



# IGBC NET ZERO Rating Programmes

*Enabling the Net Zero Movement in India!*



CII – IGBC Head Quarters, Hyderabad, India in 2003



CII – IGBC Head Quarters, Hyderabad, India in 2022





**Indian Green Building Council**  
*Greening India since 2001*

# About IGBC



[www.igbc.in](http://www.igbc.in)

© Confederation of Indian Industry



# Indian Green Building Council (IGBC)



Confederation of Indian Industry

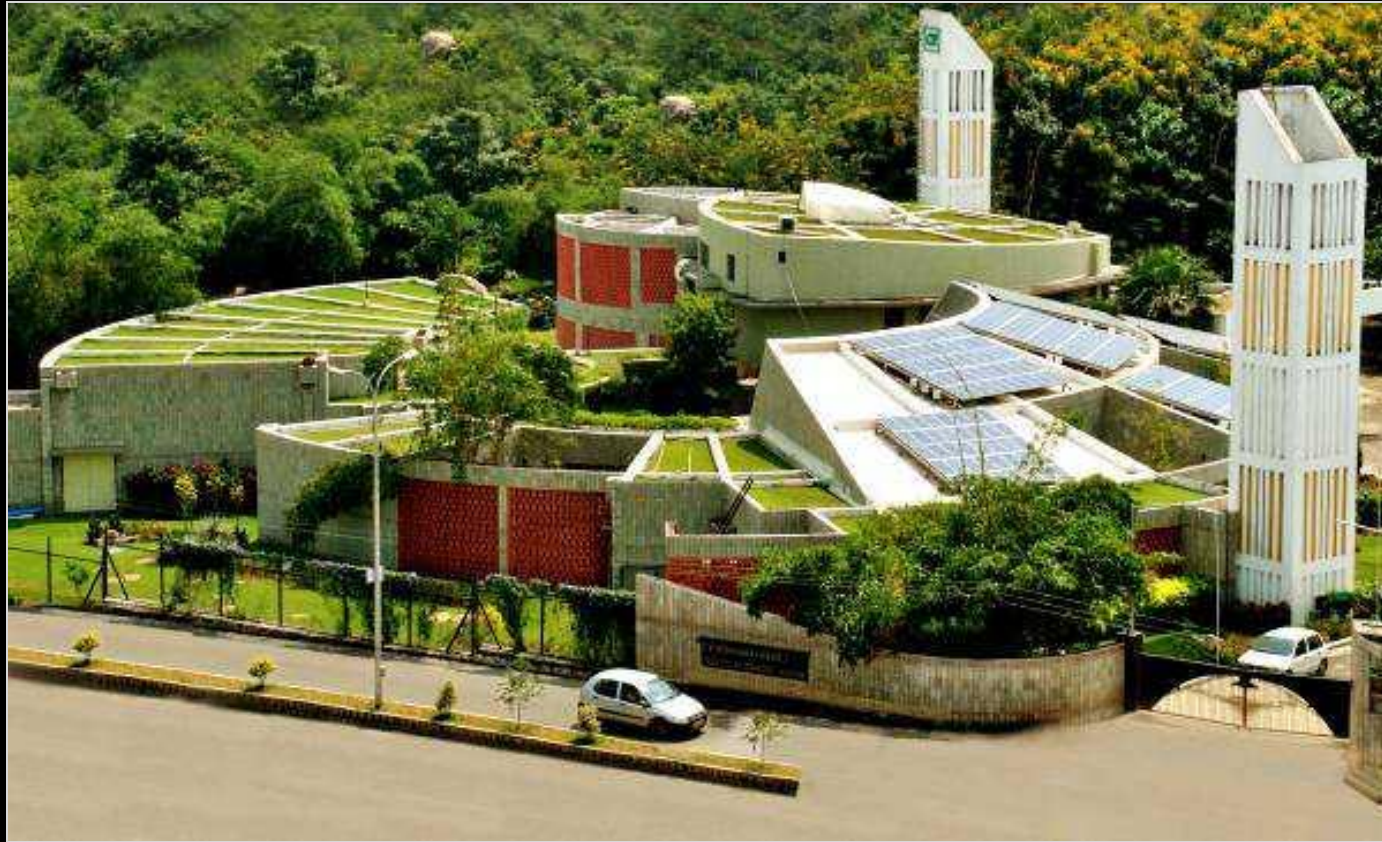
- ❖ **IGBC formed by CII in 2001**
- ❖ **Vision of IGBC**
  - **Enable 'sustainable built environment for all'**
  - **India to be one of the global leaders in sustainable built environment by 2025**
- ❖ **Founding Member of WorldGBC since 2004**





