



ASSOCHAM  
Global Headquarters



**Green and Eco-friendly Movement**

**GEM Sustainability  
Certification Program**

**(Existing Building)  
Reference Guide**



**THE ASSOCIATED CHAMBERS OF COMMERCE AND INDUSTRY OF INDIA**

**ASSOCHAM Corporate Office:**

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**The Associated Chambers of Commerce and Industry of India**





Green and Eco-friendly Movement

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(Existing Building)  
Reference Guide

Care for the Mother Earth

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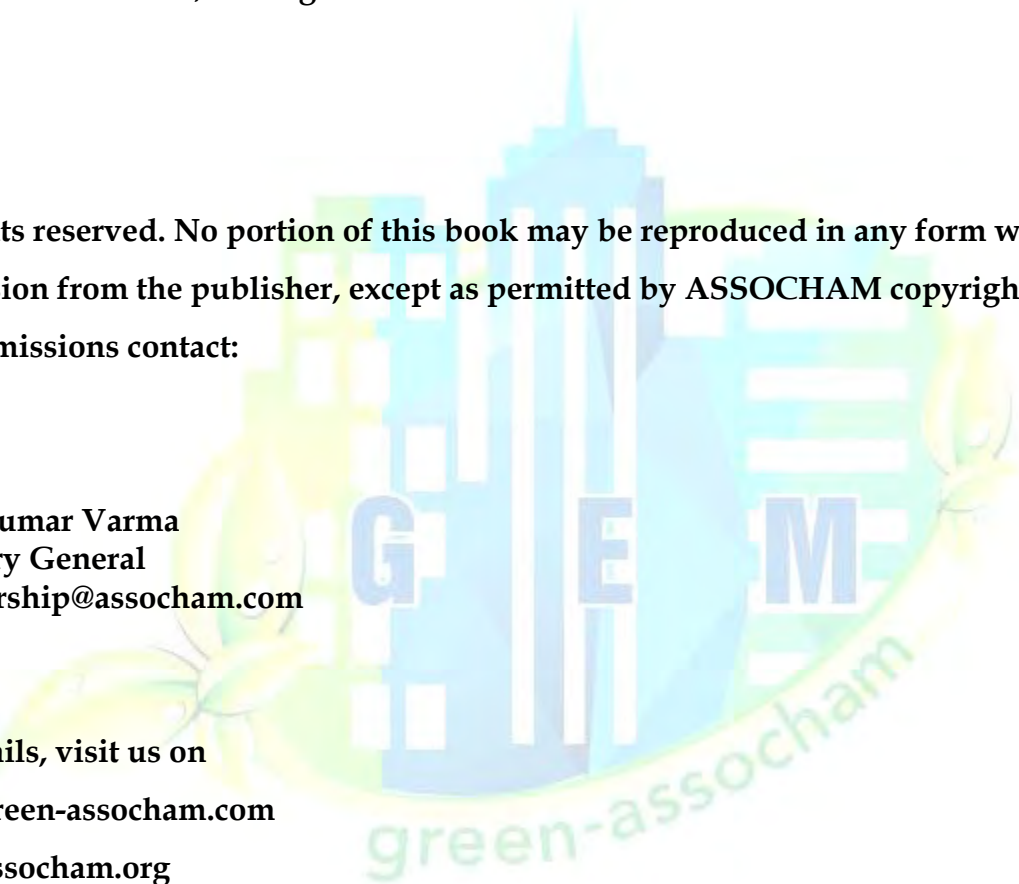
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## Chairman's Message

Sustainable building design is about building the future, not just a structure. Sustainability is a form of development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Effective sustainable design of a building is a comprehensive approach to select and integrate design, planning, products and processes that account for consumer satisfaction and environmental conservation.

Less than 5% of buildings in India are Green Certified till date. India is undergoing rapid urbanisation and the urban population is set to rise from 33% of India's population to 52% by 2030. This will obviously put a lot of strain on our natural resources.

Sustainable design process empowers the designers to better evaluate and anticipate the environmental, economical and social impacts and costs of building products. Evaluation of Sustainability parameters at the start of a project lead to better project planning and that leads to greater overall success of the project.

**Green and Eco-Friendly Movement (GEM)** is a great opportunity to create awareness about sustainable development and **ASSOCHAM** being the apex chamber can do it in a most efficient way.

**Pankaj R. Dharkar**

A handwritten signature in black ink, appearing to be 'P. Dharkar', written in a cursive style.

**Chairman**  
**National Council for Green & Eco-friendly Movement (CGEM)**  
**ASSOCHAM**



### *"Care for the Mother Earth"*

**ASSOCHAM** is a not for profit organization initiated its endeavour of value creation for Indian industry in 1920. It is also referred to as the "Chamber of Chambers" having in its fold more than 400 Industry Chambers, Trade Associations and serving more than 4,00,000 Corporate Members from all over. It has contributed significantly by playing a catalytic role in shaping up the Trade, Commerce and Industrial environment of the country. ASSOCHAM derives its strength from its Promoter Chambers and other Industry/Regional Chambers/Associations spread all over the country. ASSOCHAM has more than 100 Expert Committees covering the entire gamut of economic activity in India.

India's Sustainable building market is estimated to double by 2022 at 10 billion sqft, valuing around USD 35-50 billion, driven by increasing awareness level, environmental benefits and government support. India has emerged as one of the leading countries in terms of sustainable building projects and ranks only second after US in terms of number of green projects and built-up area. Still this is only about 5% of total buildings in India, and hence there is huge potential for further penetration of sustainable building design.



In order to complement in India's Sustainability Movement and take it to the next level, ASSOCHAM has now taken a Green Initiative to care for the Mother Earth and formed a **Council for Green and Eco-friendly Movement (CGEM)** that governs the Green Building Certification Program "**GEM Sustainability Certification Rating**



**Program (GEM)**” with the objective to promote environment friendly green building design and construction.

**GEM Sustainability Certification Rating Program (GEM)** is based upon BEE ECBC 2017 and NBC 2016. Through this initiative, ASSOCHAM has started certifying Sustainability Rating to Housing, Commercial Offices, Hotels, Colleges, Universities, Hospitals, Schools, Factory buildings and related developments. All existing, under construction or upcoming projects can register for GEM certification rating program.

GEM Sustainability Certification Rating Program aims to address the sustainability of a given development throughout its lifecycle from design through construction to operation. GEM Sustainability Certification Reference Guide provides design guidance and detailed requirements for rating a project’s potential performance.

GEM Sustainability Certification Rating has been organized into **Twenty Seven Principles** that are fundamental to a more sustainable development. These Principles include –

1. Natural landscape and tree plantation - Conserving, preserving and restoring the regional natural environment and habitat
2. Save energy - Targeting energy conservation through improved building envelop, reduced demand, energy efficiency and renewable sources
3. Save water - Reducing water demand, encouraging efficient distribution, water treatment, reuse of treated water and alternative resources of water
4. Regional and recycled materials – Considering regional and recycled materials when selecting and specifying materials. Reduce the use of virgin materials.
5. Natural light and fresh air - Improving quality and connectivity of outdoor and indoor spaces
6. Training and capacity building - Inter-disciplinary teamwork and training to deliver sustainable and quality product throughout the life of the project
7. Going the extra mile in building design and construction


## GEM Sustainability Certification Rating levels

There are some Essential and Suggested requirements of each Principle. Points are awarded for each Suggested requirement achieved.

There is a 0-130 point scale. Project will achieve **GEM 1 to GEM 5** rating levels as per the requirements fulfilled and scores achieved by the project. This depends upon the project design which includes building architectural and elevation design, materials used during construction, HVAC, lighting and plumbing system designs, water and energy consumption of the building.

To achieve a GEM Sustainability Certification Rating, all Essential Principle requirements must be fulfilled along with a minimum number of Principle points. GEM 5 will be the highest achievable rating level in this program.

Project team can go directly for the **Final Certification** rating for Existing Buildings.

S. No.	Points scored	GEM levels	GEM
1	All essential requirements and 40 - 49 points	<b>GEM 1</b>	
2	All essential requirements and 50 - 64 points	<b>GEM 2</b>	
3	All essential requirements and 65 - 84 points	<b>GEM 3</b>	
4	All essential requirements and 85 - 104 points	<b>GEM 4</b>	
5	All essential requirements and 105 points or above	<b>GEM 5</b>	

Note: If the requirements prescribed by local competent authority are more stringent, those will be followed.

Key benefits of the certification –

1. Review of all design documents such as Architectural, Mechanical, Electrical, Plumbing and Landscape by Sustainability experts for further value addition from green building perspective.
2. Energy and water efficient building design that will reduce the energy and water consumption of the building.
3. Design of a building that will utilize maximum daylight, fresh air and provide healthy environment to the building occupants.
4. Sustainability Certification rating will give additional marketing mileage to the projects over other conventional buildings.

**Time frame for the award of rating -**

- A. **Final Certification Rating** - Council will firmly evaluate the documentation within Thirty days timeframe.

*Note - GEM Sustainability Certification Rating for Existing Building (GEM EB) shall be valid for three years. Rating shall be revalidated after three years.*

## ***ASSOCHAM Vision***

### ***1. Quality and Value addition***

*To add best quality and value to the projects we certify  
No compromise in quality!*

### ***2. Timeline***

*We understand the value of the precious time of our clients.  
We will firmly quality check the reports well within 20 days for pre-  
certification rating  
&  
Overall 30 days for final certification rating  
No delay at ASSOCHAM part!*

### ***3. Green at low cost***

*Green should not be the choice of elite only. Everyone should participate into  
it.  
No hidden charges. Discounted low fee for all!*

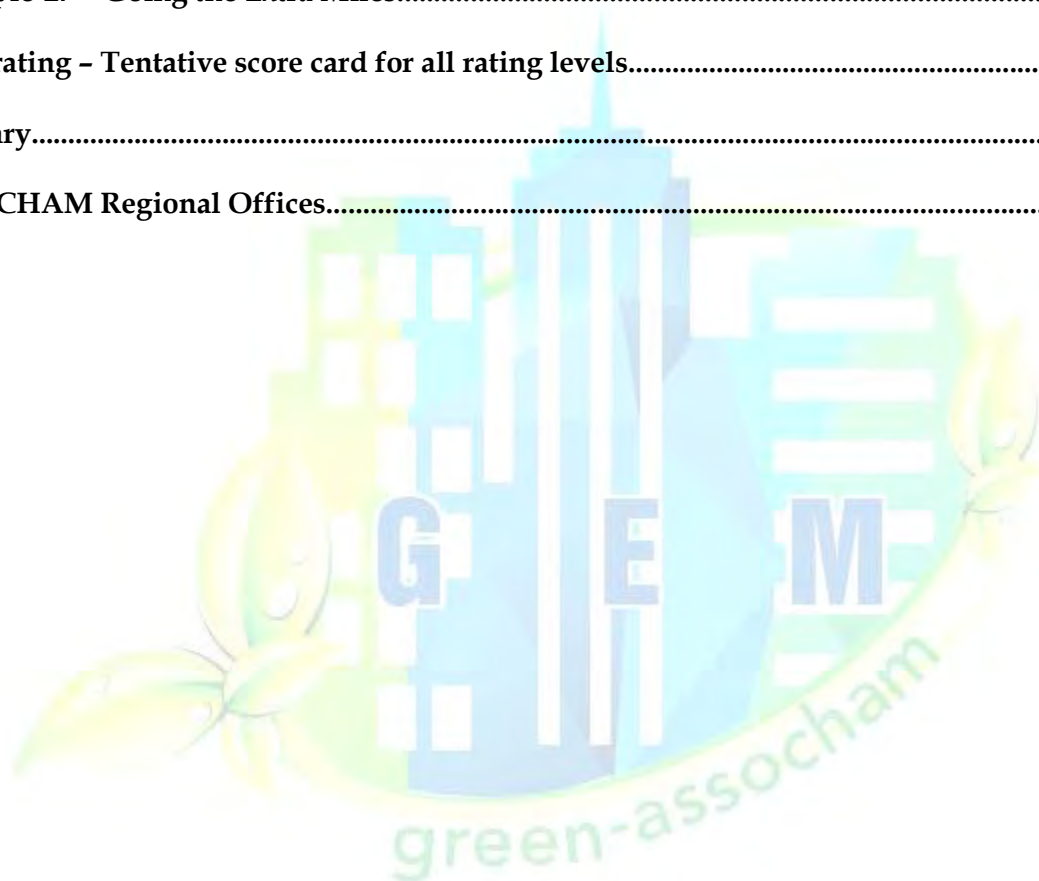
### ***4. Quick response***

*Resolving your queries is our first priority.  
Quick response to queries from project team and consultants!*

