



# Green Building Rating System

## Abridged Reference Guide

**For Core & Shell**  
(LEED –India CS)  
**Version 1.0**

Including the  
Project Checklist

Indian green building council

**September 2007**



# Project Checklist

## Sustainable Sites

**14 Possible Points**

Prereq 1	Erosion & Sedimentation Control	<b>Required</b>
Credit 1	Site Selection	1
Credit 2	Development Density & Community Connectivity	1
Credit 3	Brownfield Redevelopment	1
Credit 4.1	Alternative Transportation, Public Transportation Access	1
Credit 4.2	Alternative Transportation, Alternative Fuel Refueling Stations	1
Credit 4.3	Alternative Transportation, Parking Capacity	1
Credit 5.1	Reduced Site Disturbance, Protect or Restore Open Space	1
Credit 5.2	Reduced Site Disturbance, Development Footprint	1
Credit 6.1	Stormwater Design, Quantity Control	1
Credit 6.2	Stormwater Design, Quality Control	1
Credit 7.1	Heat Island Effect, Non Roof	1
Credit 7.2	Heat Island Effect, Roof	1
Credit 8	Light Pollution Reduction	1
Credit 9	Tenant Guidelines	1

## Water Efficiency

**6 Possible Points**

Credit 1.1	Water Efficient Landscaping, Reduce by 50%	1
Credit 1.2	Water Efficient Landscaping, No Potable Use or No Irrigation	1
Credit 2	Water Efficiency in Air-conditioning System: Reduce by 50%	1
Credit 3	Innovative Wastewater Technologies	1
Credit 4.1	Water Use Reduction, 20% Reduction	1
Credit 4.2	Water Use Reduction, 30% Reduction	1

## Energy & Atmosphere

**14 Possible Points**

Prereq 1	Fundamental Building Systems Commissioning	<b>Required</b>
Prereq 2	Minimum Energy Performance	<b>Required</b>
Prereq 3	CFC Reduction in HVAC&R Equipment	<b>Required</b>
Credit 1	Optimize Energy Performance	8
Credit 2	Renewable Energy, 1 %	1
Credit 3	Additional Commissioning	1
Credit 4	Ozone Depletion	1
Credit 5.1	Measurement & Verification-Base Building	1
Credit 5.2	Measurement & Verification-Tenant Sub-metering	1
Credit 6	Green Power	1



## Materials & Resources

11 Possible Points

Prereq 1	Storage & Collection of Recyclables	<b>Required</b>
Credit 1	Building Reuse	3
Credit 2	Construction Waste Management	2
Credit 3	Resource Reuse	1
Credit 4	Recycled Content	2
Credit 5	Local/Regional Materials	2
Credit 6	Certified Wood	1

## Indoor Environmental Quality

11 Possible Points

Prereq 1	Minimum IAQ Performance	<b>Required</b>
Prereq 2	Environmental Tobacco Smoke (ETS) Control	<b>Required</b>
Credit 1	Outdoor Air Delivery Monitoring	1
Credit 2	Increased Ventilation	1
Credit 3	Construction IAQ Management Plan(during construction)	1
Credit 4	Low-Emitting Materials	3
Credit 5	Indoor Chemical & Pollutant Source Control	1
Credit 6.1	Controllability of System, Thermal comfort	1
Credit 6.2	Thermal Comfort, Design	1
Credit 7	Daylight & Views	2

## Innovation & Design Process

5 Possible Points

Credit 1	Innovation in Design	4
Credit 2	LEED™ Accredited Professional	1

## LEED – India Certification Levels

Rating	Points
LEED – Certified	23 – 27
LEED – Silver	28 – 33
LEED – Gold	34 – 44
LEED – Platinum	45 – 61



# LEED INDIA CS

For Core & Shell

## REFERENCE GUIDE

Version 1.0

First Edition September 2007



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**LEED INDIA CS**

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## **Acknowledgements**

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ID Credit 1 – 1.4	Innovation in Design
ID Credit 2	LEED Accredited Professionals



## Foreword from the IGBC

The built environment has a profound impact on our natural environment, economy, health and productivity. Breakthroughs in building science, technology and operations are now available to designers, builders, operators and owners who want to build green and maximize both economic and environmental performance.

The Indian Green Building Council (IGBC) is coordinating the establishment and evolution of a national consensus effort to provide the industry with tools necessary to design, build and operate buildings that deliver high performance inside and out. The Council members work together to develop industry standards, design & construction practices & guidelines, operating practices & guidelines, policy positions & educational tools that support the adoption of sustainable design and building practices. Members also forge strategic alliances with key industry and research organizations, Central government agencies and state & local governments to transform the built environment. As the leading organization that represents the entire building industry on environmental building matters, the Council's unique perspective and collective power provides our members with enormous opportunity to effect change in the way buildings are designed, built, operated and maintained.

## IGBC Membership

The council's greatest strength is the diversity of our membership. The IGBC is a consensus not-for-profit organization representing the entire building industry, consisting of over 125 companies and organisations. Since its inception in 2001, the IGBC has played a vital role in providing a leadership forum and a unique, integrating force for the building industry. The Council programs are:

### ❖ **Committee – Based**

The heart of this effective coalition is our committee structure in which volunteer members design strategies that are implemented by IGBC staff and expert consultants. Our committees provide a forum for members to resolve differences, build alliances and forge cooperative solutions for influencing change in all sectors of the building industry

### ❖ **Member – Driven**

The council's membership is open and balanced and provides a comprehensive platform for carrying out important programs and activities. We target the issues identified by our members as the highest priority. We conduct an annual review of achievements that allows us to set policy, revise strategies and devise work plans based on members needs

### ❖ **Consensus – Focused**

We work together to promote green buildings and in doing so, we help foster greater economic vitality and environmental health at lower costs. The various industry segments bridge ideological gaps to develop balanced policies that benefit the entire industry.



**LEED INDIA CS**

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## **Introduction**

### **I. Why Make your Building Green?**

The environmental impact of the building design, construction and operation industry is significant. Buildings annually consume more than 20% of the electricity used in India.

Development shifts land usage away from natural, biologically-diverse habitats to hardscape that is impervious and devoid of biodiversity. The far reaching influence of the built environment necessitates action to reduce its impact.

Green building practices can substantially reduce or eliminate negative environmental impacts and improve existing unsustainable design, construction and operational practices. As an added benefit, green design measures reduce operating costs, enhance building marketability, increase worker productivity and reduce potential liability resulting from indoor air quality problems.

Studies of workers in green buildings reported productivity gains of up to 16%, including reductions in absenteeism and improved work quality, based on “people-friendly” green design. In other words, green building design has environmental, economic and social elements that benefit all building stakeholders, including owners, occupants and the general public.

### **II. LEED Green Building Rating System**

#### **A. History of LEED in India**

Following the formation of the Indian Green Building Council (IGBC) in 2001, the membership quickly realised that one of the priorities for the sustainable building industry was to have a system to define and measure “green buildings”.

Since the CII-Godrej GBC achieved the prestigious LEED rating for its own centre at Hyderabad in 2003, the Green building movement has gained tremendous momentum. The Platinum rating awarded for this building sparked off considerable enthusiasm in the country.

From a humble beginning of 20,000 sq.ft of green footprint in the country in the year 2003, to a staggering 15 million sq.ft expected by end 2008, green buildings are well poised to reach scalar heights. Today a variety of LEED rated green building projects are coming up in the country – residential complexes, exhibition centers, hospitals, educational institutions, laboratories, IT parks, airports, government buildings and corporate offices.



The IGBC set up the LEED India Core Committee to focus on indigenising the LEED rating to suit the Indian context. The composition of the committee included architects, realtors, building owners and industry representatives. This cross section of people and professions added a richness and depth both to the process and to the ultimate product.

The first LEED India rating programme, referred to as LEED India Version 1.0, was launched during the Green Building Congress Conference in October 2006. This rating system is now called the LEED India Green Building Rating System for New Commercial Construction and Major Renovations or LEED India NC.

The LEED India Green Building Rating System for Core and Shell or LEED India CS was launched during the Green Building Congress Conference in September 2007.

## **B. Features of LEED India**

The LEED India Green Building Rating System is a voluntary, consensus – based, market-driven building rating system based on existing proven technology. It evaluates environmental performance from a whole building perspective over a building’s life cycle, providing a definitive standard for what constitutes a “green building”.

