

# **RATING SYSTEMS IN INDIA--**

**IGBC, GRIHA;  
LEED;GEM**

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# BUILDINGS --AS CONSUMERS OF RESOURCES

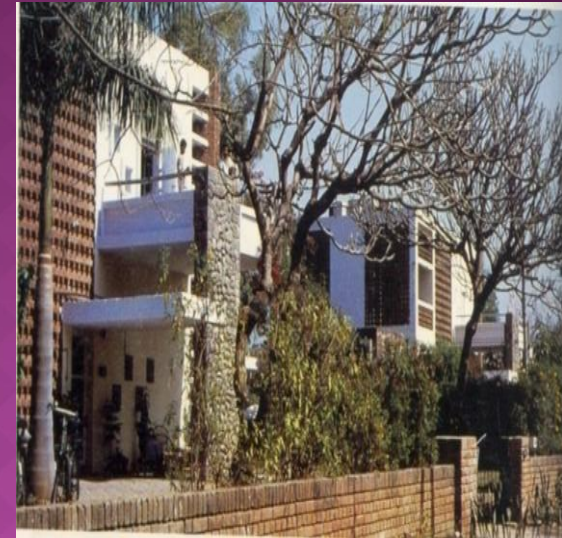
• Built environment- significantly impact environment  
/consumption of resources/generators of waste/climate  
change/rising temperature:

- 16% of world's fresh water withdrawal.
- 25% of wood harvested.
- 30% of consumption of raw material.
- 50% of global energy consumption.
- 35% of world's CO2 emission
- 40% of Municipal solid waste.
- 50% of Ozone depleting CFC's still in use.
- 30% of residents having sick building syndrome

• --70% of global warming outcome of ;

• --built environment & transportation

-- Majority of existing buildings--- low concern for energy conservation



# DEFINING- GREEN BUILDINGS

## DEFINITION:

- "A green building is one which uses less water, optimises energy efficiency, conserves natural resources, generates less waste and provides healthier spaces for occupants, as compared to a conventional building."



# **RATING FOR NEW BUILDINGS**

# **RATING OF GREEN BUILDINGS**

- **Rating is a tool :**
- **to assess level of greenness in a building**
- **Helps designers/assessor to apply green concepts**
- **define methodologies for promoting sustainability in diverse climatic zones**

**Rating system-- for certifying Green Buildings.**

- **is a framework for assessing building performance**
- **against set criteria & standard points of references**

**Rating helps in—**

- Assessing energy/water/resources- performance of building**
- Evaluating environmental performance of a building --**
- Providing standard for a 'green building'.**
- Establishing balance between practices / emerging concepts to make them sustainable**

# GREEN BUILDINGS- GLOBAL RATINGS

- ◉ Globally - all nations have rating system to evaluate green buildings
- ◉ -- **British uses - BREEAM** (Building Research Establishment Environmental Assessment Method)- first rating system in world
- ◉ (LEED)- Leadership in Energy and Environmental Design- second rating systems developed -in U.S.G.B C
- ◉ **World Green Building Council ---uses EDGE** (Excellence in Design for Greater Efficiencies)
- ◉ -- **Green Star -- used in Australia**
- ◉ **Green Building Index (GBI)-- used in Malaysia.**
- ◉ **LEED - used by Canada,**
- ◉ **DGNB-- used by--Germany)- Deutsche Gesellschaft für Nachhaltiges Bauen e.V.,2007**
- ◉ **CASBEE -- by Japan-- Comprehensive Assessment System for Built Environment Efficiency**

# INDIAN RATING SYSTEMS

India Presently uses 4 RATING SYSTEMS-- FOR GREEN BUILDINGS-

◎ **IGBC**-Indian Green Building Council-  
-accounts for > 90%India's green rated buildings

◎ **GRIHA**-Green Rating for Integrated  
Habitat Assessment

◎ **LEED**-Leadership in Energy and  
Environment Design

◎ **GEM**- Green and Eco-Friendly Movement

# ● INDIAN GREEN BUILDING COUNCIL- IGBC-- RATING SYSTEM FOR NEW GREEN BUILDINGS

# INDIAN GREEN BUILDING COUNCIL (IGBC)

- ◉ Indian Green Building Council (IGBC)--
  - ◉ - one of Centre of excellence of Confederation of Indian Industry (CII)
  - ◉ - founded in 2001.
  - ◉ non--profit research based organisation
  - ◉ -- offices -CII-Sohrabji Godrej Green Business Centre, Hyderabad
  - ◉ -- India's first LEED certified Platinum Rated Green building
  - ◉ --agreement with- LEED for using--Green Building Standard from USGBC.
  - ◉ Developed independent rating system-- based on Indian context
  - ◉ -- defined Vision for green buildings
  - ◉ -- Ensure sustainable built environment for all
  - ◉ -- Make India global leaders in sustainable built environment by 2022.
- ( achieved 10.22 bsft of green footprints by 2023)

# INDIAN GREEN BUILDING COUNCIL(IGBC)

- ◉ IGBC Rating systems are;
- ◉ -voluntary
- ◉ - consensus based
- ◉ - market driven- building programs
- ◉ - Based on five natural elements- Panch-bhutas
- ◉ Blend of ancient architectural practices and
- ◉ Modern technological innovations
- ◉ Following national codes- NBC; ECBC
- ◉ Covering practically all typologies of buildings- 31 Ratings-- Residential, commercial, industrial, institutional, healthcare, metros, townships, villages, landscape, logistics, towns, SEZs
- ◉ Rating system applicable in all 5 climate zones
- ◉ National by choice-Global in performance
- ◉ IGBC has 100-point based system comprising of 52 parameters -including 12 core points,-- which are mandatory& 40 others
- ◉ Four levels of certification -certified, silver, gold and platinum
- ◉ -- awarded based on number of points earned.
- ◉ -- minimum points required for certification - 40
- ◉ - Certification valid for 3 years from date of issue.
- ◉ Require revalidation after three years.

# GODREJ SOHRABJI BUILDING- HYDERABAD- INDIA'S FIRST PLATINUM RATED BUILDING



# INDIAN BUSINESS SCHOOL- MOHALI



# SUZLON ONE EARTH - PUNE



# IGBC RATING SYSTEMS

An important development in the growth of green building movement in India is the launch of the following IGBC Green Building Rating Systems:

IGBC Green New Buildings

IGBC Green Existing Buildings

IGBC Green Homes

IGBC Green Residential Societies

IGBC Green Interiors

IGBC Green Healthcare

IGBC Green Schools

IGBC Green Factory Buildings

IGBC Green Data Center

IGBC Green Campus

IGBC Green Villages

IGBC Green Townships

IGBC Green Cities

IGBC Green Existing Cities

IGBC Green SEZs

IGBC Green Landscapes

IGBC Green Mass Rapid Transit System

IGBC Green Existing Mass Rapid Transit System

Government Incentives to IGBC Projects

IGBC Green Affordable Housing

IGBC Health and Well-being Rating

IGBC Green Resort Rating

Renewal of IGBC Green Rating

IGBC Green Service Building

All the IGBC rating systems are voluntary, consensus based, market-driven building. The rating systems are based on the five elements of the nature (Panchabhutas) and

Quick

# OVERVIEW AND PROCESS OF RATING

- ◎ IGBC Green New Buildings rating system
- ◎ -- addresses green features under following 7 categories:
  - ▣ Sustainable Architecture and Design
  - ▣ Site Selection and Planning
  - ▣ Water Conservation
  - ▣ Energy Efficiency
  - ▣ Building Materials and Resources
  - ▣ Indoor Environmental Quality
  - ▣ Innovations and Development