# 21<sup>st</sup> Century Modern Green Building Movement in India

CII – Godrej Green Business Centre, Hyderabad, India



Inaugurated by H.E Dr (Late) A P J Abdul Kalam,  
President of India

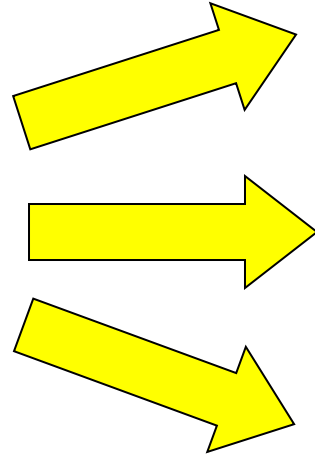
14 July 2004

**India's First Platinum Rated Green Building &  
IGBC Headquarters, Hyderabad**

# Green Building to Green Built Environment Movement in India since 2001



**In 2001,  
1 Green Building  
20,000 sq.ft.**



**8,700 + Green Projects  
9.74 Billion sq. ft.**

# 30 IGBC GREEN Rating Systems

<h2>Net Zero</h2>	<p>8. IGBC Green Data Centers</p> <p>9. IGBC Green Resorts</p> <p>10. IGBC Green Service Buildings</p>	<h2>Built Environment</h2> <p>14. IGBC Green Cities</p> <p>15. IGBC Green Existing Cities</p> <p>16. IGBC Green Villages</p> <p>17. IGBC Green Townships</p> <p>18. IGBC Green Landscape</p> <p>19. IGBC Green Hill Habitat</p>	<h2>Education</h2> <p>24. IGBC Green Schools</p> <p>25. IGBC Green Places of Worship</p>
<h2>Commercial</h2>	<h2>Residential</h2>	<h2>Transit</h2>	<h2>Industrial</h2> <p>26. IGBC Green Factory Building</p> <p>27. IGBC Green SEZ</p> <p>28. IGBC Green Logistics Parks &amp; Warehouse</p>
<p>1. IGBC Net Zero Energy Buildings</p> <p>2. IGBC Net Zero Water</p> <p>3. IGBC Net Zero Waste - 'NZ Carbon in Pilot stage'</p> <p>4. IGBC Green New Buildings</p> <p>5. IGBC Green Existing Buildings</p> <p>6. IGBC Green Interiors</p> <p>7. IGBC Green Campus</p>	<p>11. IGBC Green Homes</p> <p>12. IGBC Green Residential Societies</p> <p>13. IGBC Green Affordable Housing</p>	<p>20. IGBC Green Metro Stations</p> <p>21. IGBC Green Existing MRTS</p> <p>22. IGBC Green Railway Stations</p> <p>23. IGBC Green High Speed Rail</p>	<h2>Health &amp; Wellbeing</h2> <p>29. IGBC Green Healthcare Facilities</p> <p>30. IGBC Health &amp; Well-being</p>

Places where we stay, live, learn, work, play, transit & worship - *can all go green*



# Measurable Benefits in 2,215 IGBC Certified Green Projects across India



**15.3 Billion kWh**

(Energy savings per annum)



**49.0 Billion Litres**

(Water savings per annum)



**12.55 Million Tons**

(GHG mitigation per annum)

**2,215 IGBC Certified projects – 1,170 Million sq.ft**

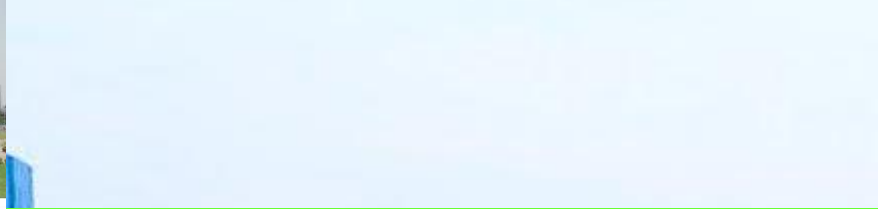
**30 IGBC GREEN  
Rating Systems  
addressing Buildings to  
Built Environment**

**Now, IGBC is leading  
India's Net Zero  
Movement**

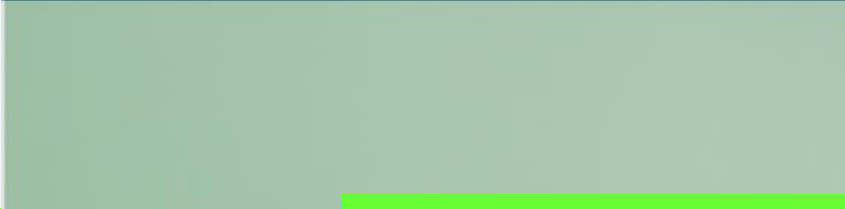




# BUILDINGS



# BUILT ENVIRONMENT



# NET ZERO







Indian Green Building Council  
*Greening India since 2001*

# IGBC NET ZERO rating Programmes

• *Energy* • *Water* • *Waste* • *Carbon*



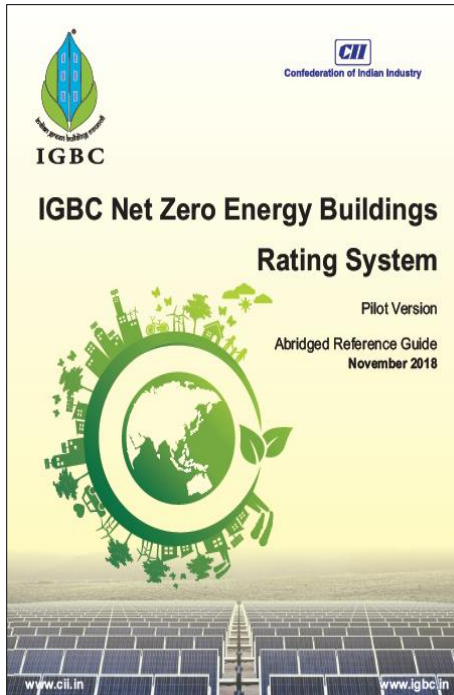
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# IGBC NET Zero Rating Systems



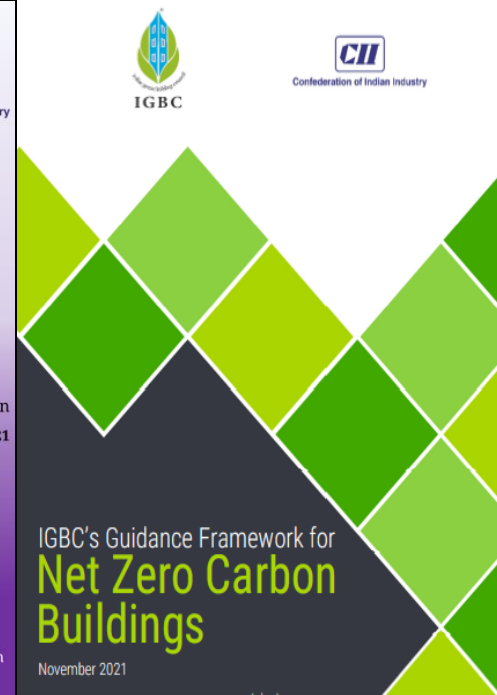
**Energy**



**Water**



**Waste**



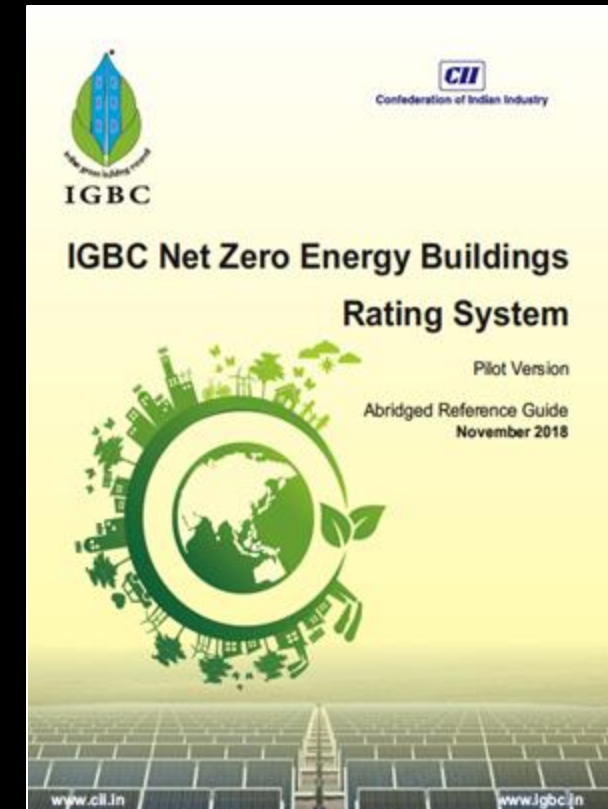
**Carbon**

[www.igbc.in](http://www.igbc.in)



# IGBC Net Zero Energy Rating (Launched in 2018)

- ❖ IGBC Net Zero Energy Buildings Rating - Voluntary & consensus-based.
- ❖ The rating system evaluates a performance-based approach.
- ❖ The rating is evolved to be comprehensive and holistic.