The rating system is organized into five environmental categories: Sustainable Sites, Water Efficiency, Energy & Atmosphere, Materials & Resources and Indoor Environmental Quality. An additional category, Innovation & Design Process, addresses sustainable building expertise as well as design measures not covered under the five environmental categories.

LEED is a measurement system designed for rating new and existing commercial, institutional and residential buildings. It is based on accepted energy and environmental principles and strikes a balance between known established practices and emerging concepts.

It is a performance-oriented system where credits are earned for satisfying criterion designed to address specific environmental impacts inherent in the design and construction. Different levels of green building certification are awarded based on the total credits earned. The system is designed to be comprehensive in scope, yet simple in operation.

## **C. The Future of LEED India**

The green design field is growing and changing daily. New technologies and products are coming into the marketplace and innovative designs are proving their effectiveness. Therefore, the Rating System and the Reference Guide will evolve as



well. Teams wishing to certify with LEED should note that they will need to comply with the version of the rating system that is current at the time of their registration.

The IGBC will highlight new developments on its website on a continuous basis at [www.igbc.in](http://www.igbc.in)

### **III. LEED India CS Overview and Process**

The LEED India Green Building Rating System for Core and Shell (LEED India CS) is a set of performance standards for certifying the design and construction of Core and Shell buildings. The intent of LEED India CS is to assist in the creation of high performance, healthful, durable, affordable and environmentally sound buildings.

LEED India CS addresses:

- ❖ Sustainable Sites
- ❖ Water Efficiency
- ❖ Energy & Atmosphere
- ❖ Materials & Resources
- ❖ Indoor Environmental Quality
- ❖ Innovation in Design

#### **D. When to use LEED India CS**

The LEED-CS Rating System was developed to serve the speculatively driven development market where project teams routinely do not control all aspects of a building's design and construction. The scope of LEED-CS is limited to those elements of the project under the direct control of the owner/developer. The LEED-CS Rating System has been developed to address a variety of project types and a broad project range.

##### **Scope of Construction**

- LEED-CS can be used for projects where the developer controls the design and construction of the entire core and shell base building including MEP/FP systems, but has no control over the design and construction of the tenant fit-out. Examples of this type of project are a commercial office building, medical office building, retail center, warehouse, or lab facility.
- LEED-CS can also be used for projects that have limited control of the building systems. This is often found in retail development. Projects with limited scope should review the specific credit requirements for guidance.



- In projects that are designed and constructed to be partially occupied by the owner/developer, it is assumed the owner/developer has direct influence over the portion of the work that would typically be tenant interior construction. For projects of this type to utilize the LEED-CS Rating System, the owner/tenant must occupy 50% or less of the building's leasable space. Projects with greater than 50% of the building's tenant space occupied by a owner/tenant should utilize LEED-NC.

## **Core & Shell and Tenant Space Guidance**

To assist project teams in defining the owner/tenant division in the project design as well as certification review process, the Core & Shell/Tenant Interiors Checklist has been developed.

### **E. LEED India for Core and Shell Pre-certification**

#### **Overview**

LEED India for Core & Shell pre-certification is a unique aspect of the LEED India Core & Shell program. Pre-certification is formal recognition by IGBC given to a LEED India for Core & Shell candidate project for which the development/owner has established a goal to develop a LEED India for Core & Shell building. LEED India for Core & Shell pre-certification is granted to projects after IGBC has reviewed early design stage documentation. This documentation, which reflects a studied and realistic set of project goals and intentions, forms the basis for an award of pre-certification at the project's anticipated LEED India for Core & Shell certification level. Pre-certification is not a documented and completed building and is not confirmation or a commitment to achieve LEED India Core & Shell certification. Pre-certification is not LEED India certification.

#### **Value**

Pre-certification provides the Core & Shell owner/developer with the ability to market to potential tenants and financiers the unique and valuable green features of a proposed building.

#### **Submittal and Review**

Once a project is registered as a LEED India Core & Shell project with IGBC, the project team may complete the LEED India for Core & Shell pre-certification letter templates and submit the project for pre-certification. This is a voluntary submittal at the discretion of the project team.



Because much of the value of pre-certification occurs early in a project's development, the project team's documentation and IGBC's review is less comprehensive than the final LEED India for Core & Shell certification application. Project teams are required to provide confirmation that the project intends to meet the requirements of a credit. This is provided using the LEED India Core & Shell letter templates on the appropriate design team member's letterhead for each credit pursued, with a brief description of the strategy and/or technology that will be employed. The developer/owner is also required to provide a signed letter template declaring that they are in agreement with the intention and strategies as indicated on each credit specific letter template submitted.

The LEED India for Core & Shell Project Scope checklist will also need to be submitted. This checklist is both a design team tool and provides IGBC with useful building information for review. This includes information about building use, LEED India for Core & Shell occupancy numbers and core and shell scope.

The project is reviewed and a LEED India for Core & Shell pre-certification level (certified, silver, gold or platinum) is granted. A certificate and letter are provided to the project. The review will allow the developer to market the project's intention to achieve a particular LEED India for Core & Shell certification level. This pre-certification process is not intended to be a supplementary comprehensive review of a project's submittal and the anticipated LEED India for Core & Shell certification level. LEED India for Core & Shell certification review will still occur with IGBC's established two-phase application (Design and Construction). Because of the many factors inherent in project design, construction and project documentation and review, it is possible that the final certification review will not correspond exactly to the pre-certification review. Project team members should be aware that it is incumbent upon the team to demonstrate that the credit requirements have been met at the design and construction certification reviews.

## **F. Credit Compliance**

### **Overview**

The LEED India for Core & Shell Rating System is written for core and shell development and is intentionally neutral regarding requirements for tenant build-out. A LEED India for Core & Shell rating can be attained without making any requirements of a tenant. A tenant can choose to pursue or not to pursue a LEED for Commercial Interiors (LEED-CI) rating with no impact on the building's LEED India for Core & Shell rating. However, if a developer chooses to make specific lease requirements part of their tenant negotiation, and these requirements part of their tenant negotiation, and these requirements meet the criteria of a particular credit in the LEED India for Core &



Shell Rating System, the LEED India for Core & Shell project may be able to receive a point for this credit even if the work is not part of the core and shell design and construction.

The following describes this approach to credit compliance and may be used, as applicable, throughout the rating system.

### **Requirements**

Meet LEED India for Core & Shell Credit requirements through either;

- Design and Construction of the building core and shell,

OR

- Establishment of tenant requirements that meet the LEED India for Core and Shell credit requirements, but will be implemented as part of the tenant controlled build-out.

### **Submittals**

- Provide the LEED India letter template, signed by the building developer/owner for the credit being pursued, based on the core and shell design and construction.

OR

- The LEED letter template for the credit pursued indicating that:
  - 100% of leased square footage complies with credit requirements. Lease or sales agreements may be requested.

AND

- That 100% of the unleashed square footage shall comply with the credit requirements when leased. A statement signed by the developer/owner that all leases and/or sales agreements will comply may be requested.

SS	WE	EA	MR	EQ	ID
<b>Prerequisite 1</b>					

# Sustainable Sites

Prerequisite 1    **Erosion & Sedimentation Control**

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Required

## Intent

Control erosion to reduce negative impacts on water and air quality.

## Requirement

**Prerequisite 1.0**      Design to a site sediment and erosion control plan that conforms to the best management practices highlighted in the National Building Codes of India (NBC) Part 10, section 1, chapter 4 – Protection of Landscape during Construction

The plan shall meet the following objectives:

- Prevent loss of soil during construction by storm water runoff and/ or wind erosion, including protecting topsoil by stockpiling for reuse.
- Prevent sedimentation of storm sewer or receiving streams and/ or air pollution with dust and particulate matter.

## Technologies & Strategies

Adopt an erosion and sedimentation control plan for the project site during construction. Consider employing strategies such as temporary and permanent seeding, mulching, earth dikes, silt fencing, sediment traps, and sediment basins.

SS	WE	EA	MR	EQ	ID
Credit 1					

1 Point

Credit 1

### Site Selection

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#### Intent

Avoid development of inappropriate sites and reduce the environmental impact from the location of a building on a site.

#### Requirement

Submit Land allotment / land use letter issued from the local authority and also where applicable clearance from Ministry of Environment and Forest, (MoEF), Government of India.

Do not develop buildings on portions of sites that meet any one of the following criteria:

-Prime farmland

-Land whose elevation is lower than **5 feet above** the elevation of the 100-year flood level.