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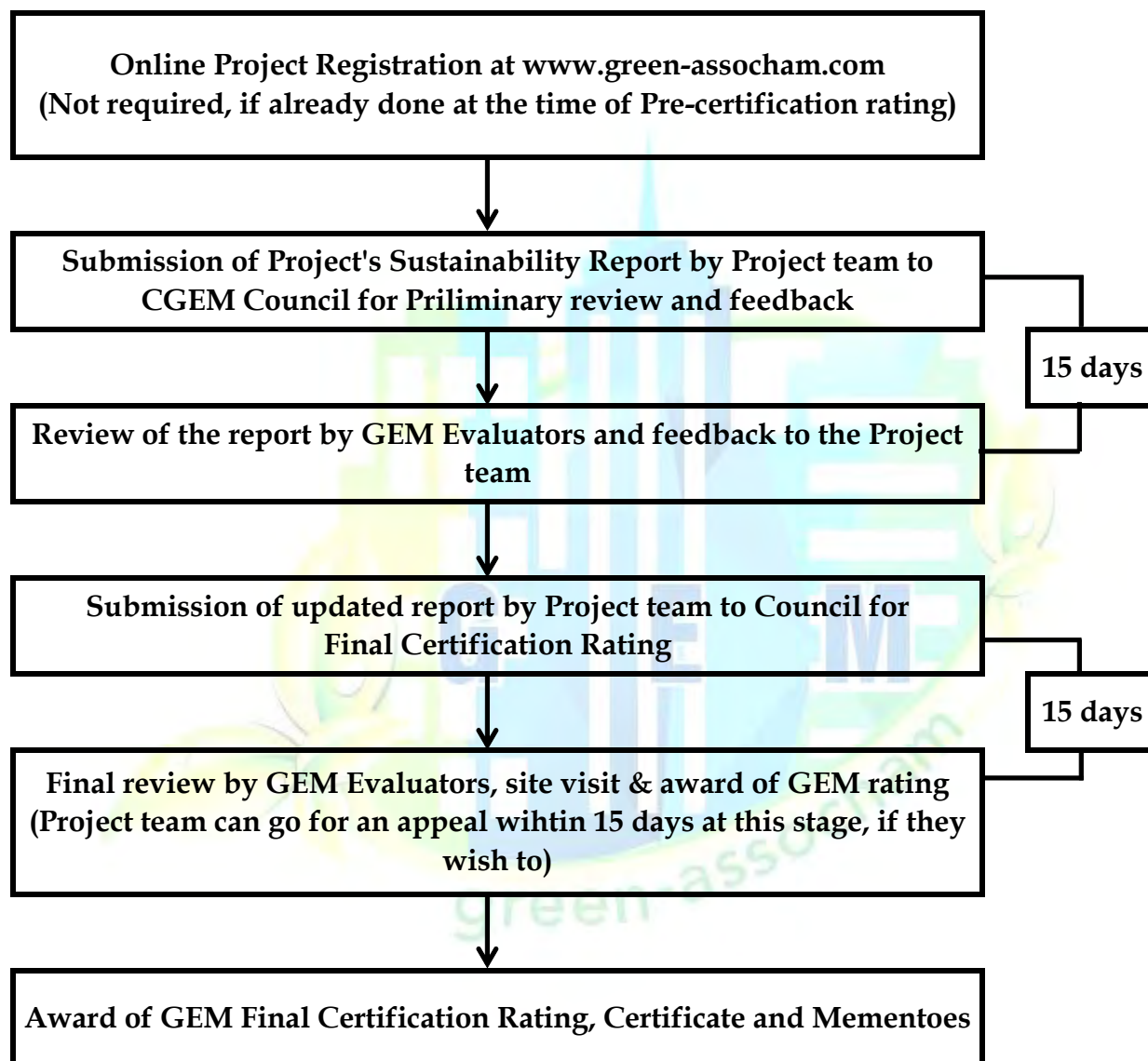
## GEM Sustainability Certification Program - Points List

GEM Sustainability Certification Program - Points List			
S. No.	Principles	Description	Maximum Points
1	Principle-1	Government Approved Plans	E
2	Principle-2	Parking for Building Occupants	2
3	Principle-3	Landscape Best Practices	4
4	Principle-4	Preserve and Plant Trees Onsite	2
5	Principle-5	High Albedo Materials - Roof and Non-roof	6
6	Principle-6	Rainwater Harvesting – Recharge and/ or Reuse	4
7	Principle-7	Install Low Flow Water Fixtures	7
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11	Principle-11	Post-occupancy Waste Management	4
12	Principle-12	Onsite Conversion of Organic Waste	4
13	Principle-13	Amenities for fundamental needs and daily commute	6
14	Principle-14	Best Practices for Universal Building Design	5
15	Principle-15	Reduced Exposure to VOC	3
16	Principle-16	No Use of Halogenated Hydrocarbons	2
17	Principle-17	Sustainable Development of Construction Engineering	12
18	Principle-18	Local Sourcing of Construction Materials	6
19	Principle-19	Judicious use of hard wood and soft wood	4
20	Principle-20	Energy Management Best Practices	12
21	Principle-21	Efficient Electric Equipment and Systems	5
22	Principle-22	Use of Imperishable Energy Resources	6
23	Principle-23	Optimal Use of Natural Light	6
24	Principle-24	Healthy Indoor Air Quality	6
25	Principle-25	Training and Capacity Building of Project Team	2
26	Principle-26	Activities for Corporate Social Responsibility	2
27	Principle-27	Going the Extra Miles	5
Total Points			130

## Final Certification Rating Process

Council will firmly evaluate the documentation within Thirty days timeframe.

### Final Certification Rating Process



## Principle-1 – Government Approved Plans

**Aim:** Project must have all necessary statutory approvals from applicable/competent government authorities.

### Requirements: (Essential)

Ensure that the building follows the guidelines of the local bylaws.

### Document to be provided at the time of Final Certification rating -

1. Government approved site plan with Site area, Built-up/FAR area and Parking details
2. Fit for occupancy certificate from the local competent authority or project Architect as applicable
3. No Objection Certificate from Chief Fire Officer or local competent authority as applicable
4. Environmental Clearance Certificate / Environmental Impact Assessment report from competent authority as applicable
5. Alternatively, provide owner declaration stating that the building follows the requirements of the local bylaws and required compliances from all the local competent authorities are in place

### Calculations and Methodology:

Site area, Built-up area (BUA), Floor area ratio (FAR) and Parking details mentioned in the Government approved site plan must be used for all respective Principles.

The building plans shall be clearly marked and indicate the complete fire protection arrangements and the means of access/escape for the proposed building with suitable legend along with Principle signs and symbols on the drawings. The same shall be duly signed/certified by a licensed Fire Consultant/ Architect.

Alternatively, owner declaration can be provided to confirm the compliances mentioned above.

### Documents to be submitted:

As listed in the Requirements above

## Principle-2 – Parking for Building Occupants

2 points

**Aim:** Project must meet or exceed the parking requirements as per local parking bylaws.

**Requirements:**

1. Provide parking as per local parking bylaws and Government approved site / parking plans (**Essential**)
2. Preferred parking for electric vehicles (2% of total parking spaces) (**1 point**)
3. Preferred parking for car pool/Van pool (2% of total parking spaces) (**1 point**)

**Calculations and Methodology:**

Project must provide the parking as per local parking bylaws and Government approved site / parking plans. Project can meet or exceed the parking requirements as per local parking bylaws. National Building Code (NBC) of India, 2016 can be followed to calculate the parking numbers and parking design where local parking bylaws do not exist.

Parking details mentioned in the Government approved site / parking plans must be used in all respective Principles. Dedicated parking shall be provided for bicycles, two wheelers and four wheelers, as per the local parking bylaws.

**Documents to be submitted: (as applicable)**

1. Government approved site plan with parking details
2. Copy of local parking bylaws
3. Site drawing showing the locations of preferred parking spaces
4. Photographs of the parking

## Principle-3 – Landscape Best Practices

4 points

**Aim:** Maximize natural landscape area and plant native / adaptive / drought tolerant flora onsite.

### Principle requirements:

1. Minimum landscape area requirements:
  - a. Residential projects:
    - i. At least 10% of site area **(1 point)**
    - OR
    - At least 15% of site area **(2 points)**
  - b. Industrial and institutional:
    - i. At least 12% of site area **(1 point)**
    - OR
    - At least 16% of site area **(2 points)**
  - c. Commercial and other projects:
    - i. At least 10% of site area **(1 point)**
    - OR
    - At least 15% of site area **(2 points)**
2. This covers the landscape area over mother earth only.
3. Plant native / adaptive / drought tolerant flora onsite for at least 35% of total landscape area. **(1 point)**
4. Environment friendly landscaping practices should be used like organic fertilizers, manual or electric landscape equipment. **(1 point)**
5. If the minimum landscape area requirements prescribed by local competent authority are more stringent, the same will be followed.

### **Calculations and Methodology:**

Project team should plant native / adaptive / drought tolerant plants species onsite to reduce landscape water demand. Potted plants cannot be considered for the compliance of above Principle requirements.

List of native plants, adaptive or drought tolerant flora must be approved by landscape architect or project Architect.

Site area must be taken from Government approved site plan / owner / project Architect declaration stating the site area. Site area must be consistent in all the Principles.

### **Documents to be submitted: (as applicable)**

1. Landscape drawing showing the landscape area and details of plants species planted at site
2. List of native plants, adaptive or drought tolerant flora approved by landscape architect or project Architect
3. Government approved site plan / owner / project Architect declaration
4. Total quantity of organic and inorganic fertilizers used in last one year along with the bills.
5. Photographs confirming above features



## **Principle-4 – Preserve and Plant Trees Onsite**

**2 points**

**Aim:** Onsite preservation of developed trees and plantation of more native / adaptive trees.

**Requirements:**

1. Plant tree saplings onsite as per following criteria that can develop into grown up trees: **(2 points)**
  - a. At least 5 trees saplings for site area up to 500 m<sup>2</sup>
  - b. At least 5 trees saplings for every additional 500 m<sup>2</sup> site area or part thereof

**Calculations and Methodology:**

Project team should plant native / adaptive trees and tree saplings to meet the requirements of this Principle. Potted plants cannot be considered for the compliance of this Principle.

**Documents to be submitted: (as applicable)**

1. Landscape plan showing the existing developed trees onsite
2. Landscape plan showing the location of new saplings planted onsite
3. Photographs of landscape confirming the above as applicable

## Principle-5 – High Albedo Materials - Roof and Non-roof

6 points

**Aim:** Use high albedo materials on exposed roof and non-roof hardscape areas to reduce the heat island effect as well as cooling energy consumption.