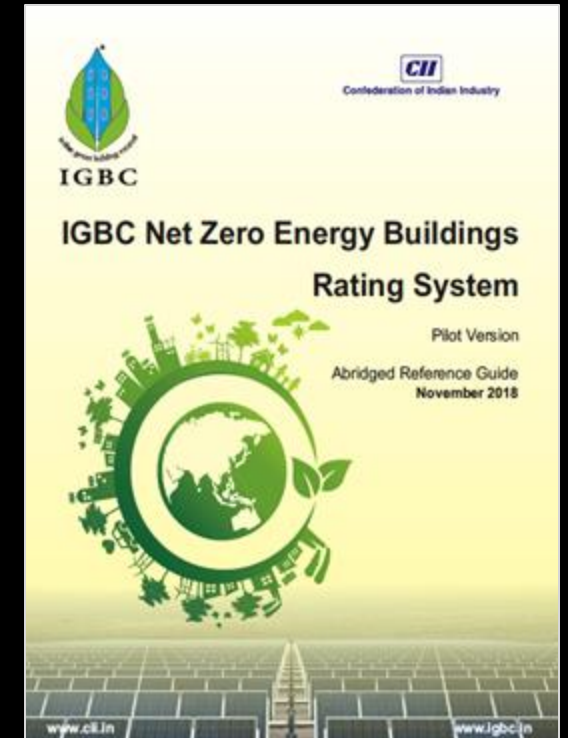




# 1. IGBC Net Zero Energy Building

**A Net Zero Energy buildings is one which is**

- Designed to have the *Lowest* Energy Demand
- High Energy Efficiency during its Operation
- Thereafter, Energy requirements are met through Renewable Energy (RE) sources



# Achieving 'IGBC Net Zero Energy' Status

**25 %**

**Renewable Energy**

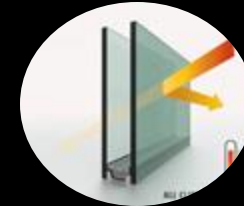
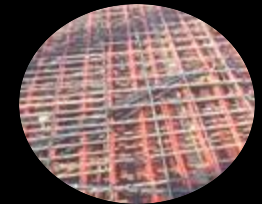


**100% offsetting of grid energy use by Renewable Energy Sources**



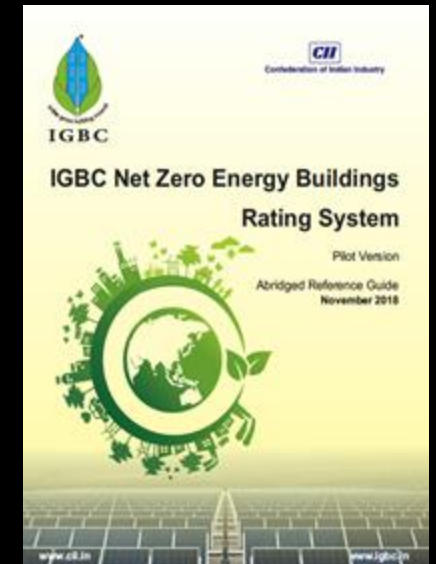
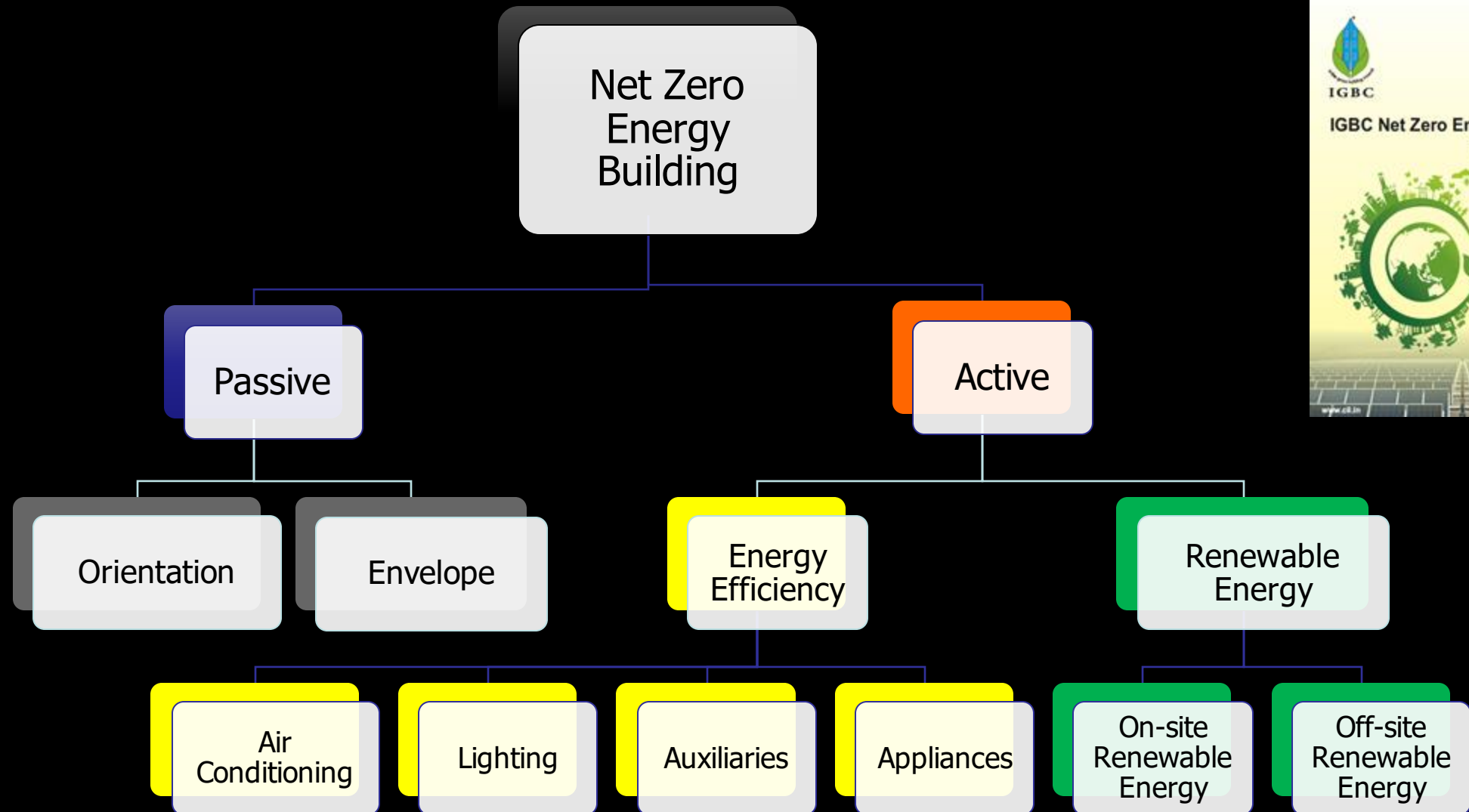
**75 %**

