



Green Building Rating System

Abridged Reference Guide

**For New Construction &
Major Renovations**

(LEED – NC)

Version 1.0

Including the
Project Checklist

indian green building council

January 2007

Project Checklist

Sustainable Sites

13 Possible Points

Prerequisite	Erosion & Sedimentation Control	Required
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

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 2.1	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

17 Possible Points

Prerequisite 1	Fundamental Building Systems Commissioning	Required
Prerequisite 2	Minimum Energy Performance	Required
Prerequisite 3	CFC Reduction in HVAC&R Equipment	Required
Credit 1.1	Optimize Energy Performance, 20% New / 10% Existing	2
Credit 1.2	Optimize Energy Performance, 30% New / 20% Existing	2
Credit 1.3	Optimize Energy Performance, 40% New / 30% Existing	2
Credit 1.4	Optimize Energy Performance, 50% New / 40% Existing	2
Credit 1.5	Optimize Energy Performance, 60% New / 50% Existing	2
Credit 2.1	Renewable Energy, 2.5%	1
Credit 2.2	Renewable Energy, 5%	1
Credit 2.3	Renewable Energy, 7.5%	1
Credit 3	Additional Commissioning	1
Credit 4	Ozone Depletion	1
Credit 5	Measurement & Verification	1
Credit 6	Green Power, 50%	1

Materials & Resources

13 Possible Points

Prerequisite 1 Storage & Collection of Recyclables		Required
Credit 1	Building Reuse	3
Credit 2	Construction Waste Management	2
Credit 3	Resource Reuse	2
Credit 4	Recycled Content	2
Credit 5	Local/Regional Materials	2
Credit 6	Rapidly Renewable Materials	1
Credit 7	Certified Wood	1

Indoor Environmental Quality

15 Possible Points

Prerequisite 1 Minimum IAQ Performance		Required
Prerequisite 2 Environmental Tobacco Smoke (ETS) Control		Required
Credit 1	Outdoor Air Delivery Monitoring	1
Credit 2	Increased Ventilation	1
Credit 3	Construction IAQ Management Plan	2
Credit 4	Low-Emitting Materials	4
Credit 5	Indoor Chemical & Pollutant Source Control	1
Credit 6	Controllability of System	2
Credit 7	Thermal Comfort	2
Credit 8	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	26 – 32
LEED – Silver	33 – 38
LEED – Gold	39 – 51
LEED – Platinum	52 – 69



LEED INDIA NC

FOR NEW CONSTRUCTION

REFERENCE GUIDE

Version 1.0

First Edition January 2007

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Indian Green Building Council

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Acknowledgements

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Foreword from Indian Green Building Council

Introduction

Why Make your Building Green?
LEED Green Building Rating System
LEED India NC Overview and Process
LEED India NC Overview and Process

Sustainable Sites

SS Prerequisite 1	Erosion & Sedimentation Control
SS Credit 1	Site Selection
SS Credit 2	Development Density & Community Connectivity
SS Credit 3	Brownfield Redevelopment
SS Credit 4.1	Alternative Transportation, Public Transportation Access
SS Credit 4.2	Alternative Transportation, Low Emission & Alternative Fuel Refueling Stations
SS Credit 4.3	Alternative Transportation, Parking Capacity
SS Credit 5.1	Reduced Site Disturbance, Protect or Restore Habitat
SS Credit 5.2	Reduced Site Disturbance, Development Footprint
SS Credit 6.1	Stormwater Design, Quantity Control
SS Credit 6.2	Stormwater Design, Quality Control
SS Credit 7.1	Heat Island Effect: Non – Roof
SS Credit 7.2	Heat Island Effect: Roof
SS Credit 8	Light Pollution Reduction

Water Efficiency

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

Energy & Atmosphere

EA Prerequisite 1	Fundamental Building Systems Commissioning
EA Prerequisite 2	Minimum Energy Performance
EA Prerequisite 3	CFC Reduction in HVAC&R Equipment
EA Credit 1	Optimize Energy Performance
EA Credit 2.1	Renewable Energy: 2.5%
EA Credit 2.2	Renewable Energy: 5%
EA Credit 2.3	Renewable Energy: 7.5%
EA Credit 3	Additional Commissioning
EA Credit 4	Ozone Depletion
EA Credit 5	Measurement & Verification
EA Credit 6	Green Power

Material & Resources

MR Prerequisite 1	Storage & Collection of Recyclables
MR Credit 1.1	Building Reuse: Maintain 75% of Existing Walls, Floors and Roof
MR Credit 1.2	Building Reuse: Maintain 100% of Existing Walls, Floors and Roof
MR Credit 1.3	Building Reuse: Maintain 100% of Shell + 50% of Non-Shell
MR Credit 2.1	Construction Waste Management, Divert 50% from Disposal
MR Credit 2.2	Construction Waste Management, Divert 75% from Disposal
MR Credit 3.1	Resource Reuse: 5%
MR Credit 3.2	Resource Reuse: 10%
MR Credit 4.1	Recycled Content: 5% (post-consumer + 1/2 post-industrial)
MR Credit 4.2	Recycled Content: 10% (post-consumer + 1/2 post-industrial)
MR Credit 5.1	Regional Materials: 20% Manufactured Regionally
MR Credit 5.2	Regional Materials: 50% Extracted Regionally
MR Credit 6	Rapidly Renewable Materials, 5% of Building Materials
MR Credit 7	Certified Wood, 50% of wood based materials

Indoor Environmental Quality

EQ Prerequisite 1	Minimum IAQ Performance
EQ Prerequisite 2	Environmental Tobacco Smoke (ETS) Control
EQ Credit 1	Outdoor Air Delivery Monitoring
EQ Credit 2	Increased Ventilation, 30% above ASHRAE 62.1 requirements
EQ Credit 3.1	Construction IAQ Management Plan (During Construction)
EQ Credit 3.2	Construction IAQ Management Plan (Before Occupancy)
EQ Credit 4.1	Low- Emitting Materials, Adhesive & Sealants
EQ Credit 4.2	Low- Emitting Materials, Paints
EQ Credit 4.3	Low- Emitting Materials, Carpet