### Principle requirements:

Provide the following –

1. At least 40% of parking in the basement or stilt floor or covered with high albedo material **(1 point)**

OR

More than 60% of parking in the basement or stilt floor or covered with high albedo material for an additional point **(2 points)**

2. Open grid grass pavers and / or shade giving trees to cover at least 40% area of open surface parking, driveways and walkways **(2 points)**
3. Roof vegetation or high albedo materials or combination of both for more than 70% of exposed roof areas. Exposed roof does not include the areas covered by services provided on the roof. **(2 points)**

### Calculations and Methodology:

Roof vegetation and high albedo materials can save cooling energy use by directly reducing the heat gain through a building envelope and also by lowering the urban air temperature in the neighborhood of the building.

Roof vegetation and high albedo materials can be used on the rooftops, exposed surfaces of parking lots. Parking can be provided in the basement or stilt floor.

Open grid grass pavers and / or shade giving trees can be provided to cover at least 40% area of open surface parking, driveways and walkways.

Materials that look white reflect most of the radiations and have a high albedo whereas materials that appear dark absorb most of the radiation have a low albedo.

Use reflective coating with SRI more than 80 for low-slope surfaces with a slope of 2:12 or less and 30 to 65 for steep-slope surfaces with a slope of greater than 2:12. Solar Reflective Index (SRI) of perfectly black surface and a perfectly white surface can be considered as 0 and 100 respectively.

**Documents to be submitted: (as applicable)**

1. Drawings showing areas of application where roof vegetation / high albedo materials / reflective roof coatings / open grid grass pavers / shade giving trees are used in the project
2. Trade catalogue / brochure / test certificate of reflective roof coating used in the project
3. Copy of purchase bills / invoices of reflective roof coating
4. Site photographs confirming the above requirements



## Principle-6 – Rainwater Harvesting – Recharge and/ or Reuse

4 points

**Aim:** Utilize collected rainwater within the premises of the building to reduce post occupancy water demand and / or recharge the aquifers.

### Requirements:

1. Install a suitably designed rain water storage system and / or recharge pit to cater to roof and non-roof rain water. OR Verify the workability of existing system. Existing system should meet the intent.
2. Store and / or recharge at least 30% of daily rain water collected from all surfaces. **(1 point)**
3. Store and / or recharge more than 60% of daily rain water collected from all surfaces. **(2 points)**
4. Store and / or recharge more than 90% of daily rain water collected from all surfaces. **(4 points)**
5. Use the stored rain water for landscape / flushing / domestic applications as applicable.
6. If any competent government authority says that the ground water table is high and ground water recharging is not required, then the project shall provide a storage system to cater to rain water from roof surfaces only and reuse it for landscape / flushing / domestic applications as applicable. **(4 points)**
7. Quality of rain water should meet the standards of landscape / flushing / domestic use as applicable.

### Calculations and Methodology:

Recharge rain water from all surfaces by spreading or impounding water on the site to increase the infiltration through soil and percolation to the aquifers or inject water by bore wells directly into the aquifers. If ground water recharge is not feasible or not recommended by competent government authority, rain water storage can also be provided.

Provide de-silting chamber and oil and grease trap before intake of rain water harvesting system. Overflow of rain water harvesting system can go into the municipal drainage system.

Use following steps to estimate total volume of rain water generated within the premises of the building:

1. Take annual rainfall data (mm) occurred in last four consecutive years. Project team can add average monthly rainfall data for twelve months to get annual rainfall data for that year.
2. Take annual number of rainy days of respective years
3. Divide annual rainfall (mm) by number of rainy days of that year
4. One day average rain fall for four consecutive years will be available
5. Take arithmetic average of these four One day average rainfall values
6. This would be the average one day rain fall for estimating rain water runoff volume generated within the premises of the building
7. Use competent government website for monthly and annual rainfall data and number of rainy days
8. The days that recorded any amount of rainfall can be considered as Rainy Days.
9. Total runoff volume can be estimated by multiplying surface area with respective surface runoff coefficient and rainfall intensity of that place
10. Refer National Building Code of India (NBC), PART 9 for surface runoff coefficient and PART 11 for further details

**Documents to be submitted: (as applicable)**

1. Site drawings clearly showing all surface types
2. Rain water runoff volume calculation
3. Rain water harvesting system design brief
4. Site storm water layout showing roof and non-roof rain water harvesting system
5. Rain water storage tank and / or recharge pit cross sectional drawings
6. Plumbing drawings confirming the use of rain water
7. Site photographs of rain water collection, storage tank and / or recharge pit

## Principle-7 – Install Low Flow Water Fixtures

7 points

**Aim:** Project should install low flow water fixtures to reduce the demand of potable as well as non-potable water.

### Requirements:

1. Install efficient water fixtures with flow rates not more than the values listed below: **(1 point for each product)**
  - I. Water Closets should be dual flush type with flush rates 4.6 LPF and 2.6 LPF
  - II. Health Faucets = 6.5 LPM at a design pressure of 3 bar
  - III. Kitchen Sink Faucets = 4.5 LPM at a design pressure of 3 bar
  - IV. Wash Basin Faucets = 4.5 LPM at a design pressure of 3 bar
  - V. Showers (all types) = 6.5 LPM at a design pressure of 3 bar
  - VI. Urinals = 1.5 LPF
2. Install sensor based water fixtures (sink / basin faucets / urinals) with above flow rates in the common area applications. **(1 point)**
3. Project team can install flow restrictors / aerators in the existing fixtures to meet the intent.

All other water fixtures that are intended to fill the bucket and / or bath tub can be excluded from above requirements.

### Calculations and Methodology:

Install low flow and flush water fixtures in the project to reduce the potable and non-potable water demand. Water flow restrictors / aerators can also be installed in the high flow fixtures to make them appropriate as per the Principle requirements mentioned above.

### Documents to be submitted: (as applicable)

1. Trade catalogue or brochure of water fixtures



2. Trade catalogue or brochure of aerators installed in the water fixtures
3. Purchase bills / Invoice of water fixtures with exact make and codes of the products at the time of final certification
4. Site photographs of water fixtures confirming the installation



## Principle-8 – On-site Treatment of Grey and Black Water and Reuse for Flushing

6 points

**Aim:** Implement strategies for onsite treatment of Grey and Black water and reduce the potable water demand for flushing.

### Requirements:

1. Install on-site waste water treatment system and treat entire grey and black water from the project. Quality of treated water must meet the norms of Central / State Pollution Control Board (CPCB / SPCB) as applicable. **(2 points)**
2. Provide dual plumbing in all toilets for flushing in all tenant spaces, residential units and common area toilets as applicable. **(2 points)**
3. Use treated water for flushing such that at least 75% of total flushing water demand is fulfilled by the treated water. **(1 point)**

OR

If more than 95% of total flushing water demand shall be fulfilled by the treated water **(2 points)**

*Note: Project can use localized common public STP where it is mandated by the local competent authority. 2 points shall be awarded to the project in that case. In this case, project can use the treated water from other resources. Points will be awarded accordingly.*

### Calculations and Methodology:

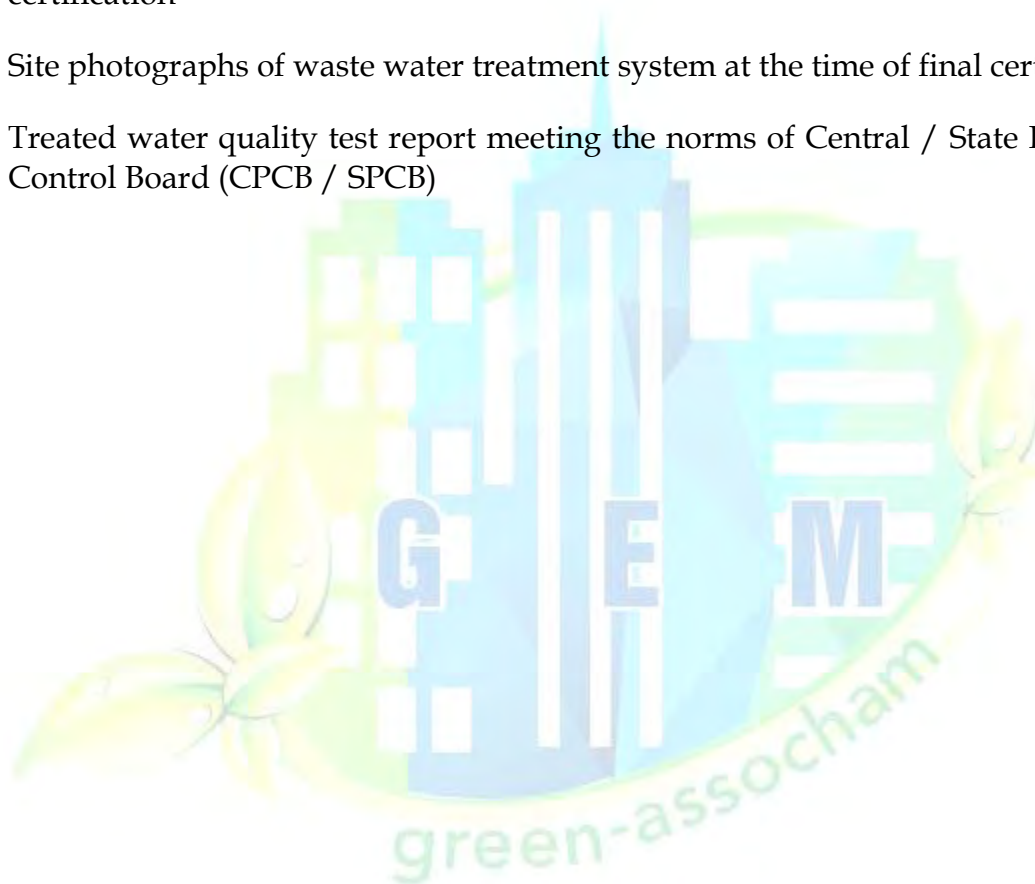
Install onsite grey and black water treatment system of capacity recommended by project's plumbing consultant in the plumbing design basis report (DBR). Provide dual plumbing in all toilets for flushing in all tenant spaces in commercial buildings, residential units and common area toilets as applicable.

Use treated / rain water for flushing such that at least 75% of flushing water demand can be fulfilled by the treated / rain water.

An additional point will be awarded if at least 95% of flushing water demand is fulfilled by the treated / rain water.

**Documents to be submitted: (as applicable)**

1. Plumbing Design Basis Report for on-site waste water treatment system capacity
2. Plumbing water single line diagram (SLD) confirming the dual plumbing line in all toilets
3. Trade catalogue or brochure of waste water treatment system
4. Purchase bills / Invoice of waste water treatment system at the time of final certification
5. Site photographs of waste water treatment system at the time of final certification
4. Treated water quality test report meeting the norms of Central / State Pollution Control Board (CPCB / SPCB)



## Principle-9 – Irrigation Best Practices

3 points

**Aim:** Use irrigation best practices to reduce the landscape water demand.

### Principle requirements:

1. Use treated water / rain water for landscape to reduce at least 50% of total landscape water demand **(1 point)**

OR

If more than 75% of total landscape water demand shall be fulfilled by treated water / rain water **(2 points)**

2. Use water efficient irrigation systems such as: **(1 point for any three strategies)**
  - a. Sprinklers for lawn and turf areas
  - b. Drip irrigation system for plants and trees
  - c. Time base controller on irrigation system
  - d. Moisture sensor controller on irrigation system

### Calculations and Methodology:

Use treated / rain water to meet at least 50% of landscape water demand. Baseline landscape water demand can be taken from the plumbing design report or estimated using 5.5 liters/m<sup>2</sup> of landscape area as applicable. Use sprinklers, drip irrigation system, time based controllers and moisture sensor controllers on the irrigation system to further reduce the landscape water demand.