-Land which provides habitat for any species on the threatened or endangered list of **Wildlife Institute of India** (<http://www.wii.gov.in/nwdc/index.html>)

-Within **100 feet** of any wetland as defined by **Environmental Information System (ENVIS)** (<http://www.wetlandsofindia.org:8080/wetlands/introduction.jsp>) OR as defined by local or state rule or law, whichever is more stringent

-Land which prior to acquisition for the project was public parkland, unless land of equal or greater value as parkland is accepted in trade by the public landowner (park Authority projects are exempt)

#### Technologies & Strategies

During the site selection process, give preference to those sites that do not include sensitive site elements and restricted land types. Select a suitable building location and design the building with the minimal footprint to minimize site disruption. Strategies include stacking the building program, tuck under parking, and sharing facilities with neighbors.

SS	WE	EA	MR	EQ	ID
<b>Credit 2</b>					

**Development Density & Community Connectivity**

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**1 Point**

**Intent**

Channel development to urban areas with existing infrastructure, protect green fields and preserve habitat and natural resources.

**Requirement**

**OPTION 1 — DEVELOPMENT DENSITY**

Construct or renovate building on a previously developed site AND in a community with a minimum density of 60,000 square feet per acre net. (Note: density calculation must include the area of the project being built and is based on a typical two-story downtown development).

**OR**

**OPTION 2 — COMMUNITY CONNECTIVITY**

Construct or renovate building on a previously developed site AND within **800 Meters** of a residential zone or neighborhood with an average density of 10 units per acre net AND within **800 Meters** of at least 10 Basic Services AND with pedestrian access between the building and the services. Basic Services include, but are not limited to:

- 1) Bank; 2) Place of Worship; 3) Convenience Grocery; 4) Day Care; 5) Cleaners; 6) Fire Station; 7) Beauty; 8) Hardware; 9) Laundry; 10) Library; 11) Medical/Dental; 12) Senior Care Facility; 13) Park; 14) Pharmacy; 15) Post Office; 16) Restaurant; 17) School; 18) Supermarket; 19) Theater; 20) Community Center; 21) Fitness Center; 22) Museum. Proximity is determined by drawing an 800 Meters radius around the main building entrance on a sitemap and counting the services within that radius.

**Potential Technologies & Strategies**

During the site selection process, give preference to urban sites with pedestrian access to a variety of services.

<b>SS</b>	<b>WE</b>	<b>EA</b>	<b>MR</b>	<b>EQ</b>	<b>ID</b>
<b>Credit 3</b>					

1 Point

Credit 3

## **Brownfield Redevelopment**

### **Intent**

Rehabilitate damaged sites where development is complicated by real or perceived environmental contamination, reducing pressure on undeveloped land.

### **Requirement**

**Credit 3.0** (1 Point)      Develop on a site classified as a Brownfield and provide remediation as required by US EPA's Sustainable Redevelopment of Brownfields Program requirements

### **Technologies & Strategies**

During the site selection process, give preference to brown field sites. Identify tax incentives and property cost savings by selecting a Brownfield site. Adopt a site remediation plan and cleanup the site using remediation strategies such as pump-and-treat, bioreactors, land farming, and in-situ remediation.



SS	WE	EA	MR	EQ	ID
<b>Credit 5</b>					

2 Points

Credit 5

## Reduced Site Disturbance

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### Intent

Conserve existing natural areas and restore damaged areas to provide habitat and promote biodiversity.

### Requirements

**Credit 5.1** (1 point) On greenfield sites, limit site disturbance including earthwork and clearing of vegetation to **40 feet** beyond the building perimeter, **5 feet** beyond primary roadway curbs, walkways, and main utility branch trenches, and **25 feet** beyond pervious paving areas that require additional staging areas in order to limit compaction in the paved area; OR, on previously developed sites, restore a minimum of **50%** of the remaining open area by planting native or adapted vegetation.

**Credit 5.2** (1 point) Reduce the development footprint (including building, access roads and parking) to exceed the local zoning's open space requirement for the site by **25%**.

**OR**

For areas with no local zoning requirements (e.g., some university campuses, military bases), provide vegetated open space area adjacent to the building that is equal to the building footprint.

**OR**

Where a zoning ordinance exists, but there is no requirement for open space (zero), provide vegetated open space equal to 20% of the project's site area.

### Technologies & Strategies

Perform a site survey to identify site elements and adopt a master plan for development of the project site. Select a suitable building location and design the building with the minimal footprint to minimize site disruption. Strategies include stacking the building program, tuck under parking, and sharing facilities with neighbors. Establish clearly marked construction boundaries to minimize disturbance of existing site and restore previously degraded areas to their natural state.

<b>SS</b>	<b>WE</b>	<b>EA</b>	<b>MR</b>	<b>EQ</b>	<b>ID</b>
<b>Credit 6.1</b>					

1 Point

## **Storm water Design: Quantity Control**

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### **Intent**

Limit disruption of natural water hydrology by reducing impervious cover, increasing on-site infiltration, and managing stormwater runoff.

### **Requirement**

Option 1 — EXISTING IMPERVIOUSNESS IS LESS THAN OR EQUAL TO 50%

Implement a stormwater management plan that prevents the post-development peak discharge rate and quantity from exceeding the pre-development peak discharge rate and quantity for the one- and two-year, 24-hour design storms.

**OR**

Implement a storm water management plan that protects receiving stream channels from excessive erosion by implementing a stream channel protection strategy and quantity control strategies.

**OR**

Option 2 — EXISTING IMPERVIOUSNESS IS GREATER THAN 50%

Implement a stormwater management plan that results in a 25% decrease in the volume of stormwater runoff from the two-year, 24-hour design storm.

### **Potential Technologies & Strategies**

Design the project site to maintain natural stormwater flows by promoting infiltration. Specify vegetated roofs, pervious paving, and other measures to minimize impervious surfaces. Reuse stormwater volumes generated for non-potable uses such as landscape irrigation, toilet and urinal flushing and custodial uses.

<b>SS</b>	<b>WE</b>	<b>EA</b>	<b>MR</b>	<b>EQ</b>	<b>ID</b>
<b>Credit 6.2</b>					

## Credit 6.2

## Stormwater Design: Quality Control

1 Point

### Intent

Reduce or eliminate water pollution by reducing impervious cover, increasing onsite infiltration, eliminating sources of contaminants, and removing pollutants from storm water runoff.

### Requirement

Implement a stormwater management plan that reduces impervious cover, promotes infiltration, and captures and treats the stormwater runoff from 90% of the average annual rainfall 1 using acceptable best management practices (BMPs).

BMPs used to treat runoff must be capable of removing 80% of the average annual post development total suspended solids (TSS) load based on existing monitoring reports. BMPs are considered to meet these criteria if they are designed in accordance with standards and specifications **from NBC (Part 10, Section 1, Clause 5.2 – Storm Water Management & Filtration Techniques)** or local program that has adopted these performance standards.

### Potential Technologies & Strategies

Use alternative surfaces (e.g., vegetated roofs, pervious pavement or grid pavers) and nonstructural techniques (e.g., rain gardens, vegetated swales, disconnection of imperviousness, rainwater recycling) to reduce imperviousness and promote infiltration, thereby reducing pollutant loadings. Use sustainable design strategies (e.g., Low Impact Development, Environmentally Sensitive Design) to design integrated natural and mechanical treatment systems such as constructed wetlands, vegetated filters, and open channels to treat storm water runoff.

<b>SS</b>	<b>WE</b>	<b>EA</b>	<b>MR</b>	<b>EQ</b>	<b>ID</b>
<b>Credit 7.1</b>					

1 Point

Credit 7.1

Heat Island Effect: Non-Roof

---

**Intent**

Reduce heat islands (thermal gradient differences between developed and undeveloped areas) to minimize impact on microclimate and human and wildlife habitat.

**Requirement**

OPTION 1 Provide any combination of the following strategies for 50% of the site hardscape (including roads, sidewalks, courtyards and parking lots):

- Shade (within 5 years of occupancy)
- Paving materials with a Solar Reflectance Index (SRI) <sup>2</sup> of at least 29
- Open grid pavement system

**OR**

OPTION 2 Place a minimum of 50% of parking spaces under cover (defined as under ground, under deck, under roof, or under a building). Any roof used to shade or cover parking must have an SRI of at least 29.