**Energy Efficiency**

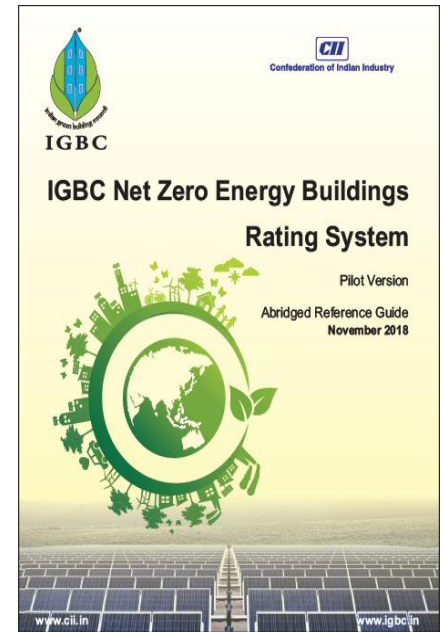


**Energy Efficiency through passive design & active energy systems, to reduce the Energy Demand**

# Approach for Achieving 'IGBC Net Zero Energy' Status







# Key Design & Operational features



# 1. Building Orientation & Energy Modelling

- ❖ IGBC rating program encourages optimised building orientation - Greenfield projects

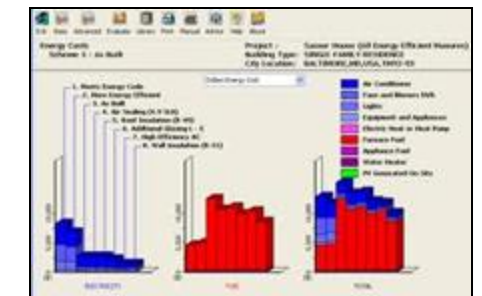
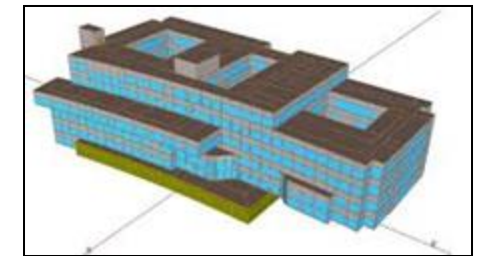
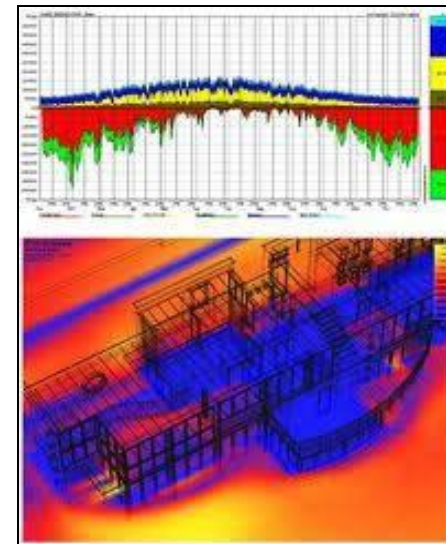
- ❖ Energy Modelling, BIM - Reduce the excessive heat ingress in New & Existing Buildings