EQ Credit 4.4	Low- Emitting Materials, Composite Wood & Agrifiber products
EQ Credit 5	Indoor Chemical & Pollutant Source Control
EQ Credit 6.1	Controllability of Systems, Lighting
EQ Credit 6.2	Controllability of Systems, Thermal Comfort
EQ Credit 7.1	Thermal Comfort, Design
EQ Credit 7.2	Thermal Comfort, Verification
EQ Credit 8.1	Daylight and Views, Daylight 75% of Spaces
EQ Credit 8.2	Views, Views for 90% of Spaces

Innovation in Design

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

Glossary of Terms

LEED India NC Project Check list

		Points Available
Sustainable Sites (max 13 points)		
Prerequisite	Erosion & Sedimentation Control	
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, Low Emission & Alternative Fuel Refueling Stations	1
Credit 4.3	Alternative Transportation, Parking Capacity	1
Credit 5.1	Reduce Site Disturbance: Protect or Restore Habitat	1
Credit 5.2	Reduce 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 Islands Effect: nonroof	1
Credit 7.2	Heat Islands Effect: roof	1
Credit 8.0	Light pollution reduction	1
		13
Water Efficiency (max 6 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 2.0	Water Efficiency in Air conditioning System: Reduce by 50%	1
Credit 3.0	Innovative wastewater technologies	1
Credit 4.1	Water use reduction, 20% reduction	1
Credit 4.2	Water use reduction, 30% reduction	1
		6

Energy & Atmosphere (max 17 points)

Prerequisite 1	Fundamental Building systems commissioning	Required
Prerequisite 2	Minimum Energy Performance	Required
Prerequisite 3	Fundamental Refrigerant Management	Required
Credit 1	Optimise energy performance	10
Credit 2	Onsite Renewable Energy, 2.5%, 5%, 7.5%	3
Credit 3.0	Additional Commissioning	1
Credit 4.0	Ozone Depletion	1
Credit 5.0	Measurement & Verification	1
Credit 6.0	Green Power, 50%	1
		17

Materials & Resources (max 13 points)

Prerequisite 1	Storage and collection of recyclables	Required
Credit 1.1	Building reuse, maintain 75% of existing walls, floors and roof	1
Credit 1.2	Building reuse, maintain 100% of existing walls, floors and roof	1
Credit 1.3	Building reuse, maintain 100% shell + 50% non shell	1
Credit 2.1	Construction waste management, Divert 50% from disposal	1
Credit 2.2	Construction waste management, Divert 75% from disposal	1
Credit 3.1	Resource Reuse, 5%	1
Credit 3.2	Resource Reuse, 10%	1
Credit 4.1	Recycled Content, 5%	1
Credit 4.2	Recycled content, 10%	1
Credit 5.1	Regional Materials, 20%	1
Credit 5.2	Regional Materials, 50%	1
Credit 6.0	Rapidly renewable materials, 5% of Building Materials	1
Credit 7.0	Certified wood, 50% of wood based materials	1
		13

Indoor Environmental Quality (max 15points)		
Prerequisite 1	Minimum IAQ performance	Required
Prerequisite 2	Environmental Tobacco Smoke Control	Required
Credit 1	Outdoor Air Delivery Monitoring	1
Credit 2	Increased Ventilation, 30% above ASHRAE 62.1 requirements	1
Credit 3.1	Construction IAQ management plan, during construction	1
Credit 3.2	Construction IAQ management plan, before occupancy	1
Credit 4.1	Low emitting materials, adhesives & sealants	1
Credit 4.2	Low emitting materials, Paints	1
Credit 4.3	Low emitting materials, carpet	1
Credit 4.4	Low emitting materials, Composite wood & Agrifiber products	1
Credit 5.0	Indoor chemical & pollutant source control	1
Credit 6.1	Controllability of Systems, Lighting	1
Credit 6.2	Controllability of systems, Thermal comfort	1
Credit 7.1	Thermal comfort, Design	1
Credit 7.2	Thermal comfort, Verification - 6 to 18 months	1
Credit 8.1	Daylight, daylight 75% of spaces	1
Credit 8.2	Views, Views for 90% of spaces	1
		15
Innovation & Design process (max 5 points)		
Credit 1.1	Innovation in design (green education)	1
Credit 1.2	Innovation in design (eco friendly HK)	1
Credit 1.3	Innovation in design (exempl performance - water efficiency)	1
Credit 1.4	Innovation in design (Local materials/recycled materials)	1
Credit 2	LEED accredited professionals	1
		5
	Total Maximum Points	69
	Fee to USGBC	
Certified 26-32 points, Silver 33-38 points, Gold 39-51 points, Platinum 52-69 points		

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.

Contact :

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Hyderabad – 500 032

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.

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

III. LEED India NC Overview and Process

The LEED India Green Building Rating System for New Commercial Construction and Major Renovation (LEED India NC) provides a set of performance standards for certifying the design and construction phases of commercial, institutional buildings and high-rise residential buildings. The specific credits in the rating system provide guidelines for the design and construction of buildings of all sizes in both the public and private sectors. The intent of LEED India NC is to assist in the creation of high performance, healthful, durable, affordable and environmentally sound commercial and institutional buildings.

LEED India NC addresses :

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

A. When to use LEED India NC

LEED India NC is designed primarily for new commercial office buildings, but it can be applied to many other building types by LEED practitioners. All commercial buildings, as defined by standard building codes are eligible for certification as a LEED-NC Building. Commercial occupancies include (but are not limited to) offices, retail and service establishments, institutional buildings (libraries, schools, museums, churches, etc.,) hotels and residential buildings of four or more habitable stories.

LEED India-NC addresses design and construction activities for both new buildings and major renovations of existing buildings. As a general rule-of-thumb, a major renovation involves elements of major HVAC renovation, significant envelope modifications and major interior rehabilitation.