**Potential Technologies & Strategies**

Shade constructed surfaces on the site with landscape features and utilize high-reflectance materials for hard cape. Consider replacing constructed surfaces (i.e. roof, roads, sidewalks, etc.) with vegetated surfaces such as vegetated roofs and open grid paving or specify high-albedo materials to reduce the heat absorption.

<b>SS</b>	<b>WE</b>	<b>EA</b>	<b>MR</b>	<b>EQ</b>	<b>ID</b>
<b>Credit 7.2</b>					

**Credit 7.2:**

**Heat Island Effect: Roof**

**1 Point**

**Intent**

Reduce heat islands (thermal gradient differences between developed and undeveloped areas) to minimize impact on microclimate and human and wildlife habitat.

**Requirements**

OPTION 1      Use roofing materials having a Solar Reflectance Index (SRI) equal to or greater than the values in the table below for a minimum of 75% of the roof surface.

**OR**

OPTION 2      Install a vegetated roof for at least 50% of the roof area.

**OR**

OPTION 3      Install high albedo and vegetated roof surfaces that, in combination, meet the following criteria:

$$(\text{Area of SRI Roof} / 0.75) + (\text{Area of vegetated Roof} / 0.5) \geq \text{Total Roof Area}$$

<b>Roof Type</b>	<b>Slope</b>	<b>SRI</b>
Low-sloped Roof	≤ 2:12	78
Steep-Sloped Roof	≥2:12	29

**Potential Technologies & Strategies**

Consider installing high-albedo and vegetated roofs to reduce heat absorption. SRI is calculated according to ASTM E 1980. Reflectance is measured according to ASTM E 903, ASTM E 1918, or ASTM C 1549. Emittance is measured according to ASTM E 408 or ASTM C 1371. Default values will be available in the LEED – India NC v1.0 Reference Guide. Product information is available from the Cool Roof Rating Council website, at [www.coolroofs.org](http://www.coolroofs.org).

<b>SS</b>	<b>WE</b>	<b>EA</b>	<b>MR</b>	<b>EQ</b>	<b>ID</b>
<b>Credit 8</b>					

1 Point

Credit 8

Light Pollution Reduction

---

**Intent**

Minimize light trespass from the building and site, reduce sky-glow to increase night sky access, improve nighttime visibility through glare reduction, and reduce development impact on nocturnal environments.

**Requirements**

FOR INTERIOR LIGHTING

The angle of maximum candela from each interior luminaire as located in the building shall intersect opaque building interior surfaces and not exit out through the windows.

**OR**

All non-emergency interior lighting shall be automatically controlled to turn off during non-business hours. Provide manual override capability for after hours use.

AND

FOR EXTERIOR LIGHTING

Only light areas as required for safety and comfort. Do not exceed 80% of the lighting power densities for exterior areas and 50% for building facades and landscape features as defined in ASHRAE/IESNA Standard 90.1-2004, Exterior Lighting Section, without amendments. All projects shall be classified under one of the following zones, as defined in IESNA RP-33, and shall follow all of the requirements for that specific zone:

**LZ1 — Dark (Park and Rural Settings)**

Design exterior lighting so that all site and building mounted luminaries produce a maximum initial illuminance value no greater than 0.01 horizontal and vertical footcandles at the site boundary and beyond. Document that 0% of the total initial designed fixture lumens are emitted at an angle of 90 degrees or higher from nadir (straight down).

**LZ2 — Low (Residential areas)**

Design exterior lighting so that all site and building mounted luminaries produce a maximum initial illuminance value no greater than 0.10 horizontal and vertical footcandles at the site boundary and no greater than 0.01 horizontal footcandles 10 feet beyond the site boundary. Document that no more than 2% of the total initial designed fixture lumens are emitted at an angle of 90 degrees or higher from nadir (straight down). For site boundaries that abut public rights-of-way, light trespass requirements may be met relative to the curb line instead of the site boundary.

### **LZ3 — Medium (Commercial/Industrial, High-Density Residential)**

Design exterior lighting so that all site and building mounted luminaires produce a maximum initial illuminance value no greater than 0.20 horizontal and vertical footcandles at the site boundary and no greater than 0.01 horizontal footcandles 15 feet beyond the site. Document that no more than 5% of the total initial designed fixture lumens are emitted at an angle of 90 degrees or higher from nadir (straight down). For site boundaries that abut public rights-of-way, light trespass requirements may be met relative to the curb line instead of the site boundary.

### **LZ4 — High (Major City Centers, Entertainment Districts)**

Design exterior lighting so that all site and building mounted luminaires produce a maximum initial illuminance value no greater than 0.60 horizontal and vertical footcandles at the site boundary and no greater than 0.01 horizontal footcandles 15 feet beyond the site. Document that no more than 10% of the total initial designed site lumens are emitted at an angle of 90 degrees or higher from nadir (straight down). For site boundaries that abut public rights-of-way, light trespass requirements may be met relative to the curb line instead of the site boundary.

### **Potential Technologies & Strategies**

Adopt site lighting criteria to maintain safe light levels while avoiding off-site lighting and night sky pollution. Minimize site lighting where possible and model the site lighting using a computer model. Technologies to reduce light pollution include full cutoff luminaires, low-reflectance surfaces and low-angle spotlights.

<b>SS</b>	<b>WE</b>	<b>EA</b>	<b>MR</b>	<b>EQ</b>	<b>ID</b>
<b>Credit 9</b>					

1 Point

**Credit 9 Tenant Design and Construction Guidelines**

---

**Intent**

Provide tenants with a descriptive tool that both educates and helps them implement sustainable design and construction features in their tenant improvement build-out.

**Requirement**

Publish an illustrated document that provides tenants with design and construction information that details the following:

- Provides a description of the sustainable design and construction features incorporated in the core and shell project and delineates the project intent with respect to sustainability goals and objectives including those for tenant spaces.
- Provides information that enables a tenant to coordinate their space design and construction with the core and shell's building systems. Specific buildings LEED-CS credits to be addressed when applicable include-

**Water Use Reduction**

- Optimize Energy Performance, Lighting Power
- Optimize Energy Performance, Lighting Controls
- Optimize Energy Performance, HVAC
- Energy Use and Metering
- Measurement and Verification
- Ventilation and Outdoor Air Delivery
- Construction IAQ Management
- Indoor Chemical and Pollutant Source Control
- Controllability of Systems
- Thermal Comfort
- Day lighting and Views
- Commissioning
- The Elimination or Control of Environmental Tobacco Smoke
- Recommendations, including examples, of Sustainable Strategies, Products, Materials, and Service Suggestions

**Potential Technologies & Strategies**

Provide a copy of the Tenant Design and Construction Guidelines to tenants.

SS	<b>WE</b>	EA	MR	EQ	ID
Credit 1					

# Water Efficiency

1-2 Points

Credit 1 Water Efficient Landscaping

---

## Intent

Limit or eliminate the use of potable water for landscape irrigation.

## Requirements

**Credit 1.1** (1 point) Use high efficiency irrigation technologies, OR, use captured rain or recycled site water, to reduce potable water consumption for irrigation by 50% over conventional means.

**Credit 1.2** (1 point) Use only captured rain or recycled site water for an additional 50% reduction (100% total reduction) of potable water for site irrigation needs, OR, do not install permanent landscape irrigation systems.

## Technologies & Strategies

Perform a soil/ climate analysis to determine appropriate landscape types and design the landscape with indigenous plants to reduce or eliminate irrigation requirements. Use high efficiency irrigation systems and consider reuse of stormwater or graywater volumes for irrigation.

SS	WE	EA	MR	EQ	ID
<b>Credit 2</b>					

1 Point

**Credit 2      Water Efficiency in Air-conditioning System**

---

**Intent**

Limit or eliminate the use of potable water for Air-conditioning make-up.

**Requirements**

Use captured rain or recycled site water, to reduce potable water consumption for air-conditioning make up by 50%..

**Technologies & Strategies**

Select water efficient chillers to reduce water requirement for cooling tower make-up. Estimate potable water requirement for cooling tower makeup in the water cooled chillers. Consider reuse of storm water or gray water generated within the site for air-conditioning makeup.

SS	<b>WE</b>	EA	MR	EQ	ID
<b>Credit 3</b>					

### **Credit 3     Innovative Wastewater Technologies**

---

1 Point

#### **Intent**

Reduce the generation of wastewater and potable water demand, while increasing the local aquifer recharge.