- ❖ Effective tool to develop and adopt sustainable design in building

  - Models, forecasts, scenario projections of proposed building



*BGRT, Bangalore*

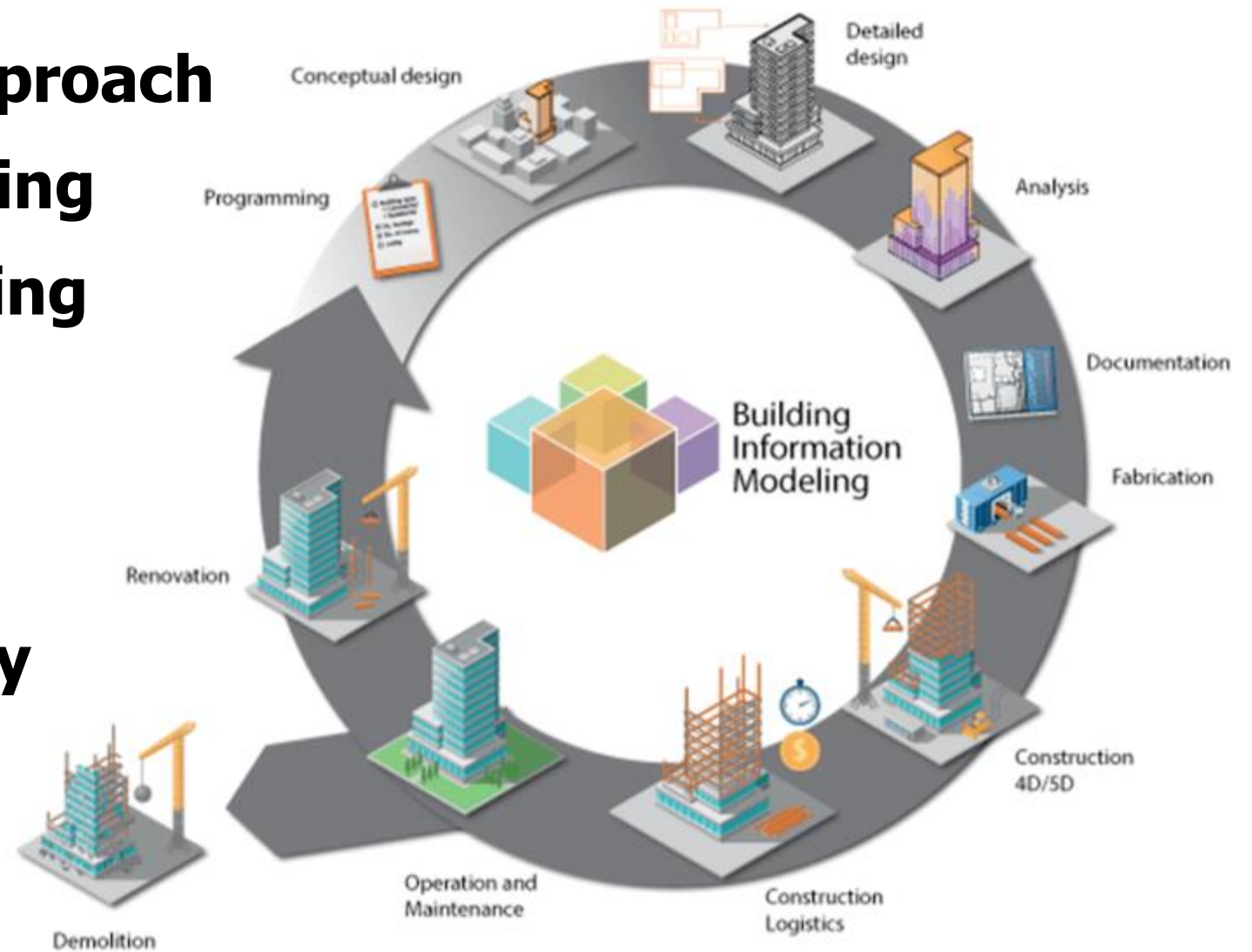


**Building Orientation is key to Enhance Energy Efficiency!**



# Building Information Modelling (BIM)

- ❖ **Highly Collaborative Approach**
- ❖ **Project Life-cycle planning**
- ❖ **Informed Decision making**
- ❖ **Right information at right time to all project stakeholders**
- ❖ **Improved overall quality**
- ❖ **Greater certainty over cost and time**



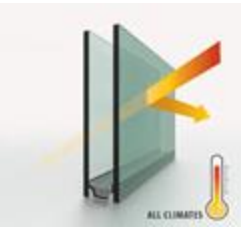
**IGBC rating system encourages BIM**



# 2. Envelope Design

**Based on Holistic & Integrated Design : Well Informed Design specifications**

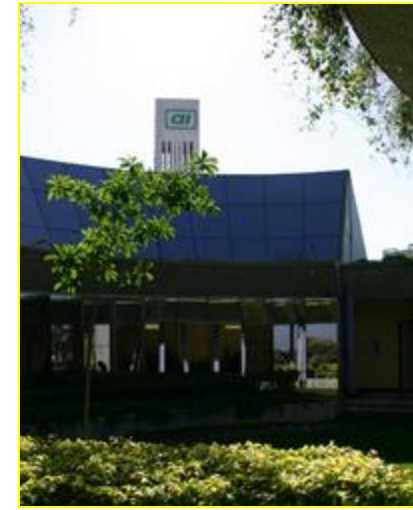
- ❖ **Window Wall Ratio (WWR)**
- ❖ **High Performance Glass**
- ❖ **PV Integrated Glazing**
- ❖ **Vertical Fenestration**
- ❖ **Insulated roof / Cool Roof**
- ❖ **Increased use of Fly Ash blocks**
- ❖ **Design for 95% clear sky**
- ❖ **Sky light . . . .**



# Approach towards Enhanced HVAC

## ❖ IGBC Rating Programmes – Encourage Passive Measures

- Wind Tower System
- Earth Tunnel Cooling
- Geothermal Cooling
- Conventional HVAC Systems
- Highly Integrated & Holistic –  
Super Energy Efficient Systems . . .



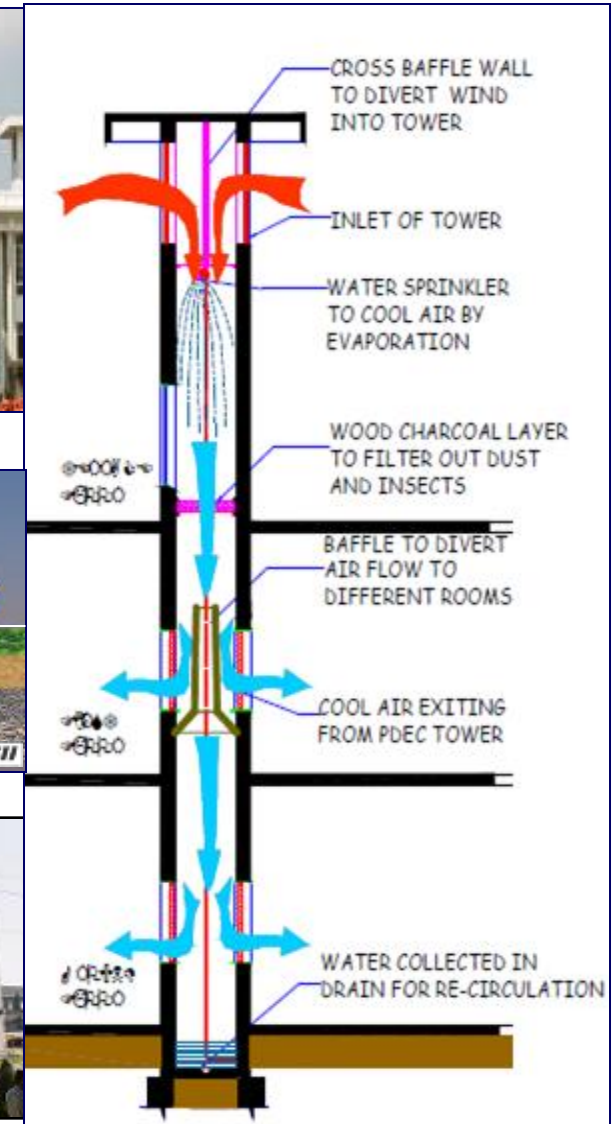


# 3. Heating, Ventilation & Air Conditioning (HVAC)

## Passive Cooling

❖ Temperature reduction up to 8-10 deg C, possible

- Earth air tunnel
- Geothermal cooling
- Wind Towers
- PDEC system  
(Passive Downdraft  
Evaporative Cooling)