The IGBC over a period of time, would also release other rating programs like LEED CS (Core & Shell), LEED EB (Existing Buildings), LEED Residential, etc.,

Many projects will cleanly and clearly fit the defined scope of only one LEED Rating System product. Other projects may be applicable to two or more

LEED Rating System product scopes. IGBC encourages the project team to tally a potential point total using the Rating System checklists for all possibilities. The project is a viable candidate for LEED certification if it can meet all prerequisites and achieve the minimum points required in a given Rating System. If more than one Rating System applies, then it is up to the project team to decide which one to pursue. For assistance in choosing the most appropriate LEED Rating System, please e-mail at igbc@ciionline.org.

B. LEED India NC Registration

Project teams interested in obtaining LEED India NC Certification for their project must first register this intent with the IGBC. Projects can be registered on the IGBC website (www.igbc.in) under 'Register Your Project'. The website includes information on registration costs for IGBC member companies as well as non-members. Registration is an important step that establishes contact with the IGBC and provides access to software tools, errata, critical communications and other essential information.

C. Credit Interpretation Rulings

In some cases, the design team may encounter challenges in applying a LEED India NC prerequisite or credit to their particular project. These difficulties arise from instances where the Reference Guide does not sufficiently address a specific issue or there is a special conflict that requires resolution.

IGBC will establish a uniform review process for registered project inquiries, called credit interpretation requests (CIRs), to ensure that rulings are consistent and available to other projects. If a question arises, project teams should:

1. Consult the Reference Guide for a detailed description of the credit intent, requirements and calculations
2. Review the intent of the credit or prerequisite in question to self-evaluate whether the project meets this intent
3. Review the Credit Interpretation (CIR) Web page for previously logged CIRs on relevant credits. All LEED India registered project contacts have access to this page
4. If a similar credit interpretation has not been logged, or does not answer the question sufficiently, submit a credit interpretation request. The CIR should be succinct and based on information found in the Reference Guide, with emphasis on the intent of the prerequisite or credit. Only registered projects are eligible to post 2 free CIRs

D. Applying for LEED India Rating:

Consult the Web site for important details about applying the LEED India application as well as the certification review process, schedule and fees. The project must satisfactorily document achievement all of the prerequisites and a minimum number of points to attain the LEED ratings as listed below.

LEED Certification Levels

Certification Level	Points
Certified	26 to 32
Silver	33 to 38
Gold	39 to 51
Platinum	52 or more

For more information, visit the LEED Web page on www.igbc.org

D. LEED India NC Process

Once a project is registered, the project design team begins to collect information and perform calculations to satisfy the prerequisite and credit submittal requirements. Since submittal documentation should be gathered throughout design and construction, it is helpful to designate a LEED team leader who is responsible for managing the compilation of this information by the LEED India NC project team. Use the Letter Template that are provided through the LEED project resources webpage located in the LEED section of the IGBC website. These templates contain embedded calculators and are instrumental in documenting fulfillment of credit requirements and prompting for correct and complete supporting information.

E. Documentation

Once a project is registered, the project team begins to prepare documentation to satisfy the prerequisite and credit submittal requirements. This documentation will become the bulk of the project's LEED India Version 1.0 submission. It is helpful to have a LEED Accredited Professional as the project contact and team member responsible for coordinating the certification process.

Documentation is submitted in two phases – Preliminary and final. Once the preliminary documentation is submitted the review team would provide review comments within 30 days. Additional documentation along with answers to the queries posed in the preliminary review is submitted to IGBC for final review. The final review will also take 30 days, after which the rating is awarded.

LEED India Version 1.0 submittal resources consist of the Welcome Packet, Calculator (spreadsheets) and Letter Template (cover sheets for each credit). The Welcome Packet provides examples of the types of documents that LEED often requires to supplement the calculation tables and cover sheets in the application. The inclusion of extraneous documentation (anything that is not listed as a credit submittal requirement) is discouraged, as this slows the review process. For example, full building commissioning reports may not be necessary because only the commissioning plan is required.

The LEED India Version 1.0 Application Template is a dynamic tracking and documentation tool that is used by project teams to track progress and prepare LEED documentation. For each credit, the Letter Template prompts LEED practitioners for summary data and signed declaration of performance, indicates when documentation requirements have been adequately fulfilled for submittal, serves as a letter template for printing on letterhead and summarises progress. Some of the template pages include spreadsheets for calculations, while others are simple declarations signed by an appropriate team member. The calculator spreadsheets are often useful when the Reference Guide calls for credit calculations but no corresponding spreadsheet exist in the Version.

During review, the project team will be expected to provide supporting documents for a portion of the prerequisites and credits. Supporting documents are those which provide specific proof of meeting the required performance level – such as calculations, specifications, drawings, cutsheets, manufacturer’s literature and other source documents that were used as a basis to justify declaration of performance in the Letter Template. Many of these items are implicitly described in the Reference Guide’s instructions.

Fee

Certification fee information can be found IGBC website. The IGBC will acknowledge receipt of your application and proceed with review when all project documentation has been submitted.

The LEED India NC ratings are awarded according to the following scale—

- Certified 26-32 points
- Silver 33-38 points
- Gold 39-51 points
- Platinum 52-69 points

The IGBC will recognize buildings that achieve one of these rating levels with a formal letter of certification and a mountable plaque.

IV. LEED India NC Version 1.0 Reference Guide

The LEED India NC Version 1.0 Reference Guide is a supporting document to the LEED India NC Green Building Rating System. The guide is intended to assist project teams in understanding LEED India NC criteria and the benefits of complying with each criterion. The guide includes examples of strategies that can be used in each category, case studies of buildings that have implemented these strategies successfully and additional resources that will provide more information. The guide does not provide an exhausting list of strategies for meeting the criteria as subsequent strategies will be developed and employed by designers that satisfy the intent of each credit. Nor does it provide all of the information that design teams need to determine the applicability of a credit to their project.