#### **Requirement**

##### **Credit 3.0** (1 point)

Reduce the use of municipally provided potable water for building sewage conveyance by a minimum of **50%**, OR, treat **100%** of wastewater on site to tertiary standards.

#### **Technologies & Strategies**

Estimate the wastewater volumes generated in the building and specify high efficiency fixtures and dry fixtures such as composting toilets and waterless urinals to reduce these volumes. Consider reusing stormwater or graywater for sewage conveyance or on-site wastewater treatment systems (mechanical or natural).

SS	<b>WE</b>	EA	MR	EQ	ID
<b>Credit 4</b>					

1-2 Point

Credit 4      **Water Use Reduction**

---

**Intent**

Maximize water efficiency within buildings to reduce the burden on municipal water supply and wastewater systems.

**Requirement & Submittals**

**Credit 4.1** (1 point)      Employ strategies that in aggregate use **20%** less water than the water use baseline calculated for the building (not including irrigation) after meeting the following fixture performance requirements:

<b>Fixture</b>	<b>Flow Requirement</b>
Water Closets (GPF)	1.6
Urinals (GPF)	1.0
Showerheads (GPM)*	2.5
Faucets (GPF)*	2.5
Replacement Aerators (gpm) *	2.5
Metering faucets (gal/cycle)	0.25

\* At flowing water pressure of 80 psi

**Credit 4.2** (1 point)      Exceed the potable water use reduction by an additional 10% (30% total efficiency increase).

**Technologies & Strategies**

Estimate the potable and non-potable water needs for the building. Use high efficiency fixtures, dry fixtures such as composting toilets and waterless urinals, and occupant sensors to reduce the potable water demand. Consider reuse of stormwater and graywater for non-potable applications such as toilet and urinal flushing, mechanical systems, and custodial uses.

# Energy & Atmosphere

SS	WE	EA	MR	EQ	ID
Prerequisite 1					

Prerequisite      **Fundamental Building Systems  
Commissioning**

---

Required

## Intent

Verify and ensure that fundamental building elements and systems are designed, installed and calibrated to operate as intended.

## Requirement

**Prerequisite 1.0**      Implement the following fundamental best practice commissioning procedures:

- Engage a commissioning authority
- Review design intent and basis of design documentation
- Include commissioning requirements in the construction documents
- Develop and utilize a commissioning plan
- Verify installation, functional performance, training and documentation
- Complete a commissioning report

## Technologies & Strategies

Engage a commissioning authority and adopt a commissioning plan. Include commissioning requirements in bid documents and task the commissioning agent to produce a commissioning report once commissioning activities are completed.

SS	WE	<b>EA</b>	MR	EQ	ID
<b>Prerequisite 2</b>					

Required

Prerequisite 2

**Minimum Energy Performance**

**Intent**

Establish the minimum level of energy efficiency for the base building and systems.

**Requirement**

**Prerequisite 2.0**

Design to meet building energy efficiency and performance as required by **ASHRAE 90.1 – 2004 / Final version of Energy Conservation Building Code (ECBC) 2006** or the local energy code, whichever is the more stringent.

**Technologies & Strategies**

Design the building envelope and building systems to maximize energy performance. Use a computer simulation model to assess the energy performance and identify the most cost effective energy efficiency measures. Quantify energy performance as compared to a baseline building.

SS	WE	<b>EA</b>	MR	EQ	ID
<b>Prerequisite 3</b>					

Prerequisite 3      **CFC Reduction in HVAC&R Equipment**

---

Required

**Intent**

Reduce ozone depletion.

**Requirement**

**Prerequisite 3.0**      **Zero use** of CFC-based refrigerants in new building HVAC&R base building systems. When reusing existing base building HVAC equipment, complete a comprehensive CFC phase-out conversion.

**Technologies & Strategies**

When reusing existing HVAC systems, conduct an inventory to identify equipment that uses CFC refrigerants and adopt a replacement schedule for these refrigerants. For new buildings, specify new HVAC equipment that uses no CFC refrigerants.

SS	WE	EA	MR	EQ	ID
<b>Credit 1</b>					

1-8 Points      Credit 1      **Optimize Energy Performance**

---

**Intent**

Achieve increasing levels of energy performance above the baseline in the prerequisite standard to reduce environmental impacts associated with excessive energy use.

**Requirements**

Reduce design energy cost compared to the energy cost budget for regulated energy components described in the requirements of **ASHRAE 90.1 – 2004 / Final version of Energy Conservation Building Code (ECBC) 2006**, as demonstrated by a whole building simulation using the Energy Cost Budget Method described in Section 11:

New Buildings	Existing Building Renovations	Points
10.5%	3.5%	1
14%	7%	2
17.5%	10.5%	3
21%	14%	4
24.5%	17.5%	5
28%	21%	6
31.5%	24.5%	7
35%	28%	8

**NOTE: LEED-India for Core and Shell projects are required to achieve at least two (2) points under EA1 to be eligible for this rating.**

Regulated energy components include HVAC systems, building envelope, service hot water systems, lighting and other regulated systems as defined by ASHRAE.

Credit 1.1 (1 points) Reduce design energy cost by 10.5% / 3.5%.

Credit 1.2 (2 points) Reduce design energy cost by 14% / 7%.

Credit 1.3 (3 points) Reduce design energy cost by 17.5% / 10.5%.

Credit 1.4 (4 points) Reduce design energy cost by 21% / 14%.

Credit 1.5 (5 points) Reduce design energy cost by 24.5% / 17.5%

Credit 1.6 (6 points) Reduce design energy cost by 28% / 21%.

Credit 1.7 (7 points) Reduce design energy cost by 31.5% / 24.5%.

Credit 1.8 (8 points) Reduce design energy cost by 35% / 28%.

## **Technologies & Strategies**

Design the building envelope and building systems to maximize energy performance. Use a computer simulation model to assess the energy performance and identify the most cost effective energy efficiency measures. Quantify energy performance as compared to a baseline building.

SS	WE	<b>EA</b>	MR	EQ	ID
<b>Credit 2</b>					

**Credit 2      Renewable Energy**

---

1 Point

**Intent**

Encourage and recognize increasing levels of self-supply through renewable technologies to reduce environmental impacts associated with fossil fuel energy use.

**Requirements**

Supply a net fraction of the building's total energy use (as expressed as a fraction of annual energy cost) through the use of on-site renewable energy systems.

<b>%, Total Energy Load Cost in Renewable</b>	<b>Points</b>
1%	1

**Credit 2** (1 point)      Renewable energy, 1% contribution

**Technologies & Strategies**

Assess the project for renewable energy potential including solar, wind, geothermal, biomass, hydro, and bio-gas strategies. When applying these strategies, take advantage of net metering with the local utility.

SS	WE	EA	MR	EQ	ID
<b>Credit 3</b>					

1 Point

### Credit 3 **Additional Commissioning**

---

#### **Intent**

Verify and ensure that the entire building is designed, constructed, and calibrated to operate as intended.

#### **Requirement**

- Credit 3.0** (1 point) In addition to the Fundamental Building Commissioning prerequisite, implement the following additional commissioning tasks:
1. Conduct a focused review of the design prior to the construction documents phase.
  2. Conduct a focused review of the Construction Documents when close to completion.
  3. Conduct a selective review of contractor submittals of commissioned equipment. (The above three reviews must be performed by a firm other than the designer.)
  4. Develop a recommissioning management manual
  5. Have a contract in place for a near-warranty end or post occupancy review

#### **Technologies & Strategies**

Engage the Commissioning Authority early in project design phases. Task the commissioning agent to conduct project reviews before and after construction documents are complete. The Commissioning Agent must also create a recommissioning manual for the building and review the project at near-warranty end.

SS	WE	EA	MR	EQ	ID
<b>Credit 4</b>					

## Ozone Depletion

1 Point

### Intent

Reduce ozone depletion and support early compliance with the Montreal Protocol.

### Requirement

**Credit 4.0** (1 point)      Install base building level HVAC and refrigeration equipment and fire suppression systems that do not contain HCFC's or Halon.

### Technologies & Strategies

When reusing buildings, inventory existing building systems using refrigerants and fire suppression chemicals and replace those that contain HCFCs or halons. For new buildings, specify refrigeration and fire suppression systems that use no HCFCs or halons.

SS	WE	<b>EA</b>	MR	EQ	ID
<b>Credit 5.1</b>					

1 Point

## Measurement & Verification-Base Building

---

### Intent

Provide for the ongoing accountability and optimization of building energy and water consumption performance over time.