### Documents to be submitted: (as applicable)

Provide the following for sprinklers, drip irrigation system, time based controllers and moisture sensor controllers:

1. Trade catalogue or brochure
2. Purchase bills / invoices
3. Site photographs

4. Plumbing water single line diagram (SLD) showing the use of treated water / rain water for irrigation



## Principle-10 – Measurement of Energy and Water Consumption

6 points

**Aim:** Project should install meters to measure Energy and Water consumptions of the project on daily/monthly basis.

**Requirements:**

1. Provide following energy meters: **(2 points for four meters, 3 points for six meters)**
  - a. Each tenant level / residential unit level / department level in case of industrial projects as applicable
  - b. Interior common area lighting including stilt and basement parking
  - c. Interior common area air-conditioning (reception, club house, gymnasium, games rooms etc.)
  - d. Separate meters for Interior lighting and HVAC applications for industrial projects
  - e. Exterior area lighting (landscape, surface parking, driveways)
  - f. Onsite renewable energy system
  - g. Onsite waste water treatment system
  - h. Water pumping (both domestic and flushing water)
  - i. Lifts and elevators
2. Provide water meters on following water end usages: **(2 points for three meters, 3 points for five meters)**
  - a. Domestic water
  - b. Flushing water
  - c. Irrigation water
  - d. Main municipal water
  - e. Bore well water



- f. Solar hot water system

**Calculations and Methodology:**

Energy meters should be capable of monitoring kWh, kW and Power factor.

Water metering at each tenant level and / or residential unit level is not required.

**Documents to be submitted: (as applicable)**

1. Provide following metering single line diagrams (SLD) showing the above meters
  - a. Electrical metering
  - b. Plumbing
2. Provide following for energy and water meters:
  - a. Trade catalogue or brochure
  - b. Purchase bills / invoices
3. Site photographs confirming the installation of energy and water meters

## Principle-11 – Waste Management

4 points

**Aim:** Implement a strategy for waste collection, segregation and disposal.

**Requirements:**

1. Provide separate waste bins for biodegradable and non biodegradable wastes at each residential unit level / tenant level or floor level as applicable **(2 points)**
2. Provide central waste collection yard(s) for collection of biodegradable and non biodegradable wastes from the entire project. **(2 points)**

**Calculations and Methodology:**

Separate waste bins must be provided for at least four major waste items to be collected from the site as applicable.

Separate bins must be provided for lamps, batteries and e-wastes as applicable.

Implement strategies for suitable disposal of the waste. Wastes must not be sent to the landfill.

Total solid waste generated by the project occupants can be estimated at the rate listed below as per NBC 2016:

- I. Residential refuse: 0.3 to 0.6 kg/person/day
- II. Commercial refuse : 0.1 to 0.2 kg/person/day
- III. Institutional refuse : 0.05 to 0.2 kg/person/day

Out of the total solid waste generated, 40% may be taken as organic waste and 60% as inorganic waste.

Total number of occupants can be taken from the project's Mechanical/Electrical/Plumbing design basis reports (MEP DBRs) or as prescribed by project design team.

Agreement with waste recyclers for picking up of waste and safe recycle of waste like paper, metal, plastic, glass, e-waste etc.

**Documents to be submitted: (as applicable)**

1. Complete site plan and all typical floor plans showing the locations of waste bins
2. Site photographs confirming the installation of waste bins at site
3. List of responsible personal/ official for building's facility management
4. Monthly waste generation report for last one year
5. Copy of agreement with waste recyclers



## Principle-12 – Onsite Conversion of Organic Waste

4 points

**Aim:** Implement a strategy for conversion of organic waste into a nutrient-rich, usable material to encourage zero waste from project.

**Requirements:**

1. Provide separate waste bins for biodegradable and non biodegradable wastes at each residential unit level / tenant level or floor level as applicable
2. Provide central waste collection yard(s) for collection of biodegradable and non biodegradable wastes from the entire project
3. Implement strategies for onsite treatment of entire organic waste

**Calculations and Methodology:**

Biodegradable waste such as food scrap, garden and lawn clippings should be converted into manure or biogas instead of being sent to landfills.

Strategies include but are not limited to vermin-compost, organic waste convertor and biogas plant etc. Project team shall share the capacity sizing calculation for onsite biodegradable waste management system.

Total solid waste generated by the project occupants can be estimated at the rate listed below as per NBC 2016:

- I. Residential refuse: 0.3 to 0.6 kg/person/day
- II. Commercial refuse : 0.1 to 0.2 kg/person/day
- III. Institutional refuse : 0.05 to 0.2 kg/person/day

Out of the total solid waste generated, 40% may be taken as organic waste and 60% as inorganic waste.

Total number of occupants can be taken from the project's Mechanical/Electrical/Plumbing design basis reports (MEP DBRs) or as prescribed by project design team.

**Documents to be submitted: (as applicable)**

1. Site drawing showing the location of biodegradable waste management system

2. Technical description of biodegradable waste management system implemented onsite
3. Trade catalogue or brochure biodegradable waste management system
4. Purchase bills / invoices of biodegradable waste management system
5. Site photographs confirming the installation of biodegradable waste management system
6. List of responsible personal/official for building's facility management
7. Monthly waste generation report for last one year



## Principle-13 – Amenities for fundamental needs and daily commute

6 points

**Aim:** Encourage the developers to provide the amenities for fundamental needs and develop the sites near to such facilities.

### Requirements:

Provide following facilities within the project site – **(2 points for any four facilities)**

- |                                 |                             |
|---------------------------------|-----------------------------|
| 1. Common hall / Break out room | 5. Play ground for activity |
| 2. Games room                   | 6. Canteen                  |
| 3. Gymnasium                    | 7. First aid facility       |
| 4. Swimming pool                |                             |

Develop the site near to the following facilities (within the site or 1 km pedestrian distance from the main entrance of the site) - **(2 points for any six facilities)**

- |                  |                               |
|------------------|-------------------------------|
| 1. Pharmacy shop | 5. Restaurant / hotel         |
| 2. Grocery store | 6. Barbershop / beauty parlor |
| 3. Bakery        | 7. Public park / Garden       |
| 4. ATM / Bank    | 8. Hardware and sanitary shop |

Develop the site near to the following facilities (within 1.5 km distance from the main entrance of the site) - **(2 points for any two facilities)**

- |                          |  |
|--------------------------|--|
| 1. School                | 5. Metro station   |
| 2. College / University  | 6. Super Market / Shopping Mall  |
| 3. Hospital / Clinic     | 7. Car / Van pool / Bus shuttle services provided for at least 20% of regular occupants by the project owner / developer |
| 4. Bus stop / Auto stand |  |

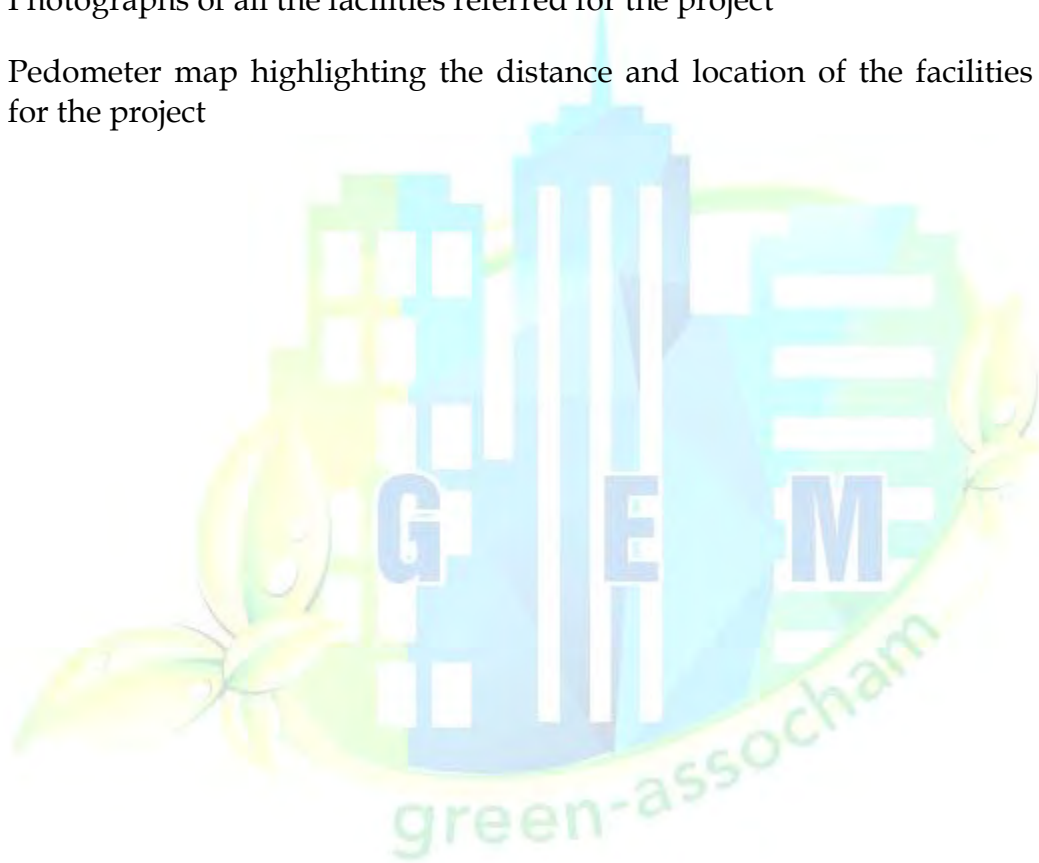


**Calculations and Methodology:**

1. Facilities provided within the site must be significantly sized to meet project's requirements.
2. Facilities outside the site must be accessible to all occupants of the project.

**Documents to be submitted: (as applicable)**

1. Drawings confirming the location of all facilities provided within the site
2. Photographs of all the facilities referred for the project
3. Pedometer map highlighting the distance and location of the facilities referred for the project



## Principle-14 – Best Practices for Universal Building Design

5 points

**Aim:** Encourage developers and designers to be innovative and think creatively about solutions that meet the needs of differently-able.

### Requirements:

Include but not limited to following features for differently-able. All features must be designed as per National Building Code (NBC) of India 2016.

1. Ramps with handrails at the main entrance and exit of each building. **(1 point)**
2. Handrails, Audio and Braille facilities in the lifts **(1 point)**
3. Preferred parking nearest to the main entrance of the building. Provide at least one designated accessible parking space for every 50 equivalent car units (ECUs) provided in the project as per local parking bylaws and part thereof. **(1 point)**
4. For commercial, industrial and other buildings – at least one toilet per floor designed for differently-able **(2 points)**

For residential buildings – provide at least two toilets designed for differently-able in the common area of the facility up to two towers / blocks. Add one toilet per tower / block further for more than two blocks / towers. **(2 points)**

### Calculations and Methodology:

1. Architects and developers should include the design features that can support differently-able
2. Refer National Building Code of India 2016, Volume 1, PART 3, Section 13, Annexure B for details.

### Documents to be submitted: (as applicable)

1. Drawings confirming the inclusion of such features in the building design
2. Trade catalogue or brochure of lifts installed in the project
3. Copy of purchase bills / invoices of such lifts
4. Photographs of the features provided for differently-able

**Principle-15 – Reduced Exposure to VOC****3 points**

**Aim:** Limiting VOC content in interior paints, adhesives, sealants and coatings to protect indoor air quality and occupational health.

**Requirements:**

1. Prepare the Construction Policy specifying the use of low-emitting or non-emitting products as per the intent of the principle. The policy shall be applicable for all future renovations and expansions.
  - a. Specify and use low-emitting or non-emitting products that will significantly reduce the strength of VOC exposure to indoors.
  - b. Architectural paints and coatings must not exceed the following limits. **(1 point)**

Paints and Coatings	VOC limit gm/lit less water
Flat (Mat) paints	50
Non-flat (Glossy) paints	150
Varnish	350

- c. Adhesives and sealants must not exceed the following limits. **(1 point)**

Adhesives	VOC limit gm/lit less water
Wood flooring	100
Carpet	50
Glazing	100
Wood	30
HVAC duct insulation	850
Tile	65

- d. Anti-corrosive and anti rust paints must not exceed the following limits. **(1 point)**

Material Description	VOC limit gm/lit less water
Anti-corrosive/ Anti-rust paints	250

### Calculations and Methodology:

Paints, coatings and adhesives are significant contributors to indoor air pollution. Many of these products contain volatile organic compounds (VOCs) that can have health effects. Exposure to VOCs can cause acute reactions, such as eye, nose, and throat irritation to chronic health problems such as asthma, chronic obstructive pulmonary disease, and cancer. Higher concentrations of VOCs are typically found indoors because of reduced air ventilation and various other sources of VOCs.