Prerequisite and Credit Format

Each prerequisite and credit is organised in a standardised format for simplicity and quick reference. The first section summarises the key points regarding the measure and includes the intent, requirements and some potential technologies & strategies for achieving the credit. The subsequent sections provide supportive information to help interpret the measure, example and links to various resources.

Updates & Addenda

This is the first edition of the LEED India Reference Guide, dated January 2007. As LEED India NC continues to improve and evolve, updates and addenda will be made available to substitute and augment the current material. Updates and addenda will be formally incorporated in major revisions. In the interim between major revisions, the IGBC may use its consensus process to clarify criteria.

When a project registers for certification, the prerequisites, credits and credit rulings current at the time of project registration will continue to guide the project through its certification processes.

Sustainable Sites

SS	WE	EA	MR	EQ	ID
Prerequisite 1					

Prerequisite 1 **Erosion & Sedimentation Control**

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.

Potential Technologies & Strategies

Create an erosion and sedimentation control plan during the design phase of the project. 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

Intent

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

Requirements

Do not develop buildings, roads or parking areas on portions of sites that meet any one of the following criteria:

- Land that is not a prime farm land
- Land whose elevation is lower than **5 feet above** the elevation of the 100-year flood level.
- Land which is specifically identified as 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

Potential 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 of those environmentally sensitive areas identified above.

SS	WE	EA	MR	EQ	ID
Credit 2					

Development Density & Community Connectivity

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.

OR

OPTION 2 — COMMUNITY CONNECTIVITY

Construct or renovate building on a previously developed site AND within ½ **mile** of a residential zone or neighborhood with an average density of 10 units per acre net AND within ½ **mile** 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 a ½ mile 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.

SS	WE	EA	MR	EQ	ID
Credit 3					

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 Brownfield Program requirements

Potential 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
Credit 4					

Credit 4 **Alternative Transportation**

1- 3 Point

Intent

Reduce pollution and land development impacts from automobile use.

Requirements

Credit 4.1 (1 point) Public Transportation Access:

Locate project within **0.8 km** of a commuter rail, light rail or subway station or **0.4 km** of two or more public or campus bus lines usable by building occupants

Credit 4.2 (1 point) Low Emission & Alternative Fuel Refueling Stations:

Provide alternative fuel vehicles for 3% of building occupants AND provide preferred parking for these vehicles, OR install alternative-fuel refueling stations for 3% of the total vehicle parking capacity of the site. Liquid or gaseous fueling facilities must be separately ventilated or located outdoors

Credit 4.3 (1 point) Parking Capacity:

Size parking capacity to meet, but not exceed, minimum local zoning requirements AND provide preferred parking for carpools or van pools capable of serving 5% of the total provided parking spaces.

Potential Technologies & Strategies

Perform a transportation survey of future building occupants to identify transportation needs. Site the building near mass transit and design the building with transportation amenities such as alternative fuel refueling stations. Also consider sharing the cost and benefits of refueling stations with neighbors. Minimize the parking lot/garage size. Consider sharing parking facilities with adjacent buildings and alternatives that will limit the use of single occupied vehicles.

SS	WE	EA	MR	EQ	ID
Credit 5					

1 Point

Credit 5

Reduced Site Disturbance

Intent

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

Requirements

Credit 5.1 (1 point) Protect or Restore Habitat:

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 constructed areas with permeable surfaces(such as pervious paving areas, stormwater detention facilities and playing fields) that require additional staging areas in order to limit compaction in the constructed area;

OR

On previously developed sites, restore a minimum of **50%** of the site area (excluding the building footprint) by replacing impervious surfaces with native or adapted vegetation.

Credit 5.2 (1 point) Development Footprint:

Reduce the development footprint (defined as entire building footprint, access roads and parking) to exceed the local zoning's open space requirement for the site by **25%**. For areas with no local zoning requirements (e.g., some university campuses, military bases), designate open space area adjacent to the building that is equal to the building footprint.

Potential 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 to maximize open space on the site. Establish clearly marked construction boundaries to minimize disturbance of existing site and restore previously degraded areas to their natural state.

SS	WE	EA	MR	EQ	ID
Credit 6.1					

1 Point

Storm water Design: Quantity Control

Intent

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

Requirement

If existing imperviousness is less than or equal to 50%:

Implement a stormwater management plan that prevents the post-development 1.5 year, 24 hour peak discharge rate from exceeding the pre-development 1.5 year, 24-hour peak discharge rate.

OR

If existing imperviousness is greater than 50%:

Implement a stormwater management plan that results in a 25% decrease in the rate & quantity of stormwater runoff.

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.

SS	WE	EA	MR	EQ	ID
Credit 6.2					

Stormwater Design: Quality Control

1 Point

Intent

Limit disruption of natural water flows by eliminating stormwater runoff, increasing onsite infiltration and eliminating contaminants.

Requirement

Construct site stormwater treatment systems designed to remove 80% of the average annual post-development total suspended solids(TSS) based on the average annual loadings from all storms less than or equal to the 2-year/24-hour storm.

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.

SS	WE	EA	MR	EQ	ID
Credit 7.1					

1 Point

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

Provide shade(within 5 years)and /or use light-colored/high-albedo materials(reflectance of at least 0.3) and/or open grid pavement for at least 30% of the site's non-roof impervious surface, including parking lots, walkways, plazas etc.;

OR

Place a minimum of 50% of parking spaces underground or covered by structured parking; OR use an open-grid pavement system(less than 50% impervious) for a minimum of 50% of the parking lot area .

Potential Technologies & Strategies

Shade constructed surfaces on the site with landscape features and utilize high-reflectance materials for hardscape. 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.

SS	WE	EA	MR	EQ	ID
Credit 7.2					

SS 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:

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

Roof Type	Slope	SRI
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.

SS	WE	EA	MR	EQ	ID
Credit 8					

1 Point

SS 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 foot-candles at the site boundary

and no greater than 0.01 horizontal foot-candles 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 luminaries produce a maximum initial illuminance value no greater than 0.60 horizontal and vertical foot-candles at the site boundary and no greater than 0.01 horizontal foot-candles 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.