### Requirement

**Credit 5.1** (1 point) Comply with the long term continuous measurement of performance as stated in Option B: Methods by Technology of the International Performance Measurement and Verification Protocol (IPMVP) for the following:

- Lighting systems and controls
- Constant and variable motor loads
- Variable frequency drive (VFD) operation -Chiller efficiency at variable loads (kW / ton) -Cooling load
- Air and water economizer and heat recovery cycles
- Air distribution static pressures and ventilation air volumes - Boiler efficiencies
- Building specific process energy efficiency systems and equipment
- Indoor water risers and outdoor irrigation systems

### Technologies & Strategies

Model the energy and water systems to predict savings. Design the building with equipment to measure energy and water performance. Draft a Measurement & Verification Plan to apply during building operation that compares predicted savings to those actually achieved in the field.

SS	WE	<b>EA</b>	MR	EQ	ID
<b>Credit 5.2</b>					

## Credit 5.2 **Measurement & Verification-Tenant Sub-metering**

---

1 Point

### **Intent**

Provide for ongoing accountability of building electricity consumption performance

### **Requirement**

- **Credit 5.2** (1 point)

Include a centrally monitored electronic metering network in the base building design that is capable of being expanded to accommodate the future tenant sub-metering as required by LEED for Commercial Interiors Rating System.

Develop a tenant M&V Plan that documents and advises future tenants of this opportunity and the means of their achievement.

### **Technologies & Strategies**

Estimate the energy needs of the building on annual basis. Install green power plants in the country, which meets the 100% of the total energy requirement of the building. Green power is derived from solar, wind, geothermal, biomass, or low-impact hydro sources.

SS	WE	EA	MR	EQ	ID
<b>Credit 6</b>					

Credit 6      **Green Power**

---

1 Point

**Intent**

Encourage investments in off-site renewable energy technologies to be exported to the grid.

**Requirement**

- **Credit 6.0** (1 point)      Demonstrate that the company has installed green power equivalent to 50% of the total energy requirement of the building, anywhere in the country. **This investment should come because of the rated building and should be 50 % of the building consumption. Green power so generated should be counted only once.**

**Technologies & Strategies**

Estimate the energy needs of the building on annual basis. Install green power plants in the country, which meets the 100% of the total energy requirement of the building. Green power is derived from solar, wind, geothermal, biomass, or low-impact hydro sources.

SS	WE	EA	MR	EQ	ID
Prerequisite 1					

# Materials & Resources

Required

Prerequisite 1

**Storage & Collection of Recyclables**

---

## Intent

Facilitate the reduction of waste generated by building occupants that is hauled to and disposed of in landfills.

## Requirement

### Prerequisite 1.0

Provide an easily accessible area that serves the entire building and is dedicated to the separation, collection and storage of materials for recycling including (at a minimum) paper, cardboard, glass, plastics, and metals.

## Technologies & Strategies

Designate an area for recyclable collection and storage that is appropriately sized and located in a convenient area. Identify local waste handlers and buyers for glass, plastic, office paper, newspaper, cardboard, and organic wastes. Instruct occupants on building recycling procedures. Consider employing cardboard balers, aluminum can crushers, recycling chutes, and other waste management technologies to further enhance the recycling program.

SS	WE	EA	MR	EQ	ID
<b>Credit 1</b>					

Credit 1      **Building Reuse**

---

1 - 3 Points

**Intent**

Extend the life cycle of existing building stock, conserve resources, retain cultural resources, reduce waste, and reduce environmental impacts of new buildings as they relate to materials manufacturing and transport.

**Requirement**

Reuse large portions of existing structures during renovation or redevelopment projects:

- Credit 1.1** (1 point)      Maintain at least **75%** of existing building structure and shell (exterior skin and framing excluding window assemblies).
- Credit 1.2** (1 point)      Maintain an additional **25% (100% total)** of existing building structure and shell (exterior skin and framing excluding window assemblies).
- Credit 1.3** (1 point)      Maintain **100%** of existing building structure and **50%** non-shell (walls, floor coverings, and ceiling systems).

**Technologies & Strategies**

Consider reuse of existing buildings, including structure, shell, and non-shell elements. Remove elements that pose contamination risk to building occupants and upgrade outdated components such as windows, mechanical systems, and plumbing fixtures. Quantify the extent of building reuse.

SS	WE	EA	MR	EQ	ID
<b>Credit 2</b>					

1 - 2 Points

Credit 2 **Construction Waste Management**

---

**Intent**

Divert construction, demolition, and land clearing debris from landfill disposal Redirect recyclable material back to the manufacturing process.

**Requirements**

Develop and implement a waste management plan, quantifying material diversion by weight. (Remember that salvage may include the donation of materials to charitable organizations such as Habitat for Humanity.)

**Credit 2.1** (1 point)      Recycle and / or salvage at least **50%** (by weight) of construction, demolition, and land clearing waste

**Credit 2.2** (1 point)      Recycle and / or salvage an additional **25%** (**75%** total by weight) of the construction, demolition, and land clearing debris

**Technologies & Strategies**

Establish goals for landfill diversion and adopt a construction waste management plan to achieve these goals. Consider recycling land clearing debris, cardboard, metals, brick, concrete, plastic, clean wood, glass, gypsum wallboard, carpet, and insulation. Designate a specific area on the construction site for recycling and track recycling efforts throughout the construction process. Identify construction haulers and recyclers to handle the designated materials.

SS	WE	EA	MR	EQ	ID
<b>Credit 3</b>					

Credit 3      **Resource Reuse**

---

1 Point

**Intent**

Extend the life cycle of targeted building materials by reducing environmental impacts related to materials manufacturing and transport.

**Requirements**

**Credit 3** (1 point)      Specify salvaged or refurbished materials for 1% of building materials

**Technologies & Strategies**

Identify opportunities to incorporate salvage materials into the building design and research potential material suppliers. Consider salvage materials such as beams and posts, flooring, paneling, doors and frames, cabinetry and furniture, brick, and decorative items.

SS	WE	EA	MR	EQ	ID
<b>Credit 4</b>					

1 - 2 Points

Credit 4 **Recycled Content**

---

**Intent**

Increase demand for building products that have incorporated recycled content materials, therefore reducing the impacts resulting from the extraction of new materials.

**Requirements**

**Credit 4.1** (1 point) Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the post-industrial content constitutes at least 5% of the total value of the materials in the project.

**Credit 4.2** (1 point) Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the post-industrial content constitutes at least 10% of the total value of the materials in the project.

The value of the recycled content portion of a material or furnishing shall be determined by dividing the weight of recycled content in the item by the total weight of all material in the item, then multiplying the resulting percentage by the total value of the item. Mechanical and electrical components shall not be including in this calculation.

**Technologies & Strategies**

Establish a project goal for recycled content materials and identify materials and material suppliers that can achieve this goal. During construction, ensure that the specified recycled content materials are installed and quantify the total percentage of recycled content materials installed.

SS	WE	EA	MR	EQ	ID
<b>Credit 5</b>					

Credit 5      **Local / Regional Materials**

---

1 - 2 Points

**Intent**

Increase demand for building products that are manufactured locally, thereby reducing the environmental impacts resulting from their transportation and supporting the local economy.

**Requirements**

**Credit 5.1** (1 point)      Specify a minimum of 20% of building materials that are manufactured\* regionally within a radius of 800 Kms.

**Credit 5.2** (1 point)      Of these regionally manufactured materials, specify a minimum of 50% that are extracted, harvested, or recovered within 800 Kms.

\* Manufacturing refers to the *final assembly* of components into the building product that is furnished and installed by the tradesmen. For example, if the hardware comes from Chennai, the lumber from Mumbai and the joist is assembled in Delhi, then the location of the *final assembly* is Delhi.

**Technologies & Strategies**

Establish a project goal for locally sourced materials and identify materials and material suppliers that can achieve this goal. During construction, ensure that the specified local materials are installed and quantify the total percentage of local materials installed.

SS	WE	EA	MR	EQ	ID
<b>Credit 6</b>					

Credit 6      **Certified Wood**

---

1 Point

**Intent**

Encourage environmentally responsible forest management.

**Requirement**

**Credit 7.0** (1 point)      Use a minimum of 50% of wood-based materials certified in accordance with the Forest Stewardship Council Guidelines for wood building components including but not limited to structural framing and general dimensional framing, flooring, finishes, furnishings, and non-rented temporary construction applications such as bracing, concrete form work and pedestrian barriers.

