an indirect membership of over 1,00,000 enterprises from around 242 national and regional sectoral industry bodies.

With 64 offices, including 9 Centres of Excellence, in India, and 7 overseas offices in Australia, China, Egypt, France, Singapore, UK, and USA, as well as institutional partnerships with 312 counterpart organizations in 106 countries, CII serves as a reference point for Indian industry and the international business community.

About IGBC
(Indian Green Building Council)

The Indian Green Building Council (IGBC), part of Confederation on Indian Industry (CII) was formed in the year 2001. The vision of the council is to enable Sustainable Built-Environment for all, and to make India, one of the world leaders in Sustainable Built-Environment by 2025.

The council offers a wide array of services which include developing new green building rating programmes, certification services and green building training programmes. The council also organises Green Building Congress, its annual flagship event on green buildings.

The council is committee-based, member-driven and consensus-focused. All the stakeholders of construction industry comprising of architects, developers, product manufacturers, corporate, Government, academia and nodal agencies participate in the council activities through local chapters.

IGBC Green Building Rating Systems

National by Choice

Global in Performance

This abridged reference guide has been printed on environment friendly, chlorine free paper sourced from a responsibly managed forest

For more information on Green Buildings, please contact

Confederation of Indian Industry

Indian Green Building Council
Greening India since 2001

Confederation of Indian Industry
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