This Principle limits VOC for on-site wet-applied products to avoid environmental damage and protect the people who apply these products or are exposed to them during installation. This Principle covers architectural paints, coatings and adhesives that are applied on-site to indoor surfaces and finishes.

Increase ventilation when using products that emit VOCs, meet or exceed any label precautions and do not store opened containers of unused paints and similar materials to reduce exposure to VOCs.

### Documents to be submitted: (as applicable)

1. Provide duly signed construction policy
2. Area of application of each low-emitting and non-emitting product used
3. Trade catalogue / brochure / test certificate / Material Safety Data Sheets of each such product used
4. Copy of purchase bills / invoices of each such product used

## Principle-16 – No Use of Halogenated Hydrocarbons

2 points

**Aim:** Reduction in the emission of Halogenated Hydrocarbons (CFC, HCFC and Halons) to reduce the depletion of Ozone layer.

### Requirements:

1. Use Chlorofluorocarbon (CFC) free HVAC and refrigeration systems in the project (**essential**)
2. Fire extinguishers and suppression systems installed in the project must be free from halogens (**essential**)
3. Use Hydro chlorofluorocarbon (HCFC) free HVAC and refrigeration systems in the project (**1 points**)
4. Prepare the Construction Policy specifying the use of HCFC free HVAC and refrigeration systems in the facility as per the intent of the principle. The policy shall be applicable for all future renovations and expansions. (**1 point**)

### Calculations and Methodology:

Emissions of halogenated hydrocarbons substances such as CFCs, HCFCs and halons lead to ozone layer depletion. Such substances are found in refrigerants also. All these ozone depleting substances remain stable in the lower atmospheric region, but as they reach the stratosphere, they get exposed to the ultra violet rays. This leads to their breakdown and releasing of free chlorine atoms which reacts with the ozone gas, thus leading to the depletion of the ozone layer.

For owner occupied spaces – Project owner shall follow above Principle requirements.

For tenant occupied space – (as applicable)

- a. If HVAC, Refrigeration, Fire extinguishers and suppression systems are installed by project owner - Project owner shall follow above Principle requirements.
- b. If HVAC, Refrigeration, Fire extinguishers and suppression systems are not installed by project owner – Provide copies of tenant agreements confirming that the systems proposed to be installed in the tenant spaces must comply with the above Principle requirements.

For residential projects – (as applicable)

- a. If HVAC, Refrigeration, Fire extinguishers and suppression systems are installed by project owner - Project owner shall follow above Principle requirements.
- b. If HVAC, Refrigeration, Fire extinguishers and suppression systems are not installed by project owner – Provide copies of tenant guidelines confirming that the systems proposed to be installed in the tenant spaces must comply with the above Principle requirements.

**Documents to be submitted: (as applicable)**

1. Provide duly signed construction policy
2. Trade catalogue or brochure of Fire extinguishers and suppression systems, HVAC and refrigeration systems
3. Purchase bills / invoices of Fire extinguishers and suppression systems, HVAC and refrigeration systems
4. Site photographs confirming the installation of CFCs, HCFCs and halons free Fire extinguishers and suppression systems, HVAC and refrigeration systems
5. Copies of tenant guidelines / agreements



## Principle-17 – Sustainable Development of Construction Engineering

12 points

**Aim:** Utilization of alternatives of basic materials being used in construction industry to conserve the precious natural resources and prevent valuable recyclable materials going to landfills as waste.

### Requirements:

1. Prepare the Construction Policy confirming the use of recycled building construction materials for future renovations and expansions as per the intent -
  - a. Use façade glass, door and window glass with recycled content of more than 15% **(2 points)**
  - b. Use Portland Pozzolana Cement (PPC) cement for masonry and plaster work.
    - i. 50% of masonry and plaster work – **1 point**
    - ii. 75% of masonry and plaster work – **2 points**
  - c. Use fly ash bricks or AAC blocks or similar products for brick work.
    - i. 40% of brick work – **1 point**
    - ii. 80% of brick work – **2 points**
  - d. Use fly ash in concrete mix / ready mix concrete **(2 points)**
  - e. Use TMT steel bars with recycled content of more than 25% **(2 points)**
  - f. Use at least 50% of tiles with recycled content of more than 25% **(2 points)**

### Calculations and Methodology:

Recycling is very important for sustainable development of construction industry as it reduces the demand for virgin materials and diverts valuable wastes going to landfills.

TMT steel bars, concrete, bricks, cement, glass and tiles constitute a major portion of building construction materials bill of quantity (civil BOQ). Hence, attempt to use those materials with recycled contents as far as possible, avoid use of virgin materials and prevent useful materials going to landfills.

PPC cement has Pozzolan materials such as fly ash, volcanic ash. Fly ash bricks, AAC blocks and similar products constitute at least 35% of fly ash. Do not use conventional red clay bricks.

New Thermo Mechanically Treated (TMT) steel is mostly made up of a combination of pre-consumer waste steel, post-consumer waste steel and virgin steel. Similarly, tiles and glass are also made up of pre-consumer waste steel, post-consumer waste and virgin materials.

All calculations for this Principle will be done on the basis of quantities (either weight, volume, counts etc as applicable) of the materials used in the project, not on the costs.

**Documents to be submitted: (as applicable)**

1. Provide a duly signed construction policy specifying the use of recycled building construction materials for future renovations and expansions.
2. Building construction materials BOQ with total quantities of above materials (glass, steel, cement, bricks, concrete / RMC, tiles)
3. Owner declaration confirming the total quantities of above materials (glass, steel, cement, bricks, concrete / RMC, tiles)
4. Trade catalogue / brochure / manufacturer letter confirming the recycled content percentage in the product
5. Copy of purchase bills / invoices of respective building construction materials

## Principle-18 – Local Sourcing of Construction Materials

6 points

**Aim:** Utilize locally available building construction materials manufacturers / suppliers for buying materials to reduce environmental pollution and transportation cost.

**Requirements:**

1. Prepare the Construction Policy confirming the use of locally sourced building construction materials for future renovations and expansions as per the intent -
  - a. Use locally sourced (excavated and / or manufactured) sand, stones, aggregates, bricks, paver blocks and concrete as applicable. Source distance from project site should not be more than 250 km. **(2 points)**
  - b. Use locally sourced (excavated and / or manufactured) cement, glass, wood products and tiles as applicable. Source distance from project site should not be more than 550 km. **(2 points)**
  - c. Use locally sourced (excavated and / or manufactured) steel (all types) as applicable. Source distance from project site should not be more than 850 km. **(2 points)**

*Note – Distance mentioned above is not the radial distance. It can be pedestrian, rail or road distance. More than 50% of the material used in each category should meet the intent of the principle.*

**Calculations and Methodology:**

Local sourcing is finding the closet available manufacturers and suppliers of building construction materials as applicable and using them. It is recommended to source as much of the construction materials as possible from the local region to reduce the environmental pollution and transportation cost.

Main benefit of local sourcing of materials is the reduced environmental impact due to shorter distance travelled by the materials.

Local sourcing is most effective with simple materials such as sand, stones, aggregates, bricks, cement, wood products, paver blocks and concrete as there are often several suppliers / manufacturers within a regional area. However with more complicated materials, this strategy may not work as there may be very few suppliers / manufacturers of such materials.

All calculations will be done on the quantities and not on the costs.

**Documents to be submitted: (as applicable)**

1. Provide a duly signed construction policy specifying the use of locally sourced building construction materials for future renovations and expansions.
2. Building construction materials BOQ with total quantities of above materials
3. Owner declaration confirming the total quantities of above materials
4. Manufacturer letter confirming the local sourcing of above materials
5. Copy of purchase bills / invoices of respective building construction materials



## Principle-19 – Judicious use of hard wood and soft wood

4 points

**Aim:** Do not use hardwood and softwood in the project in order to save trees and our mother earth.

### Requirements:

1. Prepare the Construction Policy confirming judicious use of wood for future renovations and expansions as per the intent -
  - a. Do not use hardwood and softwood in the project in door frames, doors and furniture applications **(1 point)**
  - b. Use engineered wood products such as Medium density fiberboard (MDF), Low density fiberboard (LDF) and Plywood for making door frames, doors and furniture as applicable **(1 point)**
  - c. Engineered wood products should be free from urea formaldehyde resin **(1 point)**
  - d. Use rapidly renewable materials in the project that constitute at least 10% of total cost of wood or wood products used in the project. The rapidly renewable materials include but not limited to linseed, straw, cotton, wheat, natural rubber, bamboo and cork. **(1 point)**

### Calculations and Methodology:

Particleboard, low density fiberboard (LDF) and chipboard are manufactured from wood chips; sawmill shavings or sawdust and a resin or binder.

Medium density fiberboard (MDF) is made by breaking down hardwood and softwood residuals into wood fibers, combining it with resin or binder. Panels are formed by applying high temperature and pressure.

Use rapidly renewable materials instead of the products made from fossil-fuel derivatives. Rapidly renewable materials include linseed, straw, cotton, wheat, natural rubber, bamboo and cork. The products from rapidly renewable materials can be linoleum, straw bales, cotton-batt insulation, wheat board panels, bamboo cabinetry and cork flooring etc.

### Documents to be submitted: (as applicable)

1. Provide a duly signed construction policy specifying judicious use of wood.

2. Building civil construction materials bill of quantity (BOQ) to ensure that the hardwood and softwood are not used anywhere in the project.
3. Products catalogue or brochure of engineered wood products used in the project
4. Copy of purchase bills / invoices of engineered wood products used in the project





## Principle-20 – Energy Management Best Practices

12 points

**Aim:** Implement energy management best practices within the facility to achieve energy savings.

**Requirements:**

**All projects other than residential -**

1. Refer Energy Conservation Building Code (ECBC) 2017 for energy efficient design and construction of buildings. Facilities shall comply with the following –

- a. Mandatory requirements (Sections 4.2, 5.2, 6.2 and 7.2), irrespective of the compliance path
- b. Additionally, any one of the following compliance paths
  - i. PATH-1 - Prescriptive method (Sections 4.3, 5.3, 5.4, 5.5 and 6.3)

OR

PATH-2 - Whole building performance method (Section 9), all mandatory requirements (Sections 4.2, 5.2, 6.2 and 7.2) shall be met

2. PATH-1 –

Facility that shows the compliance using Prescriptive method (Sections 4.3, 5.3, 5.4, 5.5 and 6.3) shall be awarded the points as per below. All mandatory requirements (Sections 4.2, 5.2, 6.2 and 7.2) shall be met. **(Mandatory + 12 points)**

- a. Section 4.3 **(2 points)**
- b. Section 5.3 **(2 points)**
- c. Section 5.4 **(2 points)**
- d. Section 5.5 **(3 points)**
- e. Section 6.3 **(3 points)**

OR

PATH-2 –

Facility that shows the compliance using Whole building performance method (Section 9) shall be awarded the points as per below:

- a. Energy Performance Index (EPI) ratio is equal to 1 (**mandatory**)
- b. Energy Performance Index (EPI) ratio is equal to 0.95 (**6 points**)
- c. Energy Performance Index (EPI) ratio is equal to 0.9 (**8 points**)
- d. Energy Performance Index (EPI) ratio is equal to 0.85 (**10 points**)
- e. Energy Performance Index (EPI) ratio is equal to 0.8 (**12 points**)