**Technologies & Strategies**

Establish a project goal for FSC-certified wood products and identify products and suppliers that can achieve this goal. During construction, ensure that the FSC-certified wood products are installed and quantify the total percentage of FSC-certified wood products installed.

# Indoor Environmental Quality

SS	WE	EA	MR	<b>EQ</b>	ID
Prerequisite 1					

**EQ Prerequisite 1: Minimum IAQ Performance**

Required

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## **Intent**

Establish minimum indoor air quality (IAQ) performance to enhance indoor air quality in buildings, thus contributing to the comfort and well-being of the occupants.

## **Requirements**

Meet the minimum requirements of Sections 4 through 7 of ASHRAE 62.1-2004, Ventilation for Acceptable Indoor Air Quality. Mechanical ventilation systems shall be designed using the Ventilation Rate Procedure or the applicable local code, whichever is more stringent. Naturally ventilated buildings shall comply with ASHRAE 62.1-2004, paragraph 5.1.

## **Potential Technologies & Strategies**

Design ventilation systems to meet or exceed the minimum outdoor air ventilation rates as described in the ASHRAE standard. Balance the impacts of ventilation rates on energy use and indoor air quality to optimize for energy efficiency and occupant health. Use the ASHRAE 62 Users Manual for detailed guidance on meeting the referenced requirements.

SS	WE	EA	MR	<b>EQ</b>	ID
<b>Prerequisite 2</b>					

Required

**EQ Prerequisite2: Environmental Tobacco Smoke (ETS) Control**

---

**Intent**

Minimize exposure of building occupants, indoor surfaces, and ventilation air distribution systems to Environmental Tobacco Smoke (ETS).

**Requirements**

OPTION 1

- ❖ Prohibit smoking in the building.
- ❖ Locate any exterior designated smoking areas at least 25 feet away from entries, outdoor air intakes and operable windows.

**OR**

OPTION 2

- ❖ Prohibit smoking in the building except in designated smoking areas.
- ❖ Locate any exterior designated smoking areas at least 25 feet away from entries, outdoor air intakes and operable windows.
- ❖ Locate designated smoking rooms to effectively contain, capture and remove ETS from the building. At a minimum, the smoking room must be directly exhausted to the outdoors with no recirculation of ETS-containing air to the non-smoking area of the building, and enclosed with impermeable deck-to-deck partitions. With the doors to the smoking room closed, operate exhaust sufficient to create a negative pressure with respect to the adjacent spaces of at least an average of 5 Pa (0.02 inches of water gauge) and with a minimum of 1 Pa (0.004 inches of water gauge).
- ❖ Performance of the smoking room differential air pressures shall be verified by conducting 15 minutes of measurement, with a minimum of one measurement every 10 seconds, of the differential pressure in the smoking room with respect to each adjacent area and in each adjacent vertical chase with the doors to the smoking room closed. The testing will be conducted with each space configured for worst case conditions of transport of air from the smoking rooms to adjacent spaces with the smoking rooms' doors closed to the adjacent spaces.

**OR**

OPTION 3 (For residential buildings only)

- ❖ Prohibit smoking in all common areas of the building.
- ❖ Locate any exterior designated smoking areas at least 25 feet away from entries, outdoor air intakes and operable windows opening to common areas.
- ❖ Minimize uncontrolled pathways for ETS transfer between individual residential units by sealing penetrations in walls, ceilings and floors in the residential units, and by sealing vertical chases adjacent to the units.

- ❖ All doors in the residential units leading to common hallways shall be weather-stripped to minimize air leakage into the hallway.

If the common hallways are pressurized with respect to the residential units then doors in the residential units leading to the common hallways need not be weather-stripped provided that the positive differential pressure is demonstrated as in Option 2 above, considering the residential unit as the smoking room. Acceptable sealing of residential units shall be demonstrated by a blower door test conducted in accordance with ANSI/ASTM-E779-03, Standard Test Method for Determining Air Leakage Rate by Fan Pressurization, Residential units must demonstrate less than 1.25 square inches leakage area per 100 square feet of enclosure area (i.e. sum of all wall, ceiling and floor areas) AND use the progressive sampling methodology defined in Chapter 4 (Compliance Through Quality Construction) of the Residential Manual for Compliance with California's 2001 Energy Efficiency Standards([www.energy.ca.gov/title24/residential\\_manual](http://www.energy.ca.gov/title24/residential_manual)).

### **Potential Technologies & Strategies**

Prohibit smoking in commercial buildings or effectively control the ventilation air in smoking rooms. For residential buildings, prohibit smoking in common areas, design building envelope and systems to minimize ETS transfer among dwelling units.

SS	WE	EA	MR	EQ	ID
Credit 1					

### Credit 1: Outdoor Air Delivery Monitoring

1 Point

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#### Intent

Provide capacity for ventilation system monitoring to help sustain occupant comfort and well-being.

#### Requirement

Install permanent monitoring systems that provide feedback on ventilation system performance to ensure that ventilation systems maintain design minimum ventilation requirements. Configure all monitoring equipment to generate an alarm when the conditions vary by 10% or more from set point, via either a building automation system alarm to the building operator or via a visual or audible alert to the building occupants.

#### FOR MECHANICALLY VENTILATED SPACES

- ❖ Monitor carbon dioxide concentrations within all densely occupied spaces (those with a design occupant density greater than or equal to 25 people per 1000 sq.ft.). CO2 monitoring locations shall be between 3 feet and 6 feet above the floor.
- ❖ For each mechanical ventilation system serving non-densely occupied spaces, provide a direct outdoor airflow measurement device capable of measuring the minimum outdoor airflow rate with an accuracy of plus or minus 15% of the design minimum outdoor air rate, as defined by ASHRAE 62.1-2004.

#### FOR NATURALLY VENTILATED SPACES

Monitor CO2 concentrations within all naturally ventilated spaces. CO2 monitoring shall be located within the room between 3 feet and 6 feet above the floor. One CO2 sensor may be used to represent multiple spaces if the natural ventilation design uses passive stack(s) or other means to induce airflow through those spaces equally and simultaneously without intervention by building occupants.

#### Potential Technologies & Strategies

Install carbon dioxide and airflow measurement equipment and feed the information to the HVAC system and/or Building Automation System (BAS) to trigger corrective action, if applicable. If such automatic controls are not feasible with the building systems, use the measurement equipment to trigger alarms that inform building operators or occupants of a possible deficiency in outdoor air delivery.

SS	WE	EA	MR	<b>EQ</b>	ID
<b>Credit 2</b>					

1 Point

## EQ Credit 2: Increased Ventilation

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### Intent

Provide additional outdoor air ventilation to improve indoor air quality for improved occupant comfort, well-being and productivity.

### Requirement

#### FOR MECHANICALLY VENTILATED SPACES

- ❖ Increase breathing zone outdoor air ventilation rates to all occupied spaces by at least 30% above the minimum rates required by ASHRAE Standard 62.1-2004 as determined by EQ Prerequisite 1.

#### OR

#### FOR NATURALLY VENTILATED SPACES

Design natural ventilation systems for occupied spaces to meet the recommendations set forth in the Carbon Trust “Good Practice Guide 237” [1998]. Determine that natural ventilation is an effective strategy for the project by following the flow diagram process shown in Figure 1.18 of the Chartered Institution of Building Services Engineers (CIBSE) Applications Manual 10: 2005, Natural ventilation in non-domestic buildings.

#### AND

- ❖ Use diagrams and calculations to show that the design of the natural ventilation systems meets the recommendations set forth in the CIBSE Applications Manual 10: 2005, Natural ventilation in non-domestic buildings.

#### OR

- ❖ Use a macroscopic, multi-zone, analytic model to predict that room-by-room airflows will effectively naturally ventilate, defined as providing the minimum ventilation rates required by ASHRAE 62.1-2004 Chapter 6, for at least 90% of occupied spaces.

### Potential Technologies & Strategies

For Mechanically ventilated Spaces: Use heat recovery, where appropriate, to minimize the additional energy consumption associated with higher ventilation rates.