# Parameters for Evaluating Green Buildings(52= 10 Mandatory+42 Others)

## i. Sustainable Architecture & Design- 5/5

- Integrated design approach,
- Site preservation,
- Passive Architecture

## ii Site Selection and Planning - 14/14

- basic amenities, --proximity to local transport, natural topography, tree preservation, heat island reduction, low emitting vehicle,
- outdoor light pollution, facilities for construction workers etc

## iii. Water Conservation -- 18/19

- Rain water harvesting - roof/non-roof,
- efficient plumbing fixtures, Sustainable landscape design ,
- waste water treatment/recycling, water metering

## iv Energy Conservation --28/30

- use of Chloro-fluoro-carbon-free equipment,
- Minimum energy consumption , enhanced energy efficiency,
- On/off site renewable energy generation,
- energy saving measures in appliances / other equipment
- energy metering and management



# PARAMETERS FOR EVALUATING GREEN BUILDINGS:

## ● V. Building Materials/Resources-

16/16

- handling of construction waste materials,
- reuse of salvaged materials,
- using green building materials, products and equipment
- organic waste management- post occupation,
- waste segregation- post occupation

## ● vi Indoor Environment Quality-

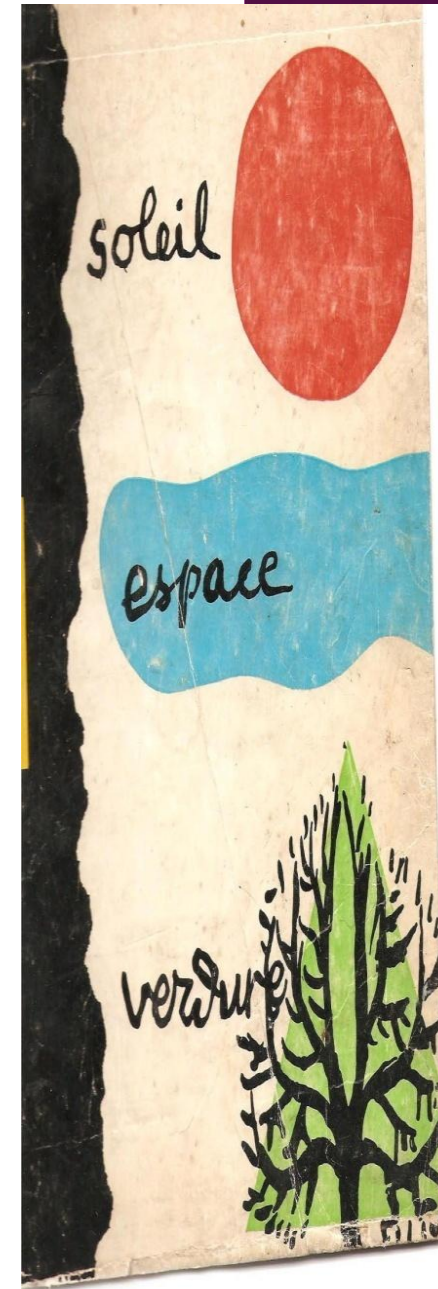
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- tobacco smoke control,
- fresh air ventilation ,
- CO2 monitoring,
- low emitting compound materials, paints and adhesives,
- Day lighting,-- outdoor view,
- indoor/outdoor pollution
- Indoor Air Quality management during construction,
- Indoor Air Quality testing after construction/ before occupation

## vii. Innovations and Development --

7/7

- Innovations in design process,
- optimisation of structural design,
- Waste water reuse during construction.
- IGBC accredited professional



| IGBC Green New Buildings Rating System Checklist |                                             | Points Available         |                           |
|--------------------------------------------------|---------------------------------------------|--------------------------|---------------------------|
|                                                  |                                             | Owner-occupied Buildings | Tenant-occupied Buildings |
| Modules                                          |                                             | 100                      | 100                       |
| Sustainable Architecture and Design              |                                             | 5                        | 5                         |
| SA Credit 1                                      | Integrated Design Approach                  | 1                        | 1                         |
| SA Credit 2                                      | Site Preservation                           | 2                        | 2                         |
| SA Credit 3                                      | Passive Architecture                        | 2                        | 2                         |
| Site Selection and Planning                      |                                             | 14                       | 14                        |
| SSP Mandatory Requirement 1                      | Local Building Regulations                  | Required                 | Required                  |
| SSP Mandatory Requirement 2                      | Soil Erosion Control                        | Required                 | Required                  |
| SSP Credit 1                                     | Basic Amenities                             | 1                        | 1                         |
| SSP Credit 2                                     | Proximity to Public Transport               | 1                        | 1                         |
| SSP Credit 3                                     | Low-emitting Vehicles                       | 1                        | 1                         |
| SSP Credit 4                                     | Natural Topography or Vegetation            | 2                        | 2                         |
| SSP Credit 5                                     | Preservation or Transplantation of Trees    | 1                        | 1                         |
| SSP Credit 6                                     | Heat Island Reduction, Non-roof             | 2                        | 2                         |
| SSP Credit 7                                     | Heat Island Reduction, Roof                 | 2                        | 2                         |
| SSP Credit 8                                     | Outdoor Light Pollution Reduction           | 1                        | 1                         |
| SSP Credit 9                                     | Universal Design                            | 1                        | 1                         |
| SSP Credit 10                                    | Basic Facilities for Construction Workforce | 1                        | 1                         |
| SSP Credit 11                                    | Green Building Guidelines                   | 1                        | 1                         |
| Water Conservation                               |                                             | 18                       | 19                        |
| WC Mandatory Requirement 1                       | Rainwater Harvesting, Roof & Non-roof       | Required                 | Required                  |
| WC Mandatory Requirement 2                       | Water Efficient Plumbing Fixtures           | Required                 | Required                  |
| WC Credit 1                                      | Landscape Design                            | 2                        | 2                         |
| WC Credit 2                                      | Management of Irrigation Systems            | 1                        | 1                         |
| WC Credit 3                                      | Rainwater Harvesting, Roof & Non-roof       | 4                        | 4                         |
| WC Credit 4                                      | Water Efficient Plumbing Fixtures           | 5                        | 5                         |
| WC Credit 5                                      | Wastewater Treatment and Reuse              | 5                        | 5                         |
| WC Credit 6                                      | Water Metering                              | 1                        | 2                         |

# RATING OF NEW GREEN BUILDINGS

| Modules                                 |                                                                 | Points Available         |                           |
|-----------------------------------------|-----------------------------------------------------------------|--------------------------|---------------------------|
|                                         |                                                                 | Owner-occupied Buildings | Tenant-occupied Buildings |
| <b>Energy Efficiency</b>                |                                                                 | <b>28</b>                | <b>30</b>                 |
| EE Mandatory Requirement 1              | Ozone Depleting Substances                                      | Required                 | Required                  |
| EE Mandatory Requirement 2              | Minimum Energy Efficiency                                       | Required                 | Required                  |
| EE Mandatory Requirement 3              | Commissioning Plan for Building Equipment & Systems             | Required                 | Required                  |
| EE Credit 1                             | Eco-friendly Refrigerants                                       | 1                        | 1                         |
| EE Credit 2                             | Enhanced Energy Efficiency                                      | 15                       | 15                        |
| EE Credit 3                             | On-site Renewable Energy                                        | 6                        | 8                         |
| EE Credit 4                             | Off-site Renewable Energy                                       | 2                        | 2                         |
| EE Credit 5                             | Commissioning, Post-installation of Equipment & Systems         | 2                        | 2                         |
| EE Credit 6                             | Energy Metering and Management                                  | 2                        | 2                         |
| <b>Building Materials and Resources</b> |                                                                 | <b>16</b>                | <b>16</b>                 |
| BMR Mandatory Requirement 1             | Segregation of Waste, Post-occupancy                            | Required                 | Required                  |
| BMR Credit 1                            | Sustainable Building Materials                                  | 8                        | 8                         |
| BMR Credit 2                            | Organic Waste Management, Post-occupancy                        | 2                        | 2                         |
| BMR Credit 3                            | Handling of Waste Materials, During Construction                | 1                        | 1                         |
| BMR Credit 4                            | Use of Certified Green Building Materials, Products & Equipment | 5                        | 5                         |
| <b>Indoor Environmental Quality</b>     |                                                                 | <b>12</b>                | <b>9</b>                  |
| IEQ Mandatory Requirement 1             | Minimum Fresh Air Ventilation                                   | Required                 | Required                  |
| IEQ Mandatory Requirement 2             | Tobacco Smoke Control                                           | Required                 | Required                  |
| IEQ Credit 1                            | CO <sub>2</sub> Monitoring                                      | 1                        | 1                         |
| IEQ Credit 2                            | Daylighting                                                     | 2                        | 2                         |
| IEQ Credit 3                            | Outdoor Views                                                   | 1                        | 1                         |