SS	WE	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 to eliminate all potable water use for site irrigation(except for initial watering to establish plants), OR do not install permanent landscape irrigation systems.

Potential 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 using of stormwater or graywater, and / or condensate water for irrigation.

SS	WE	EA	MR	EQ	ID
Credit 2					

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%..

Potential 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	WE	EA	MR	EQ	ID
Credit 3					

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.

Potential Technologies & Strategies

Specify high efficiency fixtures and dry fixtures such as composting toilet system and non-water using urinals to reduce wastewater volumes. Consider reusing storm water or gray water for sewage conveyance or on-site wastewater treatment systems (mechanical or natural). Options for on-site wastewater treatment include packaged biological nutrient removal systems, constructed wetlands, and high-efficiency filtration systems.

SS	WE	EA	MR	EQ	ID
Credit 4					

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:

Fixture	Flow Requirement
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 pounds per square inch (psi)

Credit 4.2 (1 point) Employ strategies that in aggregate use 30% less water than the water use baseline calculated for the building (not including irrigation)

Potential Technologies & Strategies

Use high efficiency fixtures, dry fixtures such as composting toilet systems non-water using 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

Implement or have a contract in place to implement the following fundamental best practice commissioning procedures:

- Engage a commissioning team that does not include individuals directly responsible for project design or construction management
- Review design intent and basis of design documentation
- Incorporate commissioning requirements in to the construction documents
- Develop and utilize a commissioning plan
- Verify installation, functional performance, training and operation and maintenance documentation.
- Complete a commissioning report

Potential 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	EA	MR	EQ	ID
Prerequisite 2					

Required

Prerequisite 2

Minimum Energy Performance

Intent

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

Requirements

Design the building project to comply with both –

- The mandatory provisions (Sections 5.4, 6.4,7.4,8.4,9.4 and 10.4) of **ASHRAE / IESNA** Standard 90.1 – 2004 / (without amendments); and
- The prescriptive requirements (Sections 5.5, 6.5, 7.5, and 9.5) or performance requirements (Section 11) of **ASHRAE / IESNA** Standard 90.1 – 2004 / (without amendments);

Project should comply with the final version of ECBC (Energy Conservation Building Code) of the Bureau of Energy Efficiency, India, as and when it is released

Potential Technologies & Strategies

Design the building envelope, HVAC, lighting and other systems to maximize energy performance. The ASHRAE 90.1-2004 User's manual contains worksheets that can be used to document compliance with this prerequisite. For projects pursuing points under EA Credit 1, the computer simulation model may be used to confirm satisfaction of this prerequisite.

If a local code has demonstrated quantitative and textual equivalence following, at a minimum, the U.S. Department of Energy standard process for commercial energy code determination, then it may be used to satisfy this prerequisite in lieu of ASHRAE 90.1-2004. Details on the DOE process for commercial energy code determination can be found at www.energycodes.gov/implement/determinations_com.stm.

SS	WE	EA	MR	EQ	ID
Prerequisite 3					

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

Intent

Reduce ozone depletion.

Requirement

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.

Potential 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
Credit 1					

2 – 10 Credit 1 **Optimize Energy Performance**

Intent

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

Requirements

Select one of the three compliance path options described below. Project teams documenting achievement using any of the three options are assumed to be in compliance with EA Prerequisite 2.

OPTION 1 — WHOLE BUILDING ENERGY SIMULATION (1–10 Points)

Demonstrate a percentage improvement in the proposed building performance rating compared to the baseline building performance rating per ASHRAE/IESNA Standard 90.1-2004 (without amendments) by a whole building project simulation using the Building Performance Rating Method in Appendix G of the Standard.

Projects should comply with the final version of ECBC (Energy Conservation Building Code) of the Bureau of Energy Efficiency, India, as and when it is released.

The minimum energy cost savings percentage for each point threshold is as follows:

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
38.5%	31.5%	9
42%	35%	10

Appendix G of Standard 90.1-2004 requires that the energy analysis done for the Building Performance Rating Method include ALL of the energy costs within and associated with the building project. To achieve points using this credit, the proposed design—

- must comply with the mandatory provisions (Sections 5.4, 6.4, 7.4, 8.4, 9.4 and 10.4) in Standard 90.1-2004 (without amendments);
- must include all the energy costs within and associated with the building project; and
- must be compared against a baseline building that complies with Appendix G to Standard 90.1-2004 (without amendments). The default process energy cost is 25% of the total energy cost for the baseline building. For buildings where the process energy cost is less than 25% of the baseline building energy cost, the LEED submittal must include supporting documentation substantiating that process energy inputs are appropriate.

For the purpose of this analysis, process energy is considered to include, but is not limited to, office and general miscellaneous equipment, computers, elevators and escalators, kitchen cooking and refrigeration, laundry washing and drying, lighting exempt from the lighting power allowance (e.g., lighting integral to medical equipment) and other (e.g., waterfall pumps). Regulated (non-process) energy includes lighting (such as for the interior, parking garage, surface parking, façade, or building grounds, except as noted above), HVAC (such as for space heating, space cooling, fans, pumps, toilet exhaust, parking garage ventilation, kitchen hood exhaust, etc.), and service water heating for domestic or space heating purposes.

For EA Credit 1, process loads shall be identical for both the baseline building performance rating and for the proposed building performance rating. However, project teams may follow the Exceptional Calculation Method (ASHRAE 90.1-2004 G2.5) to document measures that reduce process loads. Documentation of process load energy savings shall include a list of the assumptions made for both the base and proposed design, and theoretical or empirical information supporting these assumptions.