For Naturally ventilated Spaces: Follow the eight design steps described in the Carbon Trust Good Practice Guide 237 – 1) Develop design requirements, 2) Plan airflow paths, 3) Identify building uses and features that might require special attention, 4) Determine ventilation requirements, 5) Estimate external driving pressures, 6) Select types of ventilation devices, 7) Size ventilation devices, 8) Analyze the design. Use public domain software such as NIST’s CONTAM, Multizone Modeling Software, along with LoopDA, Natural Ventilation Sizing Tool, to analytically predict room-by-room airflows.

SS	WE	EA	MR	EQ	ID
<b>Credit 3</b>					

1 Point

Credit 3 **Construction IAQ Management Plan**

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**Intent**

Prevent indoor air quality problems resulting from the construction/renovation process, to sustain long-term installer and occupant health and comfort.

**Requirements**

Develop and implement an Indoor Air Quality (IAQ) Management Plan for the construction and preoccupancy phases of the building as follows:

**Credit 3** (1 point) During construction meet or exceed the minimum requirements of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guideline for Occupied Buildings under Construction, 1995, AND protect stored on-site or installed absorptive materials from moisture damage, AND replace all filtration media immediately prior to occupancy. Filtration media shall have a Minimum Efficiency Reporting Value (MERV) of 13 as determined by ASHRAE 52.2-1999.

**Technologies & Strategies**

Adopt an IAQ management plan to protect the HVAC system during construction, control pollutant sources, and interrupt pathways for contamination. Sequence installation of materials to avoid contamination of absorptive materials such as insulation, carpeting, ceiling tile, and gypsum wallboard. Prior to occupancy, perform a two week building flush out or test the contaminant levels in the building.



**Credit 4.3** (1 point) Carpet systems must meet or exceed the Carpet and Rug Institute Green Label Indoor Air Quality Test Program.

**Credit 4.4** (1 point) Composite wood and agrifiber products must contain no added urea-formaldehyde resins.

### **Technologies & Strategies**

Specify low-VOC materials in construction documents. Ensure that VOC limits are clearly stated in each section where adhesives, sealants, paints, coatings, carpet systems, and composite woods are addressed.

SS	WE	EA	MR	EQ	ID
Credit 5					

## Credit 5: Indoor Chemical & Pollutant Source Control

1 Point

### Intent

Minimize exposure of building occupants to potentially hazardous particulates and chemical pollutants.

### Requirement

Design to minimize and control pollutant entry into buildings and later cross-contamination of regularly occupied areas:

- ❖ Employ permanent entryway systems at least six feet long in the primary direction of travel to capture dirt and particulates from entering the building at all entryways that are directly connected to the outdoors. Acceptable entryway systems include permanently installed grates, grilles, or slotted systems that allow for cleaning underneath. Roll-out mats are only acceptable when maintained on a weekly basis by a contracted service organization. Qualifying entryways are those that serve as regular entry points for building users.
- ❖ Where hazardous gases or chemicals may be present or used (including garages, housekeeping/laundry areas and copying/printing rooms), exhaust each space sufficiently to create negative pressure with respect to adjacent spaces with the doors to the room closed. For each of these spaces, provide self-closing doors and deck to deck partitions or a hard lid ceiling. The exhaust rate shall be at least 0.50 cfm/sq.ft, with no air re-circulation. The pressure differential with the surrounding spaces shall be at least 5 Pa (0.02 inches of water gauge) on average and 1 Pa (0.004 inches of water) at a minimum when the doors to the rooms are closed.
- ❖ In mechanically ventilated buildings, provide regularly occupied areas of the building with air filtration media prior to occupancy that provides a Minimum Efficiency Reporting Value (MERV) of 13 or better. Filtration should be applied to process both return and outside air that is to be delivered as supply air.

### Potential Technologies & Strategies

Design facility cleaning and maintenance areas with isolated exhaust systems for contaminants. Maintain physical isolation from the rest of the regularly occupied areas of the building. Install permanent architectural entryway systems such as grills or grates to prevent occupant-borne contaminants from entering the building. Install high-level filtration systems in air handling units processing both return air and outside supply air. Ensure that air handling units can accommodate required filter sizes and pressure drops.

SS	WE	EA	MR	EQ	ID
<b>Credit 6</b>					

**Credit 6**

**Controllability of Systems – Thermal comfort**

1 Point

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**Intent**

Provide a high level of thermal comfort control by individual occupants or by specific groups in multi-occupant spaces to promote the productivity, comfort and well-being of building occupants.

**Requirements**

**Credit 6** (1 point)      Provide individual comfort controls for 50% of the building occupants to enable adjustments to suit individual task needs and preferences.  
AND  
Provide comfort system controls for all shared multi-occupant spaces to enable adjustments to suit group needs and preferences.

**Technologies & Strategies**

Design the building with occupant controls for airflow, temperature, and lighting. Strategies to consider include task lighting, operable windows, and under floor HVAC systems with individual diffusers.

SS	WE	EA	MR	EQ	ID
<b>Credit 7</b>					

1 point

### EQ Credit 7: Thermal Comfort: Design

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#### **Intent**

Provide a comfortable thermal environment that supports the productivity and well-being of building occupants.

#### **Requirement**

Design HVAC systems and the building envelope to meet the requirements of ASHRAE Standard 55-2004, Thermal Comfort Conditions for Human Occupancy. Demonstrate design compliance in accordance with the Section 6.1.1 Documentation.

#### **Potential Technologies & Strategies**

Establish comfort criteria per ASHRAE Standard 55-2004 that support the desired quality and occupant satisfaction with building performance. Design building envelope and systems with the capability to deliver performance to the comfort criteria under expected environmental and use conditions. Evaluate air temperature, radiant temperature, air speed, and relative humidity in an integrated fashion and coordinate these criteria with EQ Prerequisite 1, EQ Credit 1, and EQ Credit 2.

SS	WE	EA	MR	EQ	ID
<b>Credit 8</b>					

**Credit 8      Daylight & Views**

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1 - 2 Points

**Intent**

Provide a connection between indoor spaces and outdoor environments through the introduction of sunlight and views into the occupied areas of the building.

**Requirement & Submittals**

**Credit 8.1** (1 point)      Achieve a minimum Daylight Factor of 2% (excluding all direct sunlight penetration) in 75% of all space occupied for critical visual tasks, not including copy rooms, storage areas, mechanical, laundry, and other low occupancy support areas. Exceptions include those spaces where tasks would be hindered by the use of daylight or where accomplishing the specific tasks within a space would be enhanced by the direct penetration of sunlight.

**Credit 8.2** (1 point)      Direct line of sight to vision glazing from 90% of all regularly occupied spaces, not including copy rooms, storage areas, mechanical, laundry, and other low occupancy support areas.

**Technologies & Strategies**

Design the building to maximize day-lighting and view opportunities. Strategies to consider include building orientation, shallow no or plates, increased building perimeter, exterior and interior shading devices, high performance glazing, and photo-integrated light sensors. Model day-lighting strategies with a physical or computer model to assess footcandle levels and daylight factors achieved.

SS	WE	EA	MR	EQ	ID
Credit 1					

1 - 4 Points

# Innovation & Design Process

## Credit 1 Innovation in Design

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### Intent

To provide design teams and projects the opportunity to be awarded points for exceptional performance above requirements set by the LEED – India Green Building Rating System™ and/or innovative performance in Green Building categories not specifically addressed by the LEED - India Green Building Rating System™

### Requirements

**Credit 1.1** (1 point) In writing, using the LEED™ Credit Equivalence process, identify the intent of the proposed innovation credit, the proposed requirement for compliance, the proposed submittals to demonstrate compliance, and the design approach used to meet the required elements.

**Credit 1.2** (1 point) Same as Credit 1.1.

**Credit 1.3** (1 point) Same as Credit 1.1.

**Credit 1.4** (1 point) Same as Credit 1.1.

### Technologies & Strategies

Substantially exceed a LEED™ performance credit such as energy performance or water efficiency. Apply strategies or measures that are not covered by LEED™ such as acoustic performance, education of occupants, community development, or lifecycle analysis of material choices.

SS	WE	EA	MR	EQ	ID
Credit 2					

Credit 2      **LEED™ Accredited Professional**

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1 Point

**Intent**

To support and encourage the design integration required by a LEED™ Green Building project and to streamline the application and certification process.

**Requirements**

**Credit 2.0** (1 point)      At least one principal participant of the project team that has successfully completed the LEED™ Accredited Professional exam.

**Technologies & Strategies**

Attend a LEED™ Accredited Professional Training Workshop and successfully pass the LEED™ accreditation exam.



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