*Note - Compliance with ECBC 2017 shall be ensured. Buildings in the states which have notified their own ECBC, shall comply with the State ECBC.*

**Residential projects shall meet the following requirements:**

**1. Normative references –**

i. Glazing –

- a. All exterior windows, doors and façade glazing of conditioned spaces - Shading Coefficient (SC) value = 0.35 or lower (**essential**)
- b. If Shading Coefficient (SC) value = 0.3 or lower (**2 points**)

ii. Roof assembly –

- a. Overall heat transfer coefficient value of exposed roof assembly =  $0.8 \text{ W/m}^2\text{K}$  or lower (**essential**)
- b. If Overall heat transfer coefficient value of exposed roof assembly =  $0.5 \text{ W/m}^2\text{K}$  or lower (**2 points**)

iii. Wall assembly

- a. Overall heat transfer coefficient value of exposed wall assembly =  $1.5 \text{ W/m}^2\text{K}$  or lower (**essential**)
- b. If Overall heat transfer coefficient value of exposed wall assembly =  $1.2 \text{ W/m}^2\text{K}$  or lower (**2 points**)

iv. Lighting power density (LPD) (W/m<sup>2</sup>)

**a. Essential**

- a. Building exterior and Parking spaces (covered or open): 2.2
- b. Interior common spaces: 6.5
- c. Residential units interior spaces: 7

**b. For additional 2 points**

- a. Building exterior and Parking spaces (covered or open): 1.7
- b. Interior common area: 5.5
- c. Residential units interior spaces: 6

v. HVAC equipment

**a. Essential**

- a. All unitary and split AC systems – BEE 3 star rated
- b. All other HVAC equipment types – refer ECBC 2017

**b. For additional 2 points**

- a. All unitary and split AC systems – BEE 5 star rated
- b. All other HVAC equipment types – refer ECBC 2017

vi. Pumps and motors

**a. Essential**

- a. All plumbing and HVAC system pumps and motors – BEE 3 star rated or equivalent

**b. For additional 2 points**

- a. All plumbing and HVAC system pumps and motors – BEE 4 star rated or equivalent

## 2. Energy simulation references for standard baseline design –

- i. Glazing - All exterior windows, doors and façade glazing of conditioned spaces Shading Coefficient (SC) value = 0.35
- ii. Roof assembly - Overall heat transfer coefficient value of exposed roof assembly =  $0.8 \text{ W/m}^2\text{K}$
- iii. Wall assembly - Overall heat transfer coefficient value of exposed wall assembly =  $1.5 \text{ W/m}^2\text{K}$
- iv. Lighting power density (LPD) ( $\text{W/m}^2$ )
  - a. Building exterior and Parking spaces (covered or open): 2.2
  - b. Interior common spaces: 6.5
  - c. Residential units interior spaces: 7
- v. HVAC equipment
  - a. All unitary and split AC systems – BEE 3 star rated
  - b. All other HVAC equipment types – refer ECBC 2017
- vi. Residential facility that shows the compliance using Energy simulation references shall be awarded the points as per below:
  - a. Energy Performance Index (EPI) ratio = 0.95 **(6 points)**
  - b. Energy Performance Index (EPI) ratio = 0.9 **(8 points)**
  - c. Energy Performance Index (EPI) ratio = 0.85 **(10 points)**
  - d. Energy Performance Index (EPI) ratio = 0.8 **(12 points)**

### Calculations and Methodology:

1. Energy Performance Index (EPI) = Annual energy consumption (kWh) / Total built up area of the facility
2. Energy Performance Index (EPI) ratio = EPI of Proposed Building / EPI of Standard Building (Source ECBC)

3. Proposed building will be modeled as per “as is” actual building design and standard baseline building will be modeled as per ECBC 2017
4. For residential and all other facilities shall comply with the requirements listed under point number 5 of Principle requirements section above.
5. In case of multiple buildings in a project, each building should meet the requirements mentioned above.
6. Energy generated by on-site and / or off-site renewable energy resources can be deducted from the Proposed “as is” design model to get energy savings over standard baseline design model.
7. Energy saving due to solar hot water system cannot be considered for the energy savings under this Principle.

**Documents to be submitted:**

1. All architectural floor plans, elevations, sections
2. Building site plan with exterior developments such as parking, driveways and landscape
3. Mechanical, Electrical and Plumbing design basis reports with all process and non-process load details
4. Interior and exterior lighting floor plans with lighting fixtures make and models
5. Lighting power density calculations for proposed “as is” design as well as standard design
6. HVAC floor plans with HVAC equipment details (as applicable)
7. Trade catalogue/ brochure of lighting fixtures, HVAC equipment, pumps and motors, renewable energy systems installed in the project
8. Copy of purchase bills / invoices of lighting fixtures, HVAC equipment, pumps and motors, renewable energy systems installed in the project
9. Energy simulation output reports

## Principle-21 – Efficient Electric Equipment and Building Operations

5 points

**Aim:** Install energy efficient electric equipment and building operations to reduce electricity consumption of the project.

### Requirements:

1. Conduct detailed energy audit of the facility for all major electric equipments and systems. Alternatively, submit the energy audit report conducted within last three years. **(2 points)**
2. Install energy efficient motors in the project as per details listed below: **(3 points)**
  - a. Motors of International Efficiency IE2 (high efficiency) / EFF1 class / BEE 3 star rated **(1 point)**  
  
OR
  - b. Motors of IE3 (premium efficiency) / BEE 4 star rated **(2 points)**  
  
OR
  - c. Motors of IE4 (super premium efficiency) / BEE 5 star rated **(3 points)**

*Note – For industrial projects, consider the motors installed for non-process applications only.*

### Calculations and Methodology:

Install energy efficient electric equipment and systems in the project as applicable to reduce electricity consumption of the project.

### Documents to be submitted: (as applicable)

1. Detailed energy audit report of the facility
2. Trade catalogue / brochure of motors installed in the project
3. Copy of purchase bills / invoices of motors
4. Site photographs / photographs of nameplate of electrical equipment confirming the above installation



## Principle-22 – Use of Imperishable Energy Resources

6 points

**Aim:** Use resources of imperishable energy in the project to reduce the dependency on exhaustible fossil fuels.

### Requirements:

1. Install onsite imperishable energy systems to offset a part of electric contract demand of the project.

% contract demand of the project	Points
5	1
10	2
15	3
20	4

2. Install offsite imperishable energy systems to offset a part of electric contract demand of the project.

% contract demand of the project	Points
10	1
20	2

*Note – For industrial projects, consider non-process electric demand loads for sizing the imperishable energy system capacity.*

### Calculations and Methodology:

Determine the contract demand of the project from electrical design brief report. This can also be determined from the sanctioned electric load from competent government authority. Contract demand is the maximum demand in kilowatt (kW) agreed to be sanctioned by the utility. This is consumer's sanctioned load by electricity provider.

Install onsite renewable energy system for at least 5% of contract demand of the project. This includes solar PV system, wind turbines, biogas system, geothermal etc as applicable. Solar hot water systems cannot be considered as power generation source.

Either the project owns the offsite renewable energy system or has signed a contract with the off-site renewable energy developer for a period of at least 3 years. The offsite renewable energy system should be located within the same utility service area as the facility claiming the use.

**Documents to be submitted: (as applicable)**

1. Electrical design brief report, contract demand or consumer's sanctioned load by electricity provider
2. Drawings showing location of onsite renewable energy system
3. Trade catalogue / brochure of onsite renewable energy system
4. Copy of purchase bills / invoices of onsite renewable energy system
5. Site photographs confirming the above installation
6. Project ownership documents of offsite renewable energy system or signed contract with the off-site renewable energy developer for a period of at least 3 years
7. Details of off-site renewable energy system capacity dedicated to this project
8. Monthly and annual electricity generation report of off-site renewable energy system

## Principle-23 – Optimal Use of Natural Light

6 points

**Aim:** Optimal utilization of natural light to reduce the reliance on artificial lighting and saving lighting energy.

### Requirements:

Ensure that the project meets ECBC 2017 Day lighting requirements as per Chapter 4 Building Envelope, Section 4.2.3 day lighting. There are two approaches that can be followed to meet the Principle compliance:

1. Simulation approach:

- I. Ensure through computer simulation that at least 40% area of any occupied space comply with the day lighting requirements listed in ECBC 2017, Chapter 4, Section 4.2.3.1 **(1 point)**
- II. Ensure through computer simulation that at least 60% area of any occupied space comply with the day lighting requirements listed in ECBC 2017, Chapter 4, Section 4.2.3.1 **(2 points)**
- III. Ensure through computer simulation that at least 80% area of any occupied space comply with the day lighting requirements listed in ECBC 2017, Chapter 4, Section 4.2.3.1 **(4 points)**

OR

2. Manual approach:

- I. Ensure that at least 40% area of any occupied space comply with the day lighting requirements listed in ECBC 2017, Chapter 4, Section 4.2.3.2 **(1 point)**
- II. Ensure that at least 60% area of any occupied space comply with the day lighting requirements listed in ECBC 2017, Chapter 4, Section 4.2.3.2 **(2 points)**
- III. Ensure that at least 80% area of any occupied space comply with the day lighting requirements listed in ECBC 2017, Chapter 4, Section 4.2.3.2 **(4 points)**

AND

3. Daylight / occupancy sensors / Timers on exterior lighting:

- I. For residential and institutional units - common areas such as corridors, lift lobbies, reception, parking and exterior lighting etc as applicable and integrate it with the artificial lighting. **(2 points)**

For commercial and industrial units – Office spaces, common areas such as corridors, lift lobbies, reception, canteen, parking and exterior lighting etc as applicable and integrate it with the artificial lighting. **(2 points)**

**Calculations and Methodology:**

For the purpose of daylight design, only sky illumination shall be considered as contributing to illumination of the building interiors. Direct solar illuminance shall not be considered. Openings shall be provided with overhangs, shades, balcony, louver system or other shading devices to reduce direct sunlight entering the room as far as possible.

Overhangs, shades, balcony, louver system, etc, reduce the effective height of opening. Wide and low height openings are easier to shade against sunlight entry. Direct sunlight increases the inside illuminance.

Window design should be done very carefully as good window design can be the significant way of saving lighting energy by reducing the dependency on artificial lighting. Window orientation, occupancy patterns, task and position of windows with respect to surrounding buildings and other obstruction should be considered.

Space environment should be designed to avoid glare and it should be possible to adjust both natural and artificial light. Glare results from excessive contrast of illumination or from an excess of illumination in the field of view. Glare can be reduced by overhangs, shades balcony or louver system. Internal screening can also be provided by louvers or blinds.

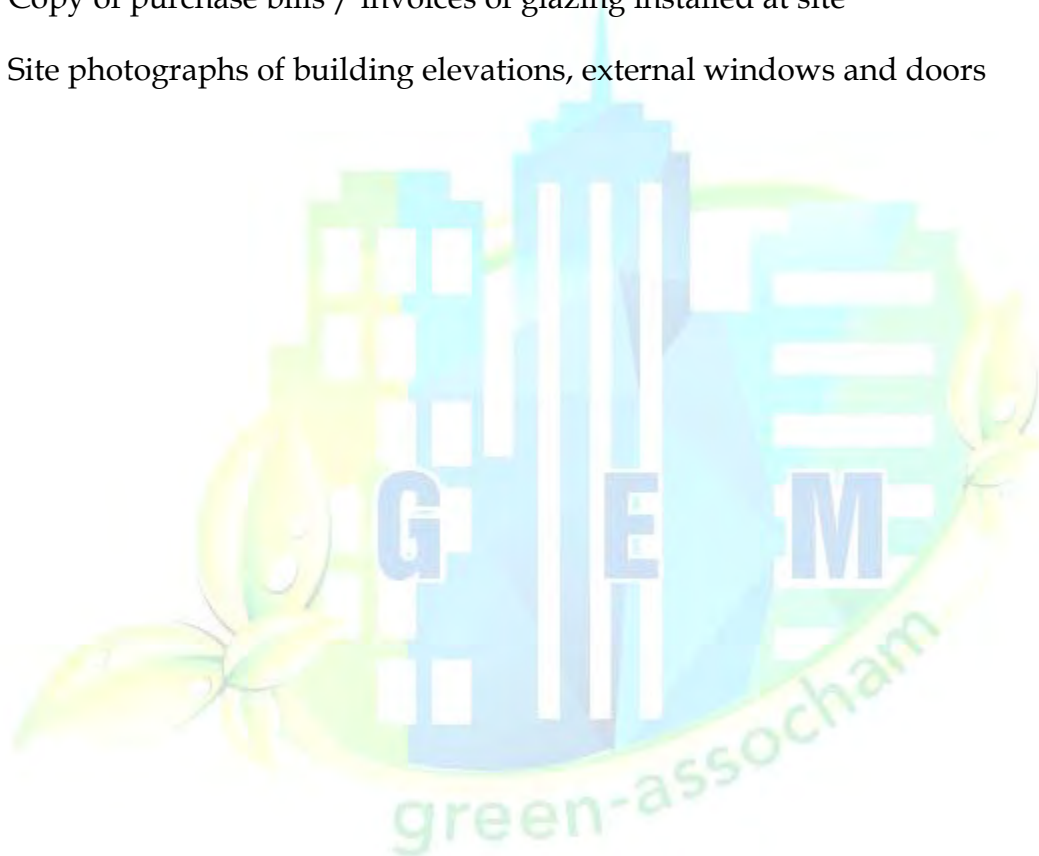
Suitably designed interior layout and / or re-orientation of glazing to avoid entry of direct solar radiation can be done to eliminate glare.

Glare can be reduced or eliminated by installation of windows in more than one wall to increase the background lux levels. Lower the sill height of windows to allow increased illumination to enter in the space which increases the adaptation level.

Diffusing glazing should be used properly within the normal field of view as it can cause direct incident solar beam to be scattered diffusely. It can cause uncomfortable high brightness.

**Documents to be submitted: (as applicable)**

1. All architectural floor plans, elevations, sections
2. Window door schedules with opening details
3. Daylight simulation output report and / or manual calculation to confirm the above requirements
4. Trade catalogue / brochure of glazing installed at site
5. Copy of purchase bills / invoices of glazing installed at site
6. Site photographs of building elevations, external windows and doors





## Principle-24 – Healthy Indoor Air Quality

6 points

**Aim:** Ensure minimum delivery and quality of outdoor fresh air supplied into the indoor spaces for ventilation.

**Requirements:**

**Mechanical Ventilation System and Residential projects where centralized chilled water system is installed:**

1. Ensure that all occupied spaces in the building comply with the minimum requirements set out in ASHRAE 62.1:2010 using the ventilation rate procedure. If a local code is applicable and is more stringent, the same will be applicable. **(essential)**
2. Install outside fresh air filtering media with at least MERV 8 (Minimum Efficiency Reporting Value) or higher rating, in the fresh air unit supplying outside air to air handling units (AHUs) or fan coil units (FCUs). MERV 8 or equivalent filters can also be installed at the fresh air intake points of AHUs or FCUs as applicable. **(essential)**
3. Outdoor fresh air intakes as well as openings required for natural ventilation system shall be located such that the shortest distance from the intake to any outdoor contaminant source shall be equal to or greater than the separation distance mentioned in ASHRAE 62.1:2010 Table 5-1. **(essential)**
4. Ensure that all occupied spaces in the building comply with an increase in outdoor air ventilation of 20% above the outdoor air ventilation rates established in the above essential requirement. **(3 points)**
5. Install permanent carbon dioxide (CO<sub>2</sub>) monitoring and alarm systems to ensure the adequate supply of outside fresh air at all times. CO<sub>2</sub> sensor can be installed at the return air duct / path. CO<sub>2</sub> level should not exceed 900 ppm. **(3 points)**

**Natural Ventilation and when Mechanical Ventilation is not operational during occupied time, Residential projects where split / window AC / VRF system is installed:**

1. The open able area of operable wall openings must be at least 8% of the net occupiable floor area. For kitchen, this can be 4%. **(essential)**
2. Additional points:



- a. If the open able area of operable wall openings shall be at least 9% of the net occupiable floor area. For kitchen, this shall be at least 4.5%. **(3 points)**
  - b. If the open able area of operable wall openings shall be at least 10% of the net occupiable floor area. For kitchen, this shall be at least 5%. **(6 points)**
3. The occupiable spaces must be permanently open to operable wall openings directly to the outdoors and within 28 feet of operable wall openings to the outdoors.
4. Where interior occupiable spaces without direct openings to the outdoors are ventilated through adjoining rooms, the opening between occupiable spaces shall be permanently unobstructed (operable wall openings such as sliding / open able doors / windows are not acceptable) and have an opening of at least 10% of the area of the interior occupiable space nor less than 21 ft<sup>2</sup>.
5. The operable openings must be readily accessible to building occupants
6. Occupiable space does not include the spaces that are occupied upon occasion and for very limited periods of time such as toilet, inactive storage, stairs, electrical and mechanical rooms.
7. If openings are covered with louvers or other obstructions, the open able area shall be the net free unobstructed area through the opening.

#### **Calculations and Methodology:**

Ventilation rate procedure is described in ASHRAE 62.1:2010.

For owner occupied spaces – Project owner shall follow above Principle requirements.

For tenant occupied space – (as applicable)

- a. If HVAC systems are installed by project owner - Project owner shall follow above Principle requirements.
- b. If HVAC systems are not installed by project owner – Provide copies of tenant agreements confirming that the systems proposed to be installed in the tenant spaces must comply with the above Principle requirements.

For residential projects – (as applicable)

- a. If HVAC systems are installed by project owner - Project owner shall follow above Principle requirements.

- b. If HVAC systems are not installed by project owner – Provide copies of tenant guidelines confirming that the systems proposed to be installed in the tenant spaces must comply with the above Principle requirements.

**Documents to be submitted: (as applicable)**

1. All HVAC and fresh air drawings to show the distances between air intake points and exhaust air points
2. Describe HVAC, fresh air and CO<sub>2</sub> monitoring and alarm systems design meeting the Principle requirements.
3. Calculations of fresh air ventilation rates based on the ventilation rate procedure for all mechanically ventilated occupied spaces.
4. Calculations of fresh air ventilation as per natural ventilation system described above.
5. HVAC and fresh air system third party commissioning verification results demonstrating compliance with minimum fresh air ventilation rate requirements. The third party must not be directly or indirectly associated with the HVAC and fresh air system design.

## Principle-25 – Training and Capacity Building of Project Team

2 points

**Aim:** Encourage the project team and facility management team to create awareness about green rating program, energy and water efficiency measures implemented in the project on a continuous basis.

**Requirements:**

Design and implement a detailed training and capacity building program to encourage and aware the project team and facility management team regarding the green rating program, energy and water efficiency strategies implemented in the project.

Conduct atleast three such trainings and capacity building programs for the project and facility management teams.

**Calculations and Methodology:**

Training and capacity building program must be conducted for the developers, architect, structure, mechanical, electrical, plumbing, landscape and BMS design teams, post-occupancy facility management teams involved in the project as applicable.

**Documents to be submitted:**

1. Detailed training and capacity building program along with training materials for all four phases of the project
2. Duly signed attendance sheet of all participants along with the name, contact number, email ID, roles and responsibilities and designation
3. Photographs of the training sessions conducted

## Principle-26 – Activities for Corporate Social Responsibility

2 points

**Aim:** Encourage the organization to take social, cultural and environmental responsibilities for positive environmental change and social welfare of the community.

**Requirements:**

Perform one or more of the following activities as per the applicability and suitability to the organization:

1. Eradicating hunger, poverty and malnutrition, promoting preventive health care and sanitation and making available safe drinking water to the community
2. Promoting education, including special education and employment enhancing vocation skills especially among children, women, elderly and differently-able and livelihood enhancement projects
3. Promoting gender equality, empowering women, setting up homes and hostels for women and orphans; setting up old age homes, daycare centers and such other facilities for senior citizens and measures for reducing inequalities faced by socially and economically backward
4. Ensuring environmental sustainability, ecological balance, protection of flora and fauna, animal welfare, agro forestry, conservation of natural resources and maintaining quality of soil, air and water
5. Protection of national heritage, art and culture including restoration of buildings and sites of historical importance and works of art; setting up public libraries; promotion and development of traditional art and handicrafts
6. Measures for the benefit of armed forces veterans, war widows and their dependents
7. Training to promote rural sports, nationally recognized sports, Paralympics sports and Olympic sports
8. Contributions or funds provided to technology incubators located within academic institutions which are approved by the Central Government
9. Rural development projects
10. Slum area development

11. PM National Relief Fund / National Defence Fund / Chief Minister Relief Fund

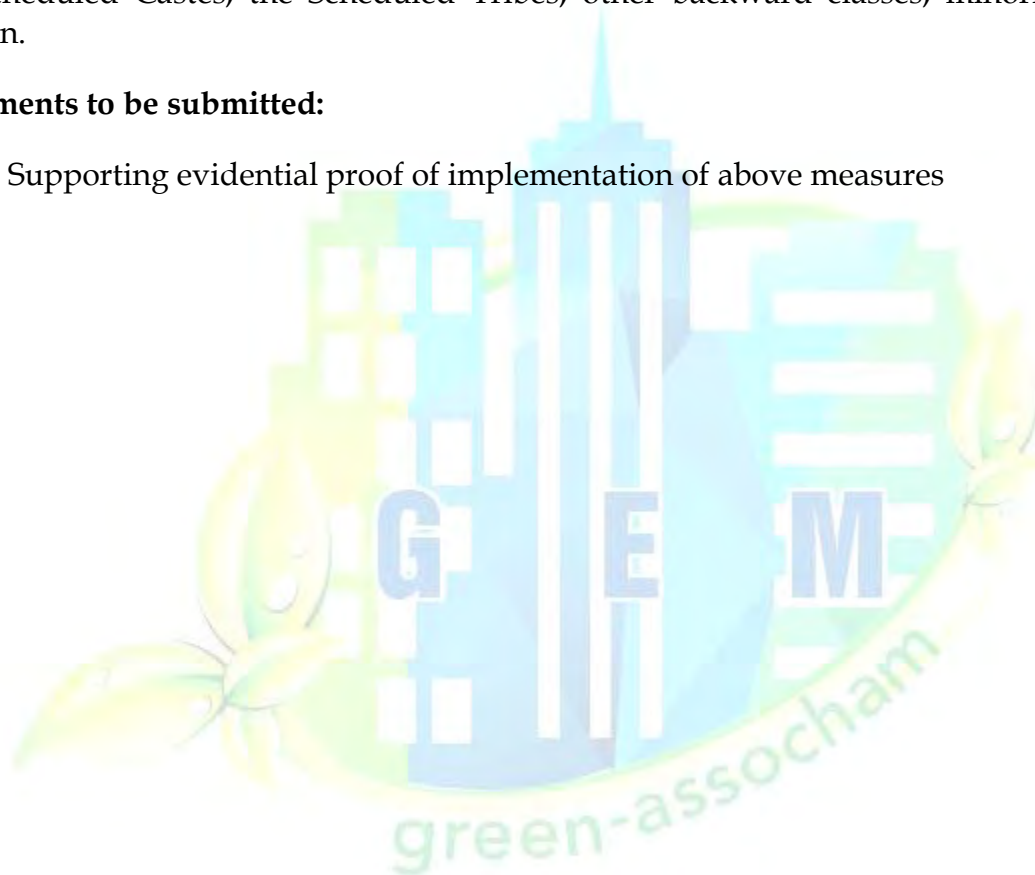
**Calculations and Methodology:**

Corporate social responsibility can involve incurring short-term costs that do not provide an immediate financial benefit to the company, but instead promote positive social and environmental change.

Contribute to the Prime Minister's National Relief Fund or any other fund set up by the Central / State Government for socio-economic development and relief and welfare of the Scheduled Castes, the Scheduled Tribes, other backward classes, minorities and women.

**Documents to be submitted:**

1. Supporting evidential proof of implementation of above measures



## Principle-27 - Going the Extra Miles

5 points

**Aim:** Encouragement for showing spectacular performance towards Eco-friendly and Sustainable development in the project and going the extra miles.

### Requirements:

1. Going the Extra Miles (GEM) points 1 to 3 – **(3 points)**
2. A GEM Certified Professional (GEM CP) should be involved in the process. **(1 point)**

OR

Involve two or more GEM Certified Professionals in the sustainability certification process of the project **(2 points)**

### Calculations and Methodology:

Recommended strategies (including but not limited to) for Going the Extra Miles (GEM) points –

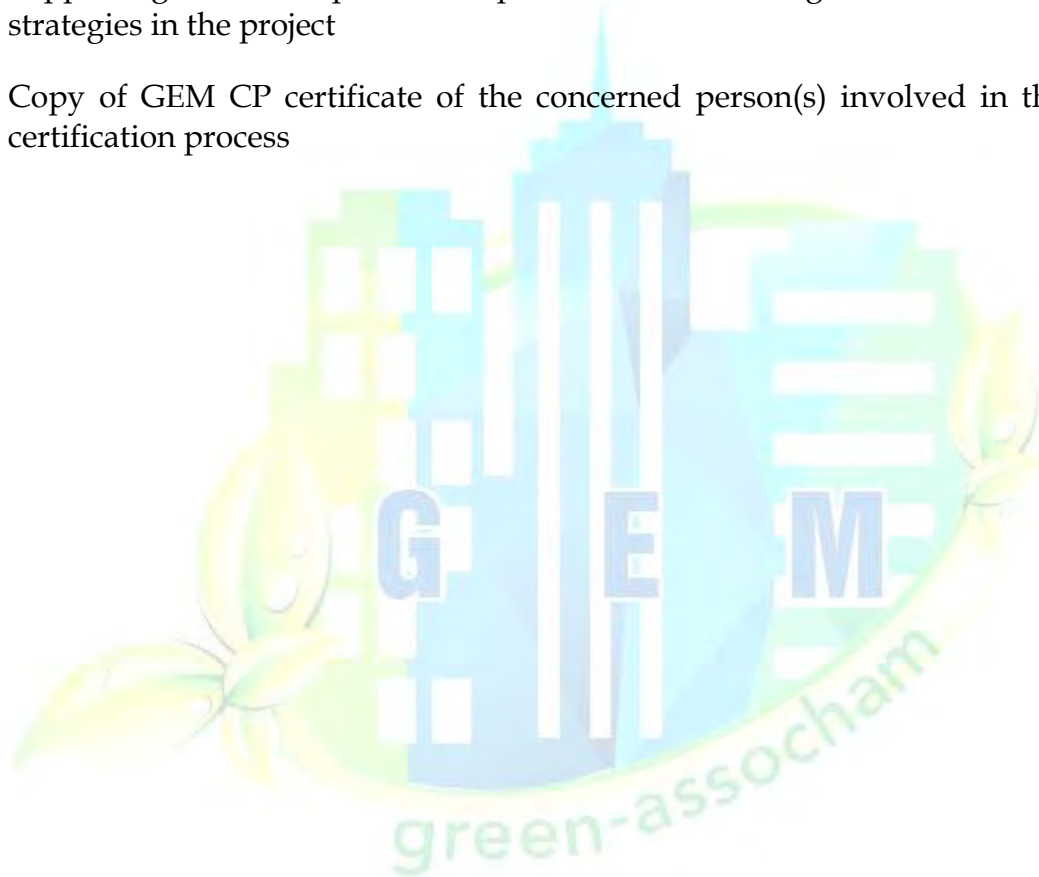
1. Green wall / vertical garden / hydroponic gardens
2. Urban gardening
3. Electric charging points for electric vehicles within the site boundary (At least 3% of total parking capacity approved as per government norms)
4. Implement strategies onsite to save paper
5. Implement strategies onsite to save water (other than mentioned in the reference guide)
6. Project team can adopt public parks and wastelands and convert them into beautiful parks
7. Project team can participate in any of the Government's National Programs or Missions such as Build Toilets in Rural or needy areas, Adopt and maintain a street or village or colony for cleanliness
8. Install onsite imperishable energy systems to offset 50% of electric contract demand of the project. (non-process loads only)



9. Install offsite imperishable energy systems to offset 50% of electric contract demand of the project. (non-process loads only)
10. Install major energy and water meters on BMS for monitoring and necessary corrective actions
11. Install CFC free HVAC insulation materials in the project

**Documents to be submitted:**

1. Supporting evidential proof of implementation of Going the Extra Miles (GEM) strategies in the project
2. Copy of GEM CP certificate of the concerned person(s) involved in the green certification process



## GEM rating – Tentative score card for all rating levels

GEM Sustainability Certification Program - Tentative score card for all GEM 1 to 5 ratings								
S. No.	Principles	Description	Maximum Points	GEM 1	GEM 2	GEM 3	GEM 4	GEM 5
			130	40 - 49	50 - 64	65 - 84	85 - 104	≥ 105
1	Principle-1	Government Approved Plans	E	E	E	E	E	E
2	Principle-2	Parking for Building Occupants	2	2	2	2	2	2
3	Principle-3	Landscape Best Practices	4	3	3	3	3	3
4	Principle-4	Preserve and Plant Trees Onsite	2	2	2	2	2	2
5	Principle-5	High Albedo Materials - Roof and Non-roof	6	1	2	3	4	5
6	Principle-6	Rainwater Harvesting – Recharge and/ or Reuse	4			2	4	4
7	Principle-7	Install Low Flow Water Fixtures	7	4	5	6	6	7
8	Principle-8	On-site Treatment of Grey & Black Water & Reuse for Flushing	6			4	5	6
9	Principle-9	Irrigation Best Practices	3		1	2	3	3
10	Principle-10	Measurement of Energy and Water Consumption	6	4	4	4	5	6
11	Principle-11	Post-occupancy Waste Management	4	4	4	4	4	4
12	Principle-12	Onsite Conversion of Organic Waste	4					4
13	Principle-13	Amenities for fundamental needs and daily commute	6	2	4	4	4	6
14	Principle-14	Best Practices for Universal Building Design	5	2	2	3	4	5
15	Principle-15	Reduced Exposure to VOC	3		2	2	3	3
16	Principle-16	No Use of Halogenated Hydrocarbons	2				2	2
17	Principle-17	Sustainable Development of Construction Engineering	12	8	10	10	10	12
18	Principle-18	Local Sourcing of Construction Materials	6	4	4	4	4	4
19	Principle-19	Judicious use of hard wood and soft wood	4	1	1	2	2	2
20	Principle-20	Energy Management Best Practices	12			6	8	10
21	Principle-21	Efficient Electric Equipment and Systems	5	1	1	2	2	4
22	Principle-22	Use of Imperishable Energy Resources	6			1	2	3
23	Principle-23	Optimal Use of Natural Light	6	2	2	2	4	4
24	Principle-24	Healthy Indoor Air Quality	6	3	3	3	3	6
25	Principle-25	Training and Capacity Building of Project Team	2	2	2	2	2	2
26	Principle-26	Activities for Corporate Social Responsibility	2					
27	Principle-27	Going the Extra Miles	5	2	3	3	4	5
		<b>TOTAL POINTS</b>	<b>130</b>	<b>47</b>	<b>57</b>	<b>76</b>	<b>92</b>	<b>114</b>

## Glossary

1. Albedo = Albedo is a measure of how much radiation that hits a surface is reflected without being absorbed.
2. Black water = Waste water and sewage from toilets
3. CFC = Chlorofluorocarbons
4. CPCB = Central Pollution Control Board
5. ECBC – Energy Conservation Building Code
6. Erosion of soil is a process by which soil is loosened, worn away and transferred by wind or water.
7. Grey water = Waste water from baths, wash basins, kitchen sinks and other kitchen appliances and washing machines
8. HCFC = Hydro-Chlorofluoro-carbon
9. HVAC = Heating Ventilation and Air Conditioning
10. LPF = Liters per Flush; LPM = Liters per Minute
11. NBC – National Building Code of India
12. SLD = Single Line Diagram
13. SPCB = State Pollution Control Board
14. VOC = Volatile Organic Compound

## **ASSOCHAM: The Knowledge Architect of Corporate India**

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ASSOCHAM initiated its endeavour of value creation for Indian industry in 1920. Having in its fold more than 400 Chambers and Trade Associations, and serving more than 4,00,000 members from all over India. It has witnessed upswings as well as upheavals of Indian Economy, and contributed significantly by playing a catalytic role in shaping up the Trade, Commerce and Industrial environment of the country.

Today, ASSOCHAM has emerged as the fountainhead of Knowledge for Indian industry, which is all set to redefine the dynamics of growth and development in the technology driven cyber age of 'Knowledge Based Economy'. ASSOCHAM is seen as a forceful, proactive, forward looking institution equipping itself to meet the aspirations of corporate India in the new world of business. ASSOCHAM is working towards creating a conducive environment of India business to compete globally.

ASSOCHAM derives its strength from its Promoter Chambers and other Industry/Regional Chambers/Associations spread all over the country.

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Empower Indian enterprise by inculcating knowledge that will be the catalyst of growth in the barrierless technology driven global market and help them upscale, align and emerge as formidable player in respective business segments.

#### **Mission**

As a representative organ of Corporate India, ASSOCHAM articulates the genuine, legitimate needs and interests of its members. Its mission is to impact the policy and legislative environment so as to foster balanced economic, industrial and social development. We believe education, IT, BT, Health, Corporate Social responsibility and environment to be the critical success factors.

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ASSOCHAM represents the interests of more than 4,50,000 direct and indirect members across the country. Through its heterogeneous membership, ASSOCHAM combines the entrepreneurial spirit and business acumen of owners with management skills and expertise of professionals to set itself apart as a Chamber with a difference.

Currently, ASSOCHAM has more than 100 National Councils covering the entire gamut of economic activities in India. It has been especially acknowledged as a significant voice of Indian industry in the field of Corporate Social Responsibility, Environment & Safety, HR & Labour Affairs, Corporate Governance, Information Technology,

Biotechnology, Telecom, Banking & Finance, Company Law, Corporate Finance, Economic and International Affairs, Mergers & Acquisitions, Tourism, Civil Aviation, Infrastructure, Energy & Power, Education, Legal Reforms, Real Estate and Rural Development, Competency Building & Skill Development to mention a few.

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ASSOCHAM has been a significant contributory factor in the emergence of new-age Indian Corporates, characterized by a new mindset and global ambition for dominating the international business. The Chamber has addressed itself to the key areas like India as Investment Destination, Achieving International Competitiveness, Promoting International Trade, Corporate Strategies for Enhancing Stakeholders Value, Government Policies in sustaining India's Development, Infrastructure Development for enhancing India's Competitiveness, Building Indian MNCs, Role of Financial Sector the Catalyst for India's Transformation. ASSOCHAM derives its strengths from the following Promoter Chambers: Bombay Chamber of Commerce & Industry, Mumbai; Cochin Chambers of Commerce & Industry, Cochin; Indian Merchant's Chamber, Mumbai; The Madras Chamber of Commerce and Industry, Chennai; PHD Chamber of Commerce and Industry, New Delhi and has over 4,50,000 Direct / Indirect members. Together, we can make a significant difference to the burden that our nation carries and bring in a bright, new tomorrow for our nation.

**Uday Kumar Varma**  
Secretary General

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