OR

OPTION 2 — PRESCRIPTIVE COMPLIANCE PATH (4 Points)

Comply with the prescriptive measures of the ASHRAE Advanced Energy Design Guide for Small Office Buildings 2004. The following restrictions apply:

- Buildings must be less than 20,000 square feet
- Buildings must be office occupancy
- Project teams must fully comply with all applicable criteria as established in the Advanced Energy Design Guide for the climate zone in which the building is located

OR

OPTION 3 — PRESCRIPTIVE COMPLIANCE PATH (1 Point)

Comply with the Basic Criteria and Prescriptive Measures of the Advanced Buildings Benchmark™ Version 1.1 with the exception of the following sections: 1.7 Monitoring and Trend-logging, 1.11 Indoor Air Quality, and 1.14 Networked Computer Monitor Control. The following restrictions apply:

- Project teams must fully comply with all applicable criteria as established in Advanced Buildings Benchmark for the climate zone in which the building is located.

Potential 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.

If a local code has demonstrated quantitative and textual equivalence following, at a minimum, the U.S. Department of Energy standard process for commercial energy code determination, then the results of that analysis may be used to correlate local code performance with ASHRAE 90.1-2004. Details on the DOE process for commercial energy code determination can be found at www.energycodes.gov/implement/determinations.com.stm.

SS	WE	EA	MR	EQ	ID
Credit 2					

Credit 2 Renewable Energy

1 - 3

Intent

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

Requirements

Supply at least 2.5% 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.

%, Total Energy Load Cost in Renewable	Points
2.5%	1
5.0%	2
7.5%	3

Credit 2.1 (1 points) Renewable energy, 2.5% contribution

Credit 2.2 (2 points) Renewable energy, 5.0% contribution

Credit 2.3 (3 points) Renewable energy, 7.5% 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
Credit 3					

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 re-commissioning management manual
5. Have a contract in place for a near-warranty end or post occupancy review

Potential 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
Credit 4					

Credit 4 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 HCFCs or Halon.

Technologies & Strategies

Design and operate the facility without mechanical cooling and refrigeration equipment. Where mechanical cooling is used, utilize base building HVAC and refrigeration systems for the refrigeration cycle that minimizes direct impact on ozone depletion and global warming. Select HVAC & R equipment with reduced refrigerant charge and increased equipment life. Maintain equipment to prevent leakage of refrigerant to the atmosphere. Utilize fire suppression systems that do not contain HCFCs or Halons.

SS	WE	EA	MR	EQ	ID
Credit 5					

1 Point

Credit 5 **Measurement & Verification**

Intent

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

Requirements

- Develop and implement a Measurement & Verification (M&V) Plan consistent with Option D: Calibrated Simulation (Savings Estimation Method 2), or Option B: Energy Conservation Measure Isolation, as specified in the International Performance Measurement & Verification Protocol (IPMVP) Volume III: Concepts and Options for Determining Energy Savings in New Construction, April, 2003.
- The M&V period shall cover a period of no less than one year of post-construction occupancy.

Potential Technologies & Strategies

Develop an M&V Plan to evaluate building and/or energy system performance. Characterize the building and/or energy systems through energy simulation or engineering analysis. Install the necessary metering equipment to measure energy use. Track performance by comparing predicted performance to actual performance, broken down by component or system as appropriate. Evaluate energy efficiency by comparing actual performance to baseline performance.

While the IPMVP describes specific actions for verifying savings associated with energy conservation measures (ECMs) and strategies, this LEED credit expands upon typical IPMVP M&V objectives. M&V activities should not necessarily be confined to energy systems where ECMs or energy conservation strategies have been implemented. The IPMVP provides guidance on M&V strategies and their appropriate applications for various situations. These strategies should be used in conjunction with monitoring and trend logging of significant energy systems to provide for the ongoing accountability of building energy performance.

SS	WE	EA	MR	EQ	ID
Credit 6					

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 50% 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.

Requirements

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, corrugated cardboard, glass, plastics, and metals.

Potential Technologies & Strategies

Coordinate the size and functionality of the recycling areas with the anticipated collections services for glass, plastic, office paper, newspaper, cardboard, and organic wastes to maximize the effectiveness of the dedicated areas. Consider employing cardboard balers, aluminum can crushers, recycling chutes, and collection bins at individual workstations to further enhance the recycling program.

SS	WE	EA	MR	EQ	ID
Credit 1					

Credit 1 **Building Reuse**

1 – 3 Point

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

Potential Technologies & Strategies

Consider reuse of existing, previously occupied buildings, including structure, envelope and interior non-structural elements. Remove elements that pose contamination risk to building occupants and upgrade components that would improve energy and water efficiency, such as mechanical systems and plumbing fixtures. Quantify the extent of building reuse.

SS	WE	EA	MR	EQ	ID
Credit 2					

1 – 2 Points

Credit 2 **Construction Waste Management**

Intent

Divert construction, demolition, and land clearing debris from landfill disposal
 Redirect recyclable recovered resources back to the manufacturing process.
 Redirect reusable materials to appropriate sites.

Requirements

Develop and implement a waste management plan, quantifying material diversion goals.

Credit 2.1 (1 point) Recycle and / or salvage at least **50%** of construction, demolition, and land clearing waste. Calculations can be done by weight or volume, but must be consistent throughout.

Credit 2.2 (1 point) Recycle and / or salvage an additional **25% (75% total)** of construction, demolition, and land clearing waste. Calculations can be done by weight or volume, but must be consistent throughout.

Potential Technologies & Strategies

Establish goals for diversion from disposal in landfills and incinerators and adopt a construction waste management plan to achieve these goals. Consider recycling cardboard, metal, brick, acoustical tile, concrete, plastic, clean wood, glass, gypsum wallboard, carpet and insulation. Designate a specific area(s) on the construction site for segregated or commingled collection of recyclable material, and track recycling efforts throughout the construction process. Identify construction haulers and recyclers to handle the designated materials. Note that diversion may include donation of materials to charitable organizations and salvage of materials on-site.

SS	WE	EA	MR	EQ	ID
Credit 3					

Credit 3 **Resource Reuse**

1 - 2 Points

Intent

Reuse building materials and products in order to reduce demand for virgin materials and to reduce waste, thereby reducing impacts associated with the extraction and processing of virgin resources.