Wind tower





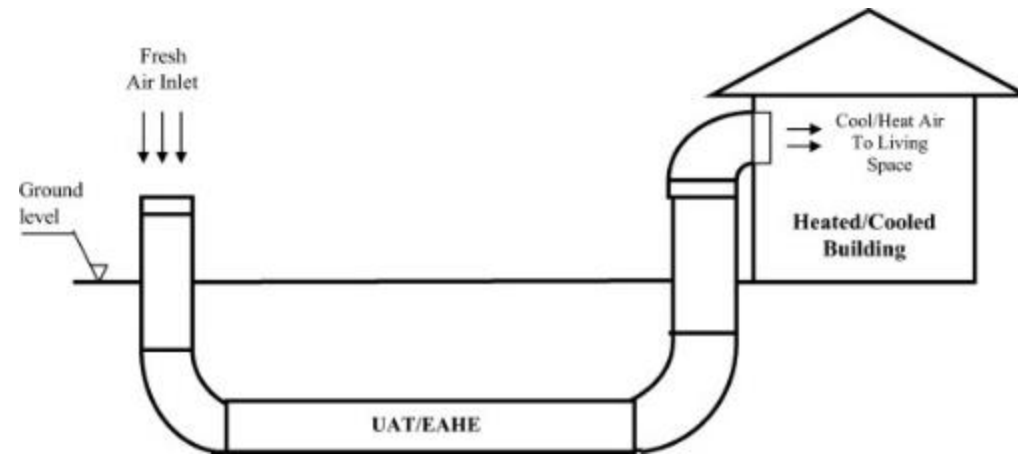
# 1. Earth Tunnel Air Conditioning – Office Project

❖ Wonder Utilisation of Nature

❖ Earth below 4 m

❖ Cooler - During Summer

❖ Warmer - During Winter



**Aquamall, Dehradun IGBC Gold**



# Earth Tunnel Air Conditioning – Residential Project

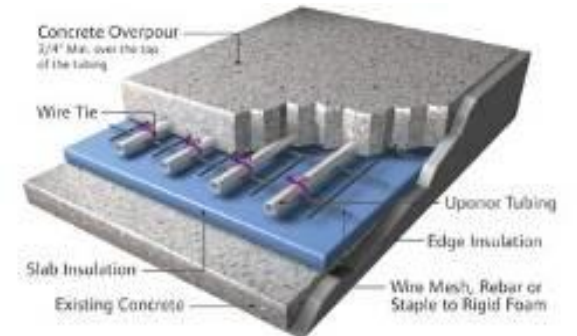
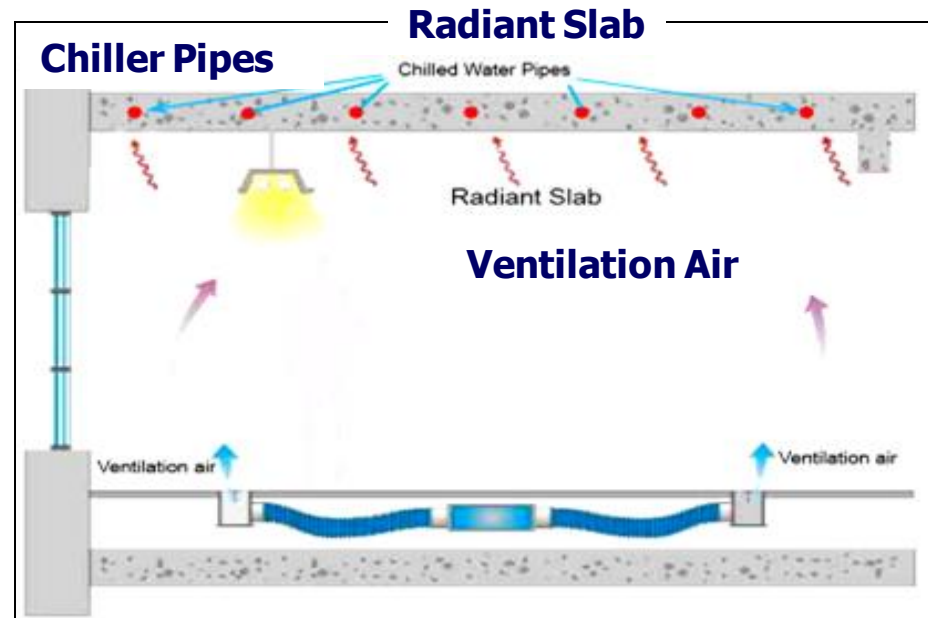


- ❖ **Earth Tunnel used to Pre-Cool the ambient air**



# 2. Radiant Cooling Technology

- ❖ **30-40% better efficiency**
  - Possible CoP : 8
- ❖ **Advantages**
  - Specific cooling of person
- ❖ **SEC – 0.3 kW/TR**
- ❖ **Infosys, Pocharam – IGBC Platinum Rated!**
  - 160,000 sq.ft





# 3. Cogeneration

- ❖ **2.5 MW Gas based turbine for onsite power generation**
- ❖ **Co-generation where waste heat from turbine exhaust runs 1,300 TR VAM**
- ❖ **System integrated to National Grid**
- ❖ **HVAC running cost almost negligible**



# 4. District Cooling

- ❖ Enhances performance - Overall HVAC system by design
- ❖ Centralized controls
- ❖ Lower cost of operation
- ❖ Part load and Full load - System's performance is very high
- ❖ Reduces Operating cost by 30-35% as compared to a standalone system
- ❖ *GIFT City, Gandhinagar, India*
- ❖ *Proposed HVAC Capacity (in 3 stages) : 180,000 TR*



## 4. Effective Usage of Recycled Water for Cooling Tower Make-up



Reuse of 100% Recycled Grey Water at Olympia Tech Park, Chennai



Cooling requirement for HVAC Make-up



Irrigation



Flushing

**Zero Discharge of Grey Water**

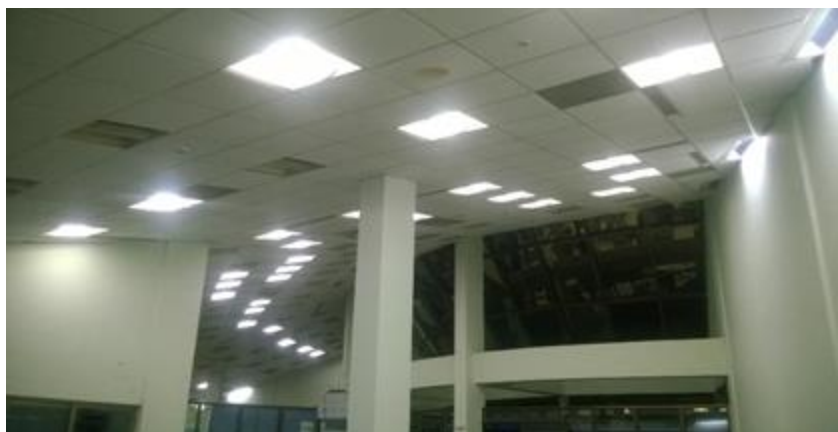


# 5. Lighting Energy Efficiency

## Retrofitting of existing fixtures by LED fixtures

	LPD (W/ft <sup>2</sup> )
Design Case	1.04
Proposed case	0.49

Case Study : Lighting retrofit in CII-Godrej GBC



### Existing Lighting Fixtures

- 72 W/ fixture
- Efficacy : 60
- No of fixtures : 211



### Proposed Lighting Fixtures

- 38 W/ fixture
- Efficacy : 132
- No of Fixtures : <100

# 6. Lighting Controls

## Occupancy sensors, Daylight sensors

- ❖ Enhanced utilisation of daylighting
- ❖ Better lamps & controls



**Lighting Power Density : 0.3 – 0.5 W/ sq.ft**

# 7. Daylighting and Views

**SKYLIGHT**



**ACCESS TO DAYLIGHT & VIEWS**



**LIGHT PIPES**



**Reduced lighting energy consumption through efficient use of skylight and light pipes**



# 8. On-Site Renewable Energy Systems

## Renewable Energy & Daylight



## Rooftop 1 MW Grid Integrated Solar PV\*



## Micro Wind Turbines



## Solar Farms



Solar Farm in IMGEOS & NDEM Facility of ISRO, Shad nagar, IGBC Platinum

## Solar Structures for Shading



Micro Wind Turbines -Suzlon One Earth, Pune  
-IGBC Platinum



# Renewable Energy Systems – IGBC Projects

**BIPV**



**CANOPY**



**FLOATING SOLAR PV**





# Renewable Energy Systems at IGBC HQ!

IGBC HQ, Hyderabad



**INDIA'S FIRST 140 kWp BIFACIAL SOLAR PV**



© Confederation of Indian Industry





# 9. Off-site Renewable Energy - Green Power

❖ **Building to install onsite/offsite RE system to achieve Net Zero Performance**

❖ **Approach**

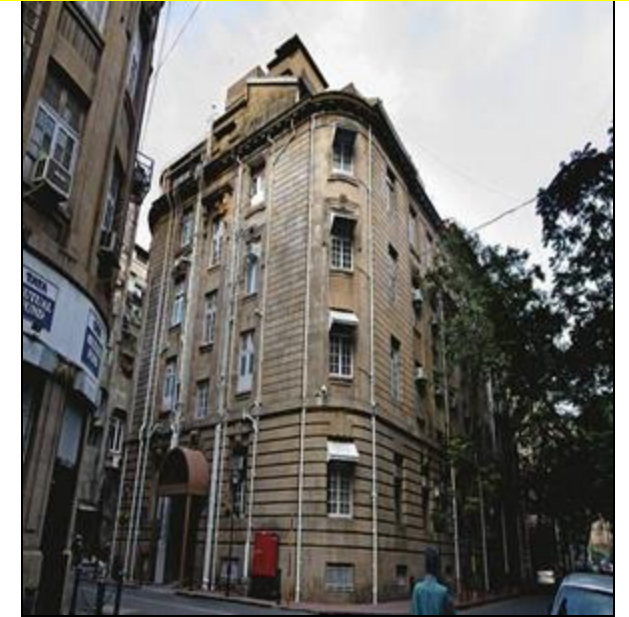
- **Encourage onsite renewable energy generation**
- **Onsite RE to cater to a minimum of 5.0 % of total building energy consumption**
- **Balance to be catered through offsite renewable energy**

❑ **Bombay House, Mumbai**

- **Purchased RECs for 1,090 MWh**
- **75% of the total energy consumption ~14.5 lakh units per year**

❑ **Beary's Group Research Triangle, Bangalore**

- ❑ **12.1 MW Wind Farm**
- ❑ **Equivalent to 50% of annual energy consumption**



Beary's Group Research Triangle, Bangalore

IGBC Platinum



# 10. Controls, BMS and AI

## Sustained Excellence in Performance

### ❖ BMS as an effective tool

#### ➤ Variations inevitable

- Load
- Occupancy schedule
- Climatic conditions

#### ➤ Human interface minimized

#### ➤ Artificial Intelligence (AI) Applications

#### ➤ IoT in buildings



Screenshots from the Sierra ODC Monitoring dashboard

***What gets Measured, gets Managed !***



Sierra ODC eFACiLITY, Coimbatore –  
IGBC Platinum

# Energy Efficiency Models for implementation

- ❖ **Capex – Savings & Pay back is excellent,**  
**Owner can allocate own financial resources**
- ❖ **ESCO – Savings and pay back is excellent,**  
**Owner needs support for capital investment**
- ❖ **Rental / Lease – Savings is attractive, and**  
**Owner does not want to own the Asset**
- ❖ **BOOT Model – Pay Back is longer, investment,**  
**Operation control lies with Investor**





# CII - IndiaGBC Headquarters Net Zero Energy Platinum Building



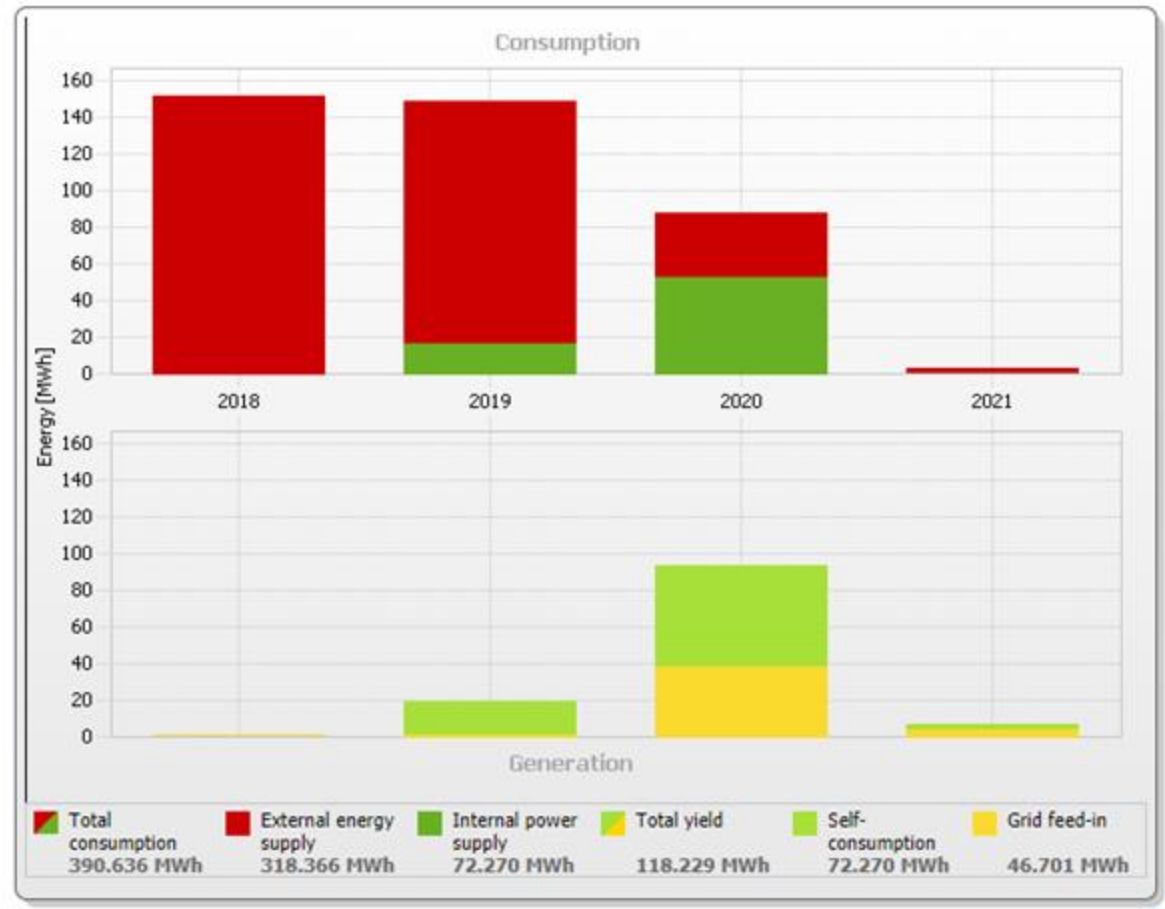
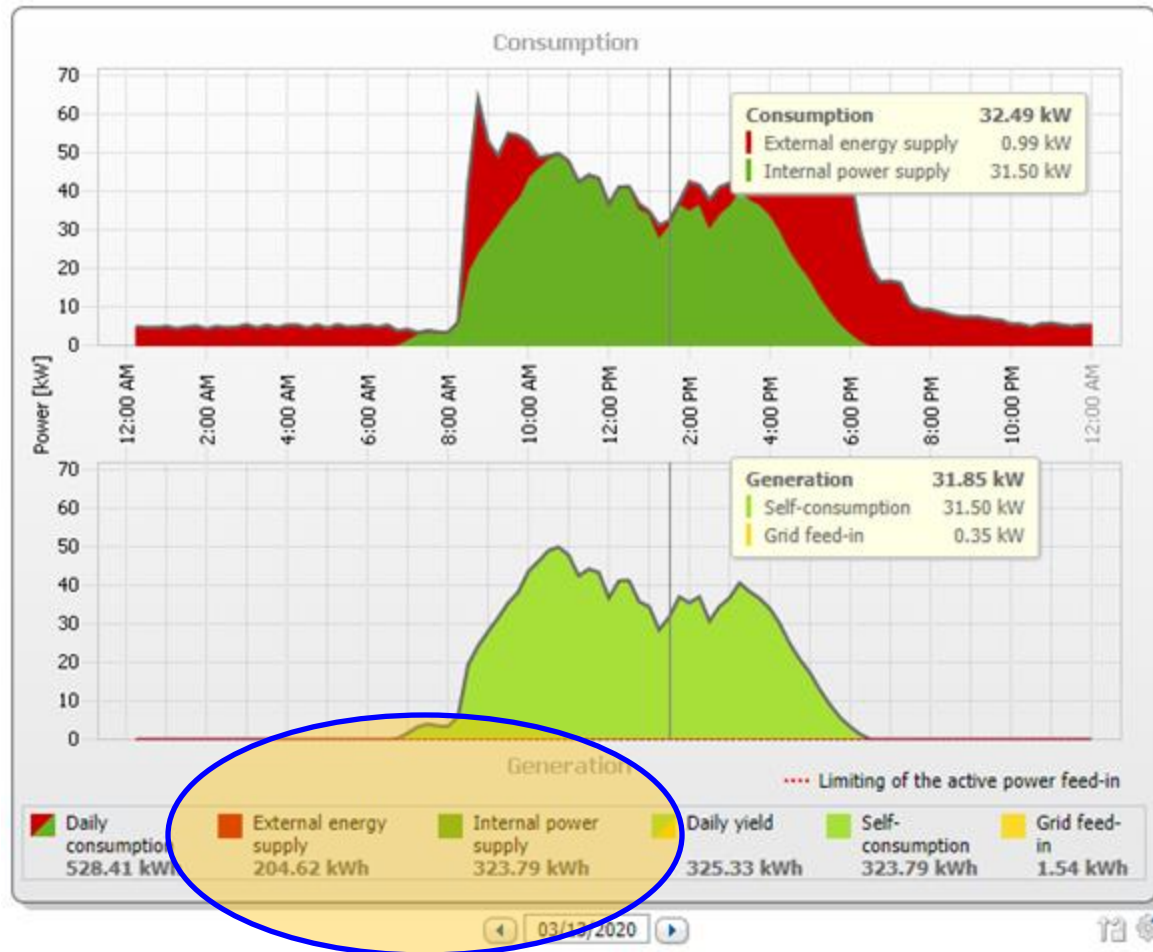
CII Godrej Sohrabji Green Business Centre	
Solar PV Capacity	<b>130 kWp</b>
Projected Onsite Solar