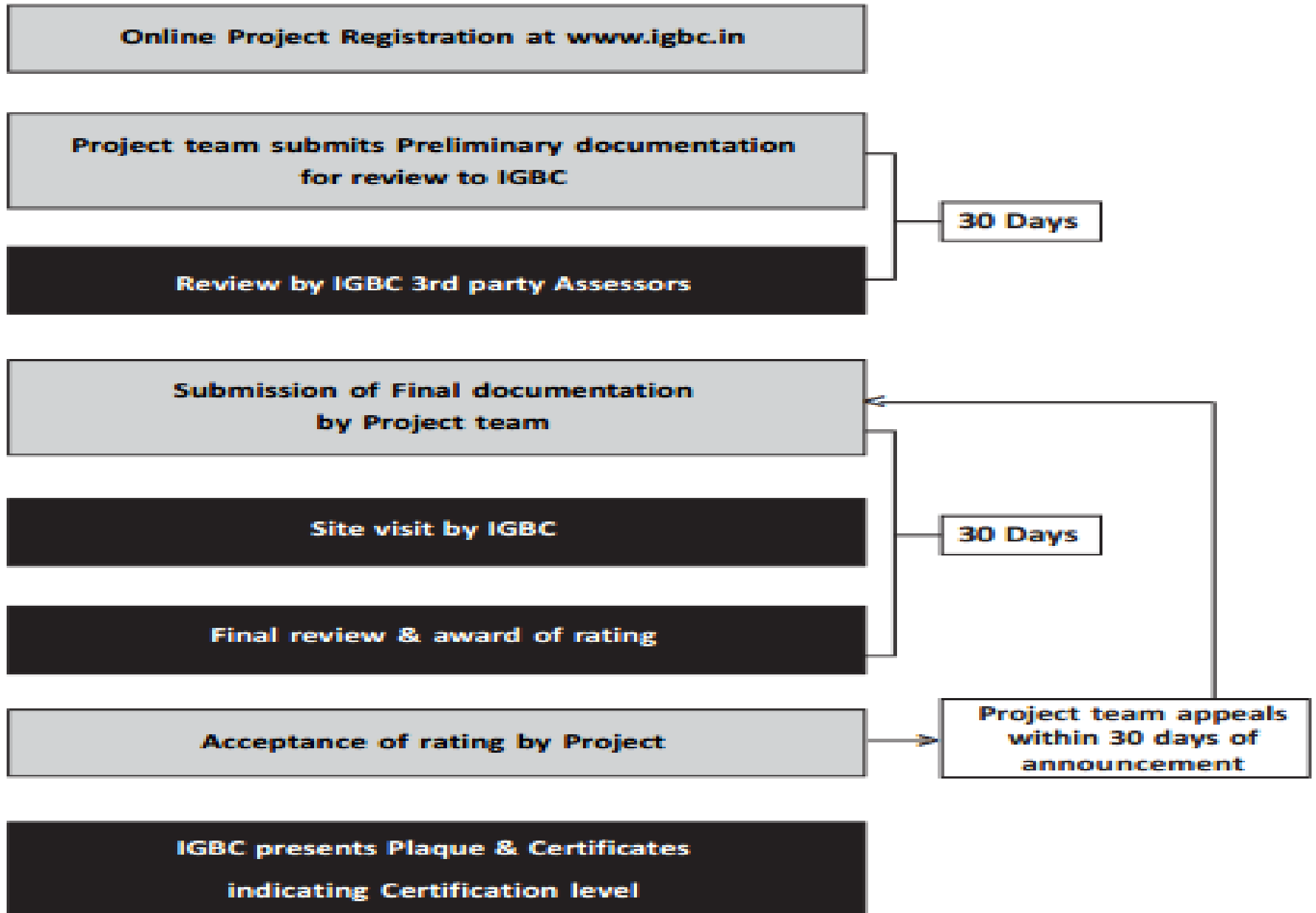
# RATING OF NEW GREEN BUILDINGS

| Modules                           |                                                                     | Points Available         |                           |
|-----------------------------------|---------------------------------------------------------------------|--------------------------|---------------------------|
|                                   |                                                                     | Owner-occupied Buildings | Tenant-occupied Buildings |
| IEQ Credit 4                      | Minimise Indoor and Outdoor Pollutants                              | 1                        | 1                         |
| IEQ Credit 5                      | Low-emitting Materials                                              | 3                        | 3                         |
| IEQ Credit 6                      | Occupant Well-being Facilities                                      | 1                        | -                         |
| IEQ Credit 7                      | Indoor Air Quality Testing, After Construction and Before Occupancy | 2                        | -                         |
| IEQ Credit 8                      | Indoor Air Quality Management, During Construction                  | 1                        | 1                         |
| <b>Innovation and Development</b> |                                                                     | <b>7</b>                 | <b>7</b>                  |
| ID Credit 1                       | Innovation in Design Process                                        | 4                        | 4                         |
| ID Credit 2                       | Optimisation in Structural Design                                   | 1                        | 1                         |
| ID Credit 3                       | Waste Water Reuse, During Construction                              | 1                        | 1                         |
| ID Credit 4                       | IGBC Accredited Professional                                        | 1                        | 1                         |

The threshold criteria for certification levels are as under:

| Certification Level | Owner-occupied Buildings | Tenant-occupied Buildings | Recognition             |
|---------------------|--------------------------|---------------------------|-------------------------|
| Certified           | 40 - 49                  | 40 - 49                   | Best Practices          |
| Silver              | 50 - 59                  | 50 - 59                   | Outstanding Performance |
| Gold                | 60 - 74                  | 60 - 74                   | National Excellence     |
| Platinum            | 75 -100                  | 75 - 100                  | Global Leadership       |

## Certification Process



# FEE - CERTIFICATION- FEB 15, 2020

| Membership Category         | Base Fee           |                                                                         |                                                                          |                     | Additional fee for Projects with multiple buildings including common basements |
|-----------------------------|--------------------|-------------------------------------------------------------------------|--------------------------------------------------------------------------|---------------------|--------------------------------------------------------------------------------|
|                             | 5,000 sq.m & below | 5,001 sq.m to 20,000 sq.m                                               | 20,001 sq.m to 50,000 sq.m                                               | 50,001 sq.m & above | For each building with built-up area 5,001 sq.m and above                      |
|                             | Flat Fee (INR)     | Based on sq.m (INR)                                                     | Based on sq.m (INR)                                                      | Flat Fee (INR)      | Flat Fee (INR)                                                                 |
| <b>IGBC Founding Member</b> | 1,80,000           | INR 2,15,000 plus INR 11.25 per additional sq.m over & above 5,000 sq.m | INR 4,25,000 plus INR 11.25 per additional sq.m over & above 20,000 sq.m | 8,25,000            | 50,000                                                                         |
| <b>IGBC Annual Member</b>   | 1,90,000           | INR 2,30,000 plus INR 11.50 per additional sq.m over & above 5,000 sq.m | INR 4,40,000 plus INR 11.50 per additional sq.m over & above 20,000 sq.m | 8,40,000            | 50,000                                                                         |
| <b>Non-Member</b>           | 2,00,000           | INR 2,40,000 plus INR 11.50 per additional sq.m over & above 5,000 sq.m | INR 4,50,000 plus INR 11.50 per additional sq.m over & above 20,000 sq.m | 8,50,000            | 50,000                                                                         |

\* Fee is exclusive of Goods and Services Tax (GST)

\* The fee structure is applicable to both Owner-occupied and Tenant-occupied projects

\* Parking areas need not be considered as part of the built-up area

\* Registration, Precertification, Provisional Certification and Certification fees are non-refundable

\* Membership discounts can be availed only if the Project Owner or Developer is a member of IGBC



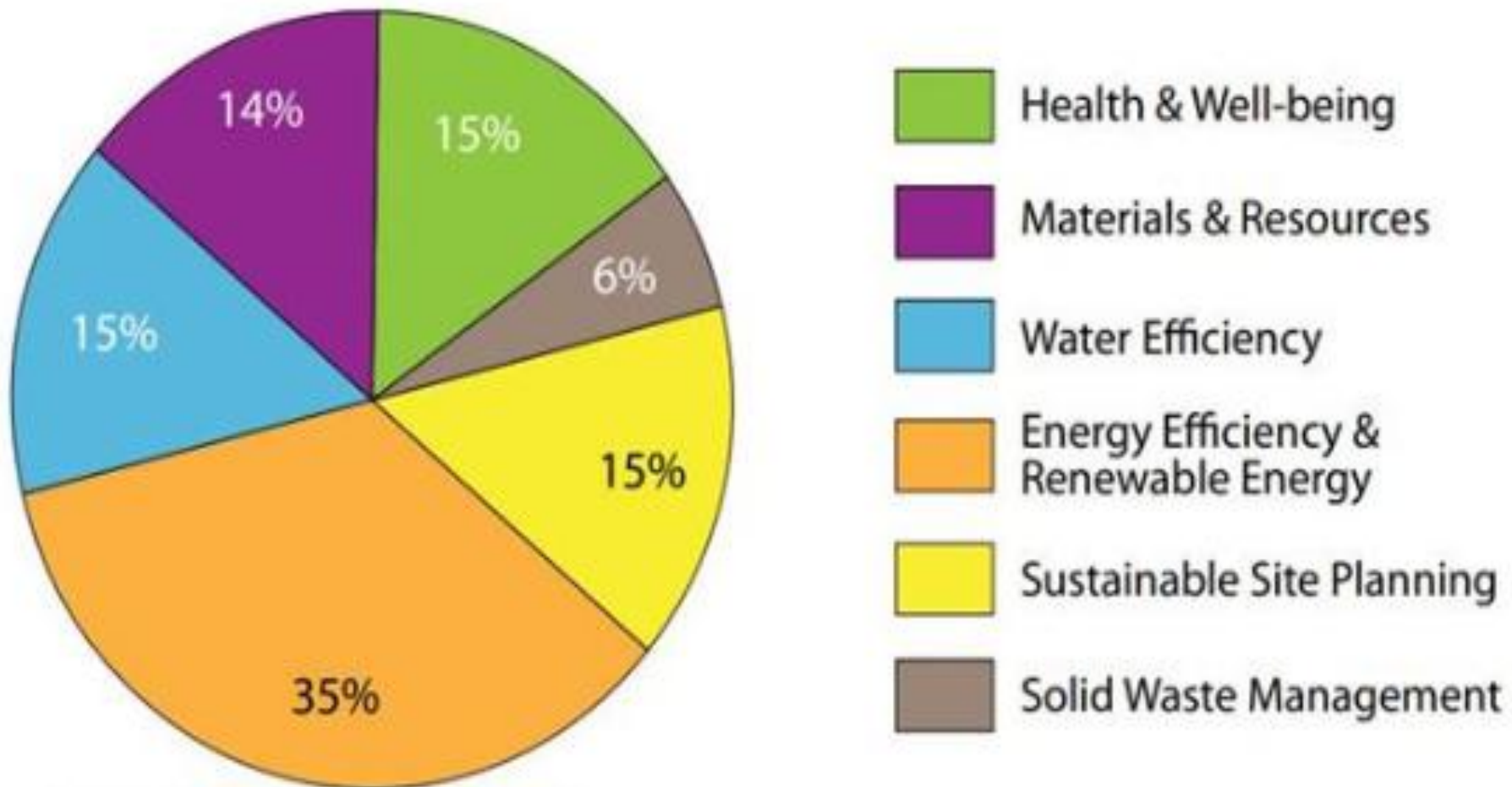
◎ Green Rating  
for Integrated  
Habitat  
Assessment---  
**GRIHA**

# GREEN RATING FOR INTEGRATED HABITAT ASSESSMENT- GRIHA-- INTRODUCTION

- ◉ Green Rating for Integrated Habitat Assessment (GRIHA)
- ◉ jointly developed by TERI( The Energy and Research Institute) /Ministry of New and Renewable Energy, Government of India.
- ◉ A green building design evaluation system
- ◉ Buildings rated in a three-tier process.
  - ◉ i. Online submission of documents-- as per prescribed criteria
  - ◉ ii. Site visit
  - ◉ iii. Evaluation of building by team of professionals/ experts from GRIHA Secretariat.
- ◉ GRIHA rating system consists of 34 criteria
- ◉ --Broadly categorised in four different sections.
  - ◉ ( 1) Site selection and site planning,
  - ◉ (2) Conservation and efficient utilization of resources-- Energy/ water/building material/waste management
  - ◉ (3) Building operation and maintenance
  - ◉ (4) Innovations.
- ◉ Rating awarded based on stars- 1 to 5, depending on score
- ◉ Minimum score needed - 50

# GRIHA RATING

Figure 1: Weighting of various criteria as per GRIHA



Source: Majumdar, M. (2008).TERI



# GRIHA (Green Rating for Integrated Habitat Assessment)

India's own green building rating

2000

- TERI conducted over 100 building audits
- TERI Retreat constructed as Green building

Rail Nirman Nilayam, Secunderabad



2007



Ministry of New and Renewable Energy, Govt

- MNRE adopts GRIHA as National Rating system for green buildings
- ECBC code released in India

Grand Chola, ITC Hotels Limited, Chennai



Administrative building for PCNTDA, Pune



2009



- Committee of secretaries: 3 star GRIHA mandatory for all Govt. Buildings
- CPWD adopts GRIHA
- Acknowledged as an innovative tool by UN



- GRIHA adopted by PCMC (Premium discounts to developers and property tax rebate for buyers announced in PCMC for GRIHA rated projects)
- EC linked to GRIHA pre-certification
- Committee of secretaries recommends up scaling of GRIHA
- ADaRSH and CREDAI sign MoU

Akshay Urja Bhawan HAREDA, Panchkula



2011



- Launch of GRIHA LD rating for large development
- GRIHA app launched for android
- GRIHA new user friendly metro design website launched
- GRIHA adopted in Noida (FAR incentive for GRIHA rated projects in Noida)
- GRIHA adopted in Greater Noida (FAR incentive for GRIHA rated projects in Greater Noida)

SIDBI Training Center, Bhubaneswar



2013



- SVA GRIHA adopted by PCMC (Premium discounts to developers and property tax rebate for buyers announced in PCMC for SVA GRIHA rated projects)
- GRIHA adopted in Punjab (FAR incentive for GRIHA rated projects in Punjab)
- GRIHA adopted in Kerala

VVIP Circuit House, Pune



2015



- Launch of GRIHA & GRIHA LD v.2015
- Government of West Bengal, Department of Municipal Affairs adopts GRIHA
- FAR for GRIHA projects in Rajasthan
- FAR for GRIHA projects in Punjab
- FAR for AUDA (Ahmedabad urban development authority)

SDB 7&8, Infosys Limited, Chennai



Fortis Memorial Research Institute, Gurgaon



SABIC Research & Technology Pvt. Ltd, Bangalore



Panedas Residence, Guatemala City



Indira Paryavaran Bhawan, New Delhi



Manipal University Campus, Jaipur



2005



- TERI GRIHA released indigenous green building rating of INDIA

- National mission on sustainable habitat launched



- Evaluators' and trainers' programme launched



- Launch SVA GRIHA rating for Buildings less than 2,500 sq.m
- GRIHA product catalogue launched
- Guidelines for large development launched
- Concessional rate of interest for GRIHA rated projects by SIDBI



- Launch of GRIHA Prakriti rating for existing day schools
- GRIHA app for iOS launched
- MoUD, Delhi Division, Govt FAR incentive for GRIHA rated projects
- MoU signed between USGBC and TERI
- Sikkim adopts GRIHA

2014



United Nations Framework Convention on Climate Change

**GRIHA** recognized as India's own green building rating system in **INDIA's INDC** submitted to **UNFCCC**.

DEVELOPED BY SUPPORTED BY

2008

2010

2012



Ministry of New and Renewable Energy, Govt

# GRIHA RATING SYSTEMS

## 1. GRIHA AH (Affordable Housing)

- GRIHA AH Version 1 feasibility checklist

## 2. – GRIHA EB (Existing Buildings)

### 3 GRIHA

- EB Version 1 feasibility checklist –
- GRIHA V 2019 feasibility checklist
- GRIHA V 2015 feasibility checklist –
- GRIHA Version 3 self- evaluation checklist –
- GRIHA Version 2 self -evaluation checklist –

## 4. GRIHA for Existing Day Schools

- GRIHA Version 2 self evaluation checklist –

## 5GRIHA LD

- GRIHA LD V 2015 feasibility checklist –
- GRIHA LD self evaluation checklist

## 6 SVA GRIHA--SVAGRIHA self evaluation checklist –

## 7.GRIHA for Cities

- GRIHA for CITIES self evaluation checklist –

# GRIHA RATING

GRIHA is a 100 point system consisting of some core points, which are mandatory, while the rest are optional.

Different levels of certification (one star to five stars) are awarded based on the number of points earned. The minimum score for certification is 50.

| Points achieved | GRIHA Rating |
|-----------------|--------------|
| 50-60           | ★            |
| 61-70           | ★ ★          |
| 71-80           | ★ ★ ★        |
| 81-90           | ★ ★ ★ ★      |
| 91-100          | ★ ★ ★ ★ ★    |

|             |                                                                                         |
|-------------|-----------------------------------------------------------------------------------------|
| Criterion 1 | Site Selection                                                                          |
| Criterion 2 | Preserve and protect landscape during construction/compensatory depository forestation. |
| Criterion 3 | Soil conservation (post construction)                                                   |
| Criterion 4 | Design to include existing site features                                                |
| Criterion 5 | Reduce hard paving on site                                                              |
| Criterion 6 | Enhance outdoor lighting system efficiency                                              |
| Criterion 7 | Plan utilities efficiently and optimize on-site circulation efficiency                  |
| Criterion 8 | Provide minimum level of sanitation/safety facilities for construction workers          |
| Criterion 9 | Reduce air pollution during construction                                                |

# GRIHA RATING

|              |                                                                                                                           |
|--------------|---------------------------------------------------------------------------------------------------------------------------|
| Criterion 10 | Reduce landscape water demand                                                                                             |
| Criterion 11 | Reduce building water use                                                                                                 |
| Criterion 12 | Efficient water use during construction                                                                                   |
| Criterion 13 | Optimize building design to reduce conventional energy demand                                                             |
| Criterion 14 | Optimize energy performance of building within specified comfort limits                                                   |
| Criterion 15 | Utilization of fly-ash or equivalent industrial/agricultural waste as recommended by BIS in building structures           |
| Criterion 16 | Reduce embodied energy of construction is reduced by adopting material efficient technologies and/or low-energy materials |
| Criterion 17 | Use low-energy materials in Interiors                                                                                     |
| Criterion 18 | Renewable energy utilization                                                                                              |
| Criterion 19 | Renewable energy based hot water system                                                                                   |
| Criterion 20 | Waste water treatment                                                                                                     |
| Criterion 21 | Water recycle and reuse (including rainwater)                                                                             |
| Criterion 22 | Reduction in waste during construction                                                                                    |
| Criterion 23 | Efficient Waste segregation                                                                                               |

# GRIHA RATING

|              |                                                                                   |
|--------------|-----------------------------------------------------------------------------------|
| Criterion 24 | Storage and disposal of wastes                                                    |
| Criterion 25 | Resource recovery from waste                                                      |
| Criterion 26 | Use of low-VOC paints/adhesives/sealants                                          |
| Criterion 27 | Minimize ozone depleting substances                                               |
| Criterion 28 | Ensure water quality                                                              |
| Criterion 29 | Acceptable outdoor and indoor noise levels                                        |
| Criterion 30 | Tobacco and smoke control                                                         |
| Criterion 31 | Provide at least the minimum level of accessibility for persons with disabilities |
| Criterion 32 | Energy audit and validation                                                       |
| Criterion 33 | Operation and Maintenance                                                         |
| Criterion 34 | Innovation Points                                                                 |

 **SVA GRIHA**

# SVAGRIHA (SMALL VERSATILE AFFORDABLE- GRIHA

- ◉ -- SVAGRIHA - a simplified, faster, easier/ more affordable green building rating system
- ◉ -- functions as a design cum-rating tool.
- ◉ --for projects with built-up area < 2500 sqm.
- ◉ -- help in designing /rating of individual residences, small offices, commercial and institutional buildings.- except Industries
- ◉ -Rating based on 14 criteria-- analyzed using software tool-- comprising simplified calculators.
- ◉ -- Calculators filled for areas / quantities of materials by architect/consultant-- using information from construction drawings -
- ◉ When completed-- tool will inform architect/consultant number of points achieved -- in particular criterion/ overall points.

# SVAGRIHA (SMALL VERSATILE AFFORDABLE- GRIHA

- ◎ *Precertification rating* --For assess performance at designing stage, /avail incentives from local authorities, wherever applicable, was introduced..
- ◎ *Rating Process*
  - *Registration*
  - *Submission of drawings, declarations and other documents as required (quantity estimates) to GRIHA Council*
  - *Assessment/review as per SVAGRIHA*
  - *Feedback to project team*
  - *mandatory for each project to achieve a certain number of minimum points in each category as mentioned in the SVAGRIHA manual.*
  - *Award of letter and certificate*

# SVAGRIHA (SMALL VERSATILE AFFORDABLE- GRIHA --EVALUATION

SVAGRIHA evaluates projects on the following 14 criteria:

| Criterion number | Criterion name                                                                                         | Points |
|------------------|--------------------------------------------------------------------------------------------------------|--------|
| 1                | Reduce UHIE and maintain native vegetation cover on site                                               | 6      |
| 2                | Passive architectural design and systems                                                               | 4      |
| 3                | Good fenestration design for reducing direct heat gain and glare while maximising daylight penetration | 6      |
| 4                | Efficient artificial lighting system                                                                   | 2      |
| 5                | Thermal efficiency of building envelope                                                                | 2      |
| 6                | Use of energy efficient appliances                                                                     | 3      |
| 7                | Use of renewable energy on site                                                                        | 4      |
| 8                | Reduction in building and landscape water demand                                                       | 5      |
| 9                | Rainwater harvesting                                                                                   | 4      |
| 10               | Generate resource from waste                                                                           | 2      |
| 11               | Reduce embodied energy of building                                                                     | 4      |
| 12               | Use of low-energy materials in interiors                                                               | 4      |
| 13               | Adoption of green Lifestyle                                                                            | 4      |
| 14               | Innovation                                                                                             | 2      |
| Total            |                                                                                                        | 50     |

# SVAGRIHA (SMALL VERSATILE AFFORDABLE- GRIHA --EVALUATION

- Achieving SVAGRIHA rating-- project must achieve
  - 50% points in each category
  - ensuring project reduces overall environmental impact
  - not just impact through energy / water.

| Category      | Maximum points | Threshold points |
|---------------|----------------|------------------|
| Landscape     | 6              | 3                |
| Energy        | 21             | 11               |
| Water & waste | 11             | 6                |
| Materials     | 8              | 4                |
| Others        | 4              | 1                |

# SVAGRIHA (SMALL VERSATILE AFFORDABLE- GRIHA --EVALUATION

## Project scoring

| Points | Rating    |
|--------|-----------|
| 25-30  | ★         |
| 31-35  | ★ ★       |
| 36-40  | ★ ★ ★     |
| 41-45  | ★ ★ ★ ★   |
| 46-50  | ★ ★ ★ ★ ★ |

# ○ Leadership in Energy and Environmental Design -- LEED

# LEED CERTIFICATION

- ◉ Under LEED 2009, there are 100 possible base points-
- ◉ Criteria- 65 in all, 7 mandatory and 58 others
- ◉ distributed across six credit categories:
- ◉ -- Sustainable Sites
- ◉ -- Water Efficiency
- ◉ --Energy and Atmosphere",
- ◉ -- Materials and Resources",
- ◉ --Indoor Environmental Quality", and
- ◉ --Innovation in Design".
- ◉ Up to 10 additional points may be earned-- four for Regional Priority Credits, and six for Innovation in Design
- ◉ **Certification level**
- ◉ Buildings can qualify for four levels of certification:
- ◉ **Certified:** 40-49 points
- ◉ **Silver:** 50-59 points
- ◉ **Gold:** 60-79 points
- ◉ **Platinum:** 80 points and above

# LEED CERTIFICATION

## Evaluation Criteria of LEED India

| CREDIT           | Description                                                                     | Maximum Points   | Points Targeted  |
|------------------|---------------------------------------------------------------------------------|------------------|------------------|
| <b>SS</b>        | <b>Sustainable Sites</b>                                                        | <b>13</b>        | <b>11</b>        |
| <b>SS P1</b>     | <b>Erosion &amp; Sedimentation Control</b>                                      | <b>Mandatory</b> | <b>Mandatory</b> |
| <b>SS CR 1</b>   | Site selection                                                                  | 1                | 1                |
| <b>SS CR 2</b>   | Development density & Community connectivity                                    | 1                | 1                |
| <b>SS CR 3</b>   | Brownfield Redevelopment                                                        | 1                | 0                |
| <b>SS CR 4.1</b> | Alternative Transportation: Public Transportation Access                        | 1                | 1                |
| <b>SS CR 4.2</b> | Alternative Transportation: Low emission & alternative fuel refuelling stations | 1                | 1                |
| <b>SS CR 4.3</b> | Alternative Transportation: Parking capacity                                    | 1                | 1                |
| <b>SS CR 5.1</b> | Reduced site disturbance: Protect / restore habitat                             | 1                | 1                |
| <b>SS CR 5.2</b> | Reduced site disturbance: Development footprint                                 | 1                | 0                |
| <b>SS CR 6.1</b> | Stormwater design: Quantity control                                             | 1                | 1                |
| <b>SS CR 6.2</b> | Stormwater design: Quality control                                              | 1                | 1                |
| <b>SS CR 7.1</b> | Heat Island Effect, Non-roof                                                    | 1                | 1                |
| <b>SS CR 7.2</b> | Heat Island Effect, roof                                                        | 1                | 1                |
| <b>SS CR 8</b>   | Light pollution reduction                                                       | 1                | 1                |

# LEED CERTIFICATION

| WE        | Water Efficiency                                                | 6         | 5         |
|-----------|-----------------------------------------------------------------|-----------|-----------|
| WE CR 1.1 | Water efficient landscaping: reduce by 50%                      | 1         | 1         |
| WE CR 1.2 | Water efficient landscaping: no potable use or no irrigation    | 1         | 0         |
| WE CR 2   | Water efficiency in AC systems                                  | 1         | 1         |
| WE CR 3   | Innovative wastewater technologies                              | 1         | 1         |
| WE CR 4.1 | Water use reduction: 20% reduction                              | 1         | 1         |
| WE CR 4.2 | Water use reduction: 30% reduction                              | 1         | 1         |
| EA        | Energy & Atmosphere                                             | 17        | 15        |
| EA PR 1   | Fundamental Building Systems Commissioning                      | Mandatory | Mandatory |
| EA PR 2   | Minimum Energy Performance                                      | Mandatory | Mandatory |
| EA PR 3   | CFC reduction in HVAC & R equipment                             | Mandatory | Mandatory |
| EA CR 1   | Optimize Energy Performance                                     | 10        | 9         |
| EA CR 2   | Onsite Renewable Energy: 2.5%,5%,7.5%                           | 3         | 3         |
| EA CR 3   | Additional Commissioning                                        | 1         | 1         |
| EA CR 4   | Ozone Depletion                                                 | 1         | 1         |
| EA CR 5   | Measurement & Verification                                      | 1         | 1         |
| EA CR 5   | Green Power:50%                                                 | 1         | May Be    |
| MR        | Material & Resources                                            | 13        | 4         |
| MR PR 1   | Storage & Collection of Recyclables                             | Mandatory | Mandatory |
| MR CR 1.1 | Building Reuse:maintain 75% of existing walls, floors and roof  | 1         | 0         |
| MR CR 1.2 | Building Reuse:maintain 100% of existing walls, floors and roof | 1         | 0         |

# LEED CERTIFICATION

|           |                                                         |   |        |
|-----------|---------------------------------------------------------|---|--------|
| MR CR 1.3 | Building Reuse:maintain 100% shell + 50% non shell      | 1 | 0      |
| MR CR 2.1 | Construction waste management: Divert 50% from disposal | 1 | 1      |
| MR CR 2.2 | Construction waste management: Divert 75% from disposal | 1 | 1      |
| MR CR 3.1 | Resource reuse: 5%                                      | 1 | 0      |
| MR CR 3.2 | Resource reuse: 10%                                     | 1 | 0      |
| MR CR 4.1 | Recycled content: 5%                                    | 1 | 0      |
| MR CR 4.2 | Recycled content: 10%                                   | 1 | 0      |
| MR CR 5.1 | Regional materials:20%                                  | 1 | 1      |
| MR CR 5.2 | Regional materials:50%                                  | 1 | 1      |
| MR CR 6   | Rapidly renewable materials:5% of building materials    | 1 | 0      |
| MR CR 7   | Certified wood:50% of wood based materials              | 1 | May Be |

# LEED CERTIFICATION

| EQ        | Indoor Environmental Quality                                | 15        | 13        |
|-----------|-------------------------------------------------------------|-----------|-----------|
| EQ PR 1   | Minimum IAQ Performance                                     | Mandatory | Mandatory |
| EQ PR 2   | Environmental Tobacco Smoke Control                         | Mandatory | Mandatory |
| EQ CR 1   | Outdoor air delivery monitoring                             | 1         | 1         |
| EQ CR 2   | Increased ventilation                                       | 1         | 1         |
| EQ CR 3.1 | Construction IAQ management plan: during construction       | 1         | 1         |
| EQ CR 3.2 | Construction IAQ management plan: before construction       | 1         | 1         |
| EQ CR 4.1 | Low emitting materials: adhesives & sealants                | 1         | 1         |
| EQ CR 4.2 | Low emitting materials: paints                              | 1         | 1         |
| EQ CR 4.3 | Low emitting materials: carpet                              | 1         | 1         |
| EQ CR 4.4 | Low emitting materials: Composite wood & Agrifiber products | 1         | 1         |
| EQ CR 5   | Indoor chemical & pollutant source control                  | 1         | 1         |
| EQ CR 6.1 | Controllability of systems: Lighting                        | 1         | 1         |
| EQ CR 6.2 | Controllability of systems: Thermal Comfort                 | 1         | 1         |
| EQ CR 7.1 | Thermal Comfort: Design                                     | 1         | 1         |
| EQ CR 7.2 | Thermal Comfort: Verification - 6 to 18 months              | 1         | 1         |
| EQ CR 8.1 | Daylight : daylight for 75% of spaces                       | 1         | 0         |
| EQ CR 8.2 | Views: Views for 90% of spaces                              | 1         | 0         |
|           | <b>Innovation &amp; Design Process</b>                      | <b>5</b>  | <b>5</b>  |
| CR 1.1    | Innovation in Design                                        | 1         | 1         |
| CR 1.2    | Innovation in Design                                        | 1         | 1         |
| CR 1.3    | Innovation in Design                                        | 1         | 1         |
| CR 1.4    | Innovation in Design                                        | 1         | 1         |
| CR 2      | LEED Accredited Professional                                | 1         | 1         |
|           | <b>TOTAL POINTS</b>                                         | <b>69</b> | <b>53</b> |

# LEED has 4 levels of certificates



Less Points

More Points

- ◉ **GEM Rating - Green and Eco-Friendly Movement----**
- ◉ **SUSTAINABILITY CERTIFICATION PROGRAM-**
- ◉ **ASSOCHAM-**  
Association of Chambers and Trade Associations

# GEM-SUSTAINABILITY CERTIFICATION PROGRAM

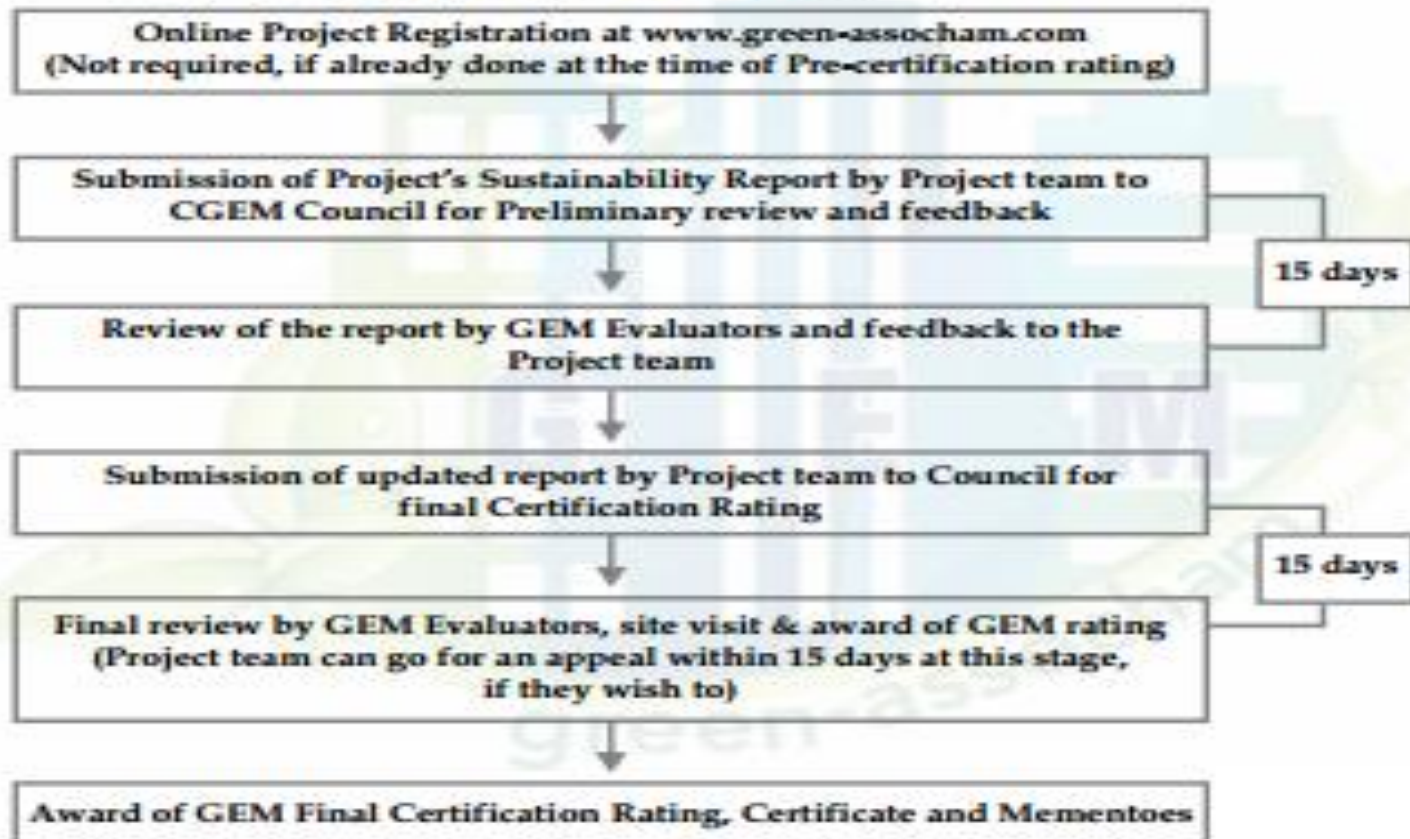
- ◉ ASSOCHAM has launched the “**GEM Sustainability (Green) Certification Program**”- **Green and Eco-Friendly Movement**
- ◉ -- to promote environment friendly green building design and construction.
- ◉ GEM Sustainability Certification Rating Program--- based upon **BEE ECBC 2017 and NBC 2016**.
- ◉ award Sustainability Certification Rating to;
- ◉ -- Housing, - Urban Developments, -- Residential, Commercial, -- Hotels, College, Universities, Schools, -- Factory buildings and related developments. GEM Sustainability Certification Rating -- **Twenty Eight Principles**
- ◉ . Points awarded for each Suggested requirement achieved.
- ◉ Scale-- 0-130 point .
- ◉ Project -- achieve **GEM 1 to GEM 5** rating levels
- ◉ --depending upon project design -including building architectural and elevation design, materials used during construction, HVAC, lighting and plumbing system designs, water and energy consumption of the building.
- ◉ --all Essential Principle requirements must be fulfilled along with a minimum number of Principle points.
- ◉ GEM 5 -- highest achievable rating

# GEM-SUSTAINABILITY CERTIFICATION PROGRAM

## Final Certification Rating Process

Council will firmly evaluate the documentation within Thirty days timeframe.

### Final Certification Rating Process



# GEM-SUSTAINABILITY CERTIFICATION PROGRAM

## GEM Sustainability Certification Rating Program – Points List

### GEM Sustainability Certification Program - Points List

| S. No. | Principles   | Description                                                  | Maximum Points |
|--------|--------------|--------------------------------------------------------------|----------------|
| 1      | Principle-1  | Government Approved Plans                                    | E              |
| 2      | Principle-2  | Construction Management Best Practices                       | E              |
| 3      | Principle-3  | Parking for Building Occupants                               | E              |
| 4      | Principle-4  | Landscape Best Practices                                     | 4              |
| 5      | Principle-5  | Preserve and Plant Trees Onsite                              | 2              |
| 6      | Principle-6  | High Albedo Materials - Roof and Non-roof                    | 6              |
| 7      | Principle-7  | Rainwater Harvesting - Recharge and/ or Reuse                | 4              |
| 8      | Principle-8  | Install Low Flow Water Fixtures                              | 7              |
| 9      | Principle-9  | On-site Treatment of Grey & Black Water & Reuse for Flushing | 6              |
| 10     | Principle-10 | Irrigation Best Practices                                    | 3              |
| 11     | Principle-11 | Measurement of Energy and Water Consumption                  | 6              |
| 12     | Principle-12 | Post-occupancy Waste Management                              | 4              |
| 13     | Principle-13 | Onsite Conversion of Organic Waste                           | 4              |

# GEM-SUSTAINABILITY CERTIFICATION PROGRAM

|    |              |                                                     |            |
|----|--------------|-----------------------------------------------------|------------|
| 14 | Principle-14 | Amenities for fundamental needs and daily commute   | 6          |
| 15 | Principle-15 | Best Practices for Universal Building Design        | 5          |
| 16 | Principle-16 | Reduced Exposure to VOC                             | 3          |
| 17 | Principle-17 | No Use of Halogenated Hydrocarbons                  | 2          |
| 18 | Principle-18 | Sustainable Development of Construction Engineering | 12         |
| 19 | Principle-19 | Local Sourcing of Construction Materials            | 6          |
| 20 | Principle-20 | Judicious use of hard wood and soft wood            | 4          |
| 21 | Principle-21 | Energy Management Best Practices                    | 12         |
| 22 | Principle-22 | Efficient Electric Equipment and Systems            | 5          |
| 23 | Principle-23 | Use of Imperishable Energy Resources                | 8          |
| 24 | Principle-24 | Optimal Use of Natural Light                        | 6          |
| 25 | Principle-25 | Healthy Indoor Air Quality                          | 6          |
| 26 | Principle-26 | Training and Capacity Building of Project Team      | 2          |
| 27 | Principle-27 | Activities for Corporate Social Responsibility      | 2          |
| 28 | Principle-28 | Going the Extra Miles                               | 5          |
|    |              | <b>Total Points</b>                                 | <b>130</b> |

# GEM-SUSTAINABILITY CERTIFICATION PROGRAM

## GEM Levels

- ◉ GEM 1- All essential requirements and 40 - 49 points--
- ◉ GEM 2--All essential requirements and 50 - 64 points
- ◉ GEM 3-- All essential requirements and 65 - 84 points
- ◉ GEM 4-- All essential requirements and 85 - 104 points
- ◉ GEM 5-- All essential requirements and 105 points or above

# ◎ Incentives for Green Buildings

# Government Incentives for IGBC Projects



सत्यमेव जयते  
Ministry of Environment, Forest  
& Climate Change



सत्यमेव जयते  
गुजरात सरकार  
Government of Gujarat



सत्यमेव जयते  
राजस्थान सरकार  
Government of Rajasthan



# Government Incentives for IGBC Projects

| S No | State                                                                                           | Incentive details                                                                                                                                                                         |
|------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | <b>Haryana</b>                                                                                  | 9%, 12% & 15% Additional FAR on Silver, Gold & Platinum rating                                                                                                                            |
| 2    | <b>Rajasthan</b>                                                                                | 7.5%, 10% & 15% Additional BAR on Silver, Gold & Platinum rating respectively; 50% cost reimbursement for Green measures                                                                  |
| 3    | <b>West Bengal</b>                                                                              | 10% Additional FAR on Gold or above rating                                                                                                                                                |
| 4    | <b>Uttar Pradesh</b>                                                                            | 5% Additional FAR on Gold or above rating<br>50% IGBC fee reimbursement for hotel/resorts                                                                                                 |
| 5    | <b>Maharashtra</b><br><b>Pune Municipal</b><br><b>Pimpri Chichwad</b><br><b>Municipal Corp.</b> | Upto 7% additional FAR<br>3%, 5%, 7% Additional FAR on Silver, Gold & Platinum rating<br>Upto 50% Discount in Premium for Developers &<br>upto 15% Discount in Property tax for Occupants |
| 6    | <b>Andhra Pradesh</b>                                                                           | 20% reduction in Permit fees and stamp duty fees on property transfer within 3 years                                                                                                      |
| 7    | <b>Himachal Pradesh</b>                                                                         | 10% Additional FAR on Gold or above rating                                                                                                                                                |
| 8    | <b>Jharkhand</b>                                                                                | 3%, 5%, 7% Additional FAR on Silver, Gold & Platinum rating                                                                                                                               |
| 9    | <b>Punjab</b>                                                                                   | 5% Additional FAR on Gold or above rating &<br>100% reduction in building scrutiny fees                                                                                                   |
| 10   | <b>Gujarat</b>                                                                                  | up to 50% of consulting charges for industrial project; 50% IGBC fee reimbursement for hotel/resorts                                                                                      |
| 11   | <b>Kerala</b>                                                                                   | 0% reduction in One time building tax, up to 1% reduction in Stamp duty and up to 20% reduction in Property tax                                                                           |

\*Except MGCM, Municipal Corp. included in MMR, New Mumbai notified area, NAINA, MIDC, MIHAN, Hill Stations, MADC, MSRDC, PCNTDA, Eco Sensitive Zone areas, Lonavala Municipal Council

# GOV. INCENTIVES TO GREEN BUILDING PROJECTS

**Ministry of Environment, Forest and Climate Change - MoEFCC**— fast track environmental clearance for certified green building projects

- ◉ **Government of Punjab**

- PUDA-- additional 5% (FAR)-- free of charge-
- 100 %exemption of building scrutiny fee- for Gold rated buildings

- ◉ **Urban Development Dept, Govt of Rajasthan**

- ◉ -- additional free 7.5%, 10% and 15% FAR
- ◉ for Silver, Gold ,Platinum rated projects

- ◉ **Government of West Bengal**

- additional 10% FAR -- Department of Municipal Affairs
- additional 10% FAR -- Gold -- Government of West Bengal (New Kolkata Development Authority) .

- ◉ Green building projects in **MSME sector**-- financial assistance at concessional rates-**Small Industries Development Bank of India (SIDBI)**

## **Government of Maharashtra--Urban Dev Department—**

- additional FAR of 3%, 5% ,7% for Silver, Gold and Platinum respectively.

**Public Works Department (PWD)**-- renovation of existing buildings / development of all new government buildings in Maharashtra --carried out as per IGBC Green Building Rating system

# GOV. INCENTIVES TO GREEN BUILDING PROJECTS

- ◉ **Government of Uttar Pradesh—**
  - ◉ Additional 5% FAR-- free of charge --for Gold rated Buildings
  - ◉ Additional 5% FAR free- Greater Noida Industrial Dev Authority --for gold rated projects
- ◉ **Government of Andhra Pradesh**
  - 25% subsidy-- on fixed capital investment for buildings-MSME /large projects
- ◉ **Municipal Administration and Urban Dev Department:**
  - ◉ 20% Reduction on Permit Fees
  - ◉ If property sold within three year--, one-time reduction of 20% on Duty on Transfer of Property
- ◉ **Government of Himachal Pradesh --**
  - ◉ -- additional 10% FAR for projects rated Gold / Platinum
- ◉ **Urban Dev and Housing Department, Jharkhand—**
  - ◉ -- additional FAR of 3%, 5% , 7% for Silver, Gold , Platinum buildings.
- ◉ **Government of Haryana (Town & Country Planning Department),**
  - ◉ --additional FAR -6%, 9% , 12% for Silver, Gold , Platinum buildings
- ◉ **Industries Commissionerate, Government of Gujarat**
  - ◉ -- 50% of consulting charges or Rs. 2.50 Lacs, whichever is less,
  - ◉ -- for Industrial building >2,000 Sq. Mts. built up area which obtain green rating
- ◉ **Pune Municipal Corporation (PMC),Pune Metro Region Dev Authori --**
  - ◉ offers an additional FAR of 3%, 5% and 7% for Silver, Gold and Platinum .

◎ ***Thanks***