Requirements

Credit 3.1 (1 point) Use salvaged, refurbished or reused materials, products and furnishings for at least **5%** of building materials

Credit 3.2 (1 point) Use salvaged, refurbished or reused materials, products and furnishings for at least **10%** of building materials

Potential 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
Credit 4					

1 – 2 Points

Credit 4 Recycled Content

Intent

Increase demand for building products that incorporated recycled content materials, therefore reducing impacts resulting from extraction and processing of new virgin 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 included in this calculation.

Potential Technologies & Strategies

Establish a project goal for recycled content materials and identify material suppliers that can achieve this goal. During construction, ensure that the specified recycled content materials are installed. Consider a range of environmental, economic and performance attributes when selecting products and materials.

SS	WE	EA	MR	EQ	ID
Credit 5					

Credit 5 **Local / Regional Materials**

1 - 2 Points

Intent

Increase demand for building materials and products that are extracted and manufactured within the region, thereby supporting the regional economy and reducing the environmental impacts resulting from transportation.

Requirements

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

Credit 5.2 (1 point) Of the regionally manufactured materials documented for MR Credit 5.1, use a minimum of 50% of building materials and products that are extracted, harvested or recovered (as well as manufactured) within 800 km of the project site.

* 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.

Potential 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. Consider a range of environmental, economic and performance attributes when selecting products and materials.

SS	WE	EA	MR	EQ	ID
Credit 6					

1 Point

Credit 6 **Rapidly Renewable Materials**

Intent

Reduce the use and depletion of finite raw, and long-cycle renewable materials by replacing them with rapidly renewable materials.

Requirement

Use rapidly renewable building materials and products (made from plants that are typically harvested within a ten-year cycle or shorter) for 5% of the total value of all building materials and products used in the project.

Potential Technologies & Strategies

Establish a project goal for rapidly renewable materials and identify products suppliers that can support achievement of this goal. Consider materials such as bamboo, wool, cotton insulation, agrifiber, linoleum, wheat board, strawboard and cork. During construction, ensure that the specified rapidly renewable materials are installed.

SS	WE	EA	MR	EQ	ID
Credit 7					

Credit 7 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's Principles and Criteria, 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.

Potential 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	EQ	ID
Prerequisite 1					

EQ Prerequisite 1: Minimum IAQ Performance

Required

Intent

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

Requirements

Meet the minimum requirements of voluntary consensus standard ASHRAE 62.1-2004 Ventilation for Acceptable Indoor sections 4 through 7 of Air Quality. Mechanical ventilation systems shall be designed using the ventilation rate produce 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	EQ	ID
Prerequisite 2					

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 re-circulation 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).

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

Intent

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

Requirement

Install permanent CO₂ 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 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	EQ	ID
Credit 2					

1 Point

EQ Credit 2: Increased Ventilation

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
Credit 3					

1 - 2 Points

Credit 3 **Construction IAQ Management Plan**

Intent

Prevent indoor air quality problems resulting from the construction/renovation process in order to help sustain the comfort and well-being of construction workers building occupants..

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 (1 point)

- During construction meet or exceed the recommended Design Approaches of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guideline for Occupied Buildings under Construction, 1995, Chapter 3.
- Protect stored on-site or installed absorptive materials from moisture damage.
- If air handlers must be used during construction, filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 must be used at each return air grill, as determined by ASHRAE 52.2-1999.

Credit 3.2 (1 point)

After construction ends and prior to occupancy conduct a minimum two-week building flush-out with new Minimum Efficiency Reporting Value (MERV) 8 filtration media at 100% outside air. After flush-out, new filter with a minimum MERV 8 value, must replace all filters except those solely processing outside air. Note these filters must be MERV 13 or better when a project plans to earn EQ credit 5, Indoor Chemical and Pollutant Source Control.

Potential 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.

SS	WE	EA	MR	EQ	ID
Credit 4					

Credit 4 Low-Emitting Materials

1 - 4 Points

Intent

Reduce the quantity of indoor air contaminants that are odorous or potentially irritating harmful to the comfort and well-being of installer and building occupants.

Requirements

All adhesives and sealants used on the interior of the building (defined as inside of the weatherproofing system and applied on-site) shall comply with the requirements of the reference standard.

Credit 4.1 (1 point) The VOC (Volatile Organic Compounds) content of adhesives and sealants used must be less than VOC content limits mentioned:

Architectural Applications	VOC Limit(g/l less water)
Indoor Carpet adhesives	50
Carpet Pad Adhesives	50
Wood Flooring Adhesive	100
Rubber Floor Adhesives	60
Sub Floor Adhesives	50
Ceramic Tile Adhesives	65
VCT and Asphalt Tile adhesives	50
Dry Wall and Panel Adhesives	50
Structural Glazing Adhesives	100
Multipurpose Construction Adhesives	70

Substrate Specific Application	VOC Limit(g/l less water)
Metal to Metal	30
Plastic Foams	50
Porous material (except wood)	50
Wood	30
Fiber Glass	80

Specialty Application	VOC Limit(g/l less water)
PVC Welding	510
Top & Trim adhesive	250
Contact adhesive	80
Special purpose contact adhesive	250

Sealants	VOC Limit(g/l less water)
PVC Welding	250
Top & Trim adhesive	300
Contact adhesive	250
Special purpose contact adhesive	420

Credit 4.2 (1 point) Paints and coatings used on the interior of the building defined as inside of the weatherproofing system and applied on-site) shall comply with the requirements of the reference standard.

The VOC (Volatile Organic Compounds) content of paints, coatings and primers used must not exceed the VOC content limits mentioned below:

- ❖ Paints
 - Non-flat - 150 g/L
 - Flat (Mat) - 50 g/L
 - Anti corrosive/ anti rust - 250 g/L
- ❖ Coatings
 - Clear wood finishes
 - ☐ Varnish - 350 g/L
 - ☐ Lacquer - 550 g/L
 - Floor coatings - 100 g/L
 - Stains - 250 g/L
 - Sealers
 - ☐ Waterproofing sealer - 250 g/L
 - ☐ Sanding sealer - 275 g/L
 - ☐ Other sealers - 200 g/L

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

All carpet cushion installed in the building interior shall meet the requirements of Carpet and Rug Institute's Green Label Indoor Air Quality Test Program.

All carpet adhesive shall meet the requirements of EQ Credit 4.1: VOC limit of 50 g/l

Credit 4.4 (1 point) Composite wood and agrifiber products used on the interior of the building must contain no added urea-formaldehyde resins.

Composite wood and agrifiber products are defined as: particleboard, medium density fibreboard (MDF), plywood, wheatboard, strawboard, panel substrates and door cores

Potential 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
Credit 6					

Credit 6

Controllability of Systems

1 - 2 Points

Intent

Provide a high level of lighting system control by individual occupants or by specific groups in multi-occupant spaces (i.e., classrooms or conference areas) to promote the productivity, comfort and well-being of building occupants.

Requirements

Credit 6.1 (1 point) Provide individual lighting controls for 90% (minimum) of the building occupants to enable adjustments to suit individual task needs and preferences.

AND

Provide lighting system controllability for all shared multi-occupant spaces to enable lighting adjustment that meets group needs and preferences.

Credit 6.2 (1 point) Provide individual comfort controls for 50% (minimum) of the building occupants to enable adjustments to suit individual task needs and preferences. Operable windows can be used in lieu of comfort controls for occupants of areas that are 20 feet inside of and 10 feet to either side of the operable part of the window. The areas of operable window must meet the requirements of ASHRAE 62.1-2004, paragraph 5.1, Natural Ventilation.

AND

Provide comfort system controls for all shared multi-occupant spaces to enable adjustments to suit group needs and preferences. Conditions for thermal comfort are described in ASHRAE Standard 55-2004 to include the primary factors of air temperature, radiant temperature, air speed and humidity. Comfort system control, for the purposes of this credit, is defined as the provision of control over at least one of these primary factors in the occupant's local environment.

Potential Technologies & Strategies

Design the building and systems with comfort controls to allow adjustments to suit individual needs or those of groups in shared spaces. ASHRAE Standard 55-2004 identifies the factors of thermal comfort and a process for developing comfort criteria for building spaces that suit the needs of the occupants involved in their daily activities. Control strategies can be developed to expand on the comfort criteria to allow adjustments to suit individual needs and preferences. These may involve system designs incorporating operable windows, hybrid systems integrating operable windows and mechanical systems, or mechanical systems alone. Individual adjustments may involve individual thermostat controls, local diffusers at floor, desk or overhead levels, or control of individual radiant panels, or other means integrated into the overall building, thermal comfort systems, and energy systems design. In addition, designers should evaluate the closely tied interactions between thermal comfort (as required by ASHRAE Standard 55-2004) and acceptable indoor air quality (as required by ASHRAE Standard 62.1-2004, whether natural or mechanical ventilation).

SS	WE	EA	MR	EQ	ID
Credit 7.1					

1 point

EQ Credit 7.1: Thermal Comfort: Design

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
Credit 7.2					

Credit 7.2: Thermal Comfort: Verification

1 point

Intent

Provide for the assessment of building thermal comfort over time

Requirement

Agree to implement a thermal comfort survey of building occupants within a period of six to 18 months after occupancy. This survey should collect anonymous responses about thermal comfort in the building including an assessment of overall satisfaction with thermal performance and identification of thermal comfort-related problems. Agree to develop a plan for corrective action if the survey results indicate that more than 20% of occupants are dissatisfied with thermal comfort in the building. This plan should include measurement of relevant environmental variables in problem areas in accordance with ASHRAE Standard 55-2004.

Potential Technologies & Strategies

ASHRAE Standard 55-2004 provides guidance for establishing thermal comfort criteria and the documentation and validation of building performance to the criteria. While the standard is not intended for purposes of continuous monitoring and maintenance of the thermal environment, the principles expressed in the standard provide a basis for design of monitoring and corrective action systems.

SS	WE	EA	MR	EQ	ID
Credit 8					

Credit 8 Daylight & Views

1 - 2 Points

Intent

Provide for the building occupants a connection between indoor spaces and the outdoors through the introduction of daylight and views into the regularly occupied areas of the building

Requirements

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. Spaces excluded from this requirement include copy rooms, storage areas, mechanical plant rooms, laundry and other low occupancy support areas. Other exceptions for spaces where tasks would be hindered by the use of daylight will be considered on their merits.

Equation 1:

$$\text{Daylight Factor} = \frac{\text{Window Area [SF]}}{\text{Floor Area [SF]}} \times \text{Window Geometry} \times \frac{\text{Actual } T_{vis}}{\text{Minimum } T_{vis}} \times \text{Window Height Factor}$$

Credit 8.2 (1 point)

Achieve direct line of sight to vision glazing for building occupants in 90% of all regularly occupied spaces. Examples of exceptions include copy rooms, storage areas, mechanical, laundry and other low occupancy support areas. Other exceptions will be considered on their merits.

Potential 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 1.1-1.4					

1 - 4 Points

Innovation & Design Process

Credit 1 Innovation in Design

Intent

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

Requirements

Credit 1.1 (1 point) In writing, identify the intent of the proposed innovation credit, the proposed requirement for compliance, the proposed submittals to demonstrate compliance, and the design approach (strategies) that might be used to meet the requirements

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.

Potential Technologies & Strategies

Substantially exceed a LEED-NC performance credit such as energy performance or water efficiency. Apply strategies or measures that demonstrate a comprehensive approach and quantifiable environment and/or health benefits

SS	WE	EA	MR	EQ	ID
Credit 2					

Credit 2 **LEED™ Accredited Professional**

1 Point

Intent

To support and encourage the design integration required by a LEED India -NC 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 shall be a LEED Accredited Professional (AP).

Potential Technologies & Strategies

Educate the project team members about green building design & construction and application of the LEED Rating System early in the life of the project. Consider assigning the LEED AP as a facilitator of an integrated design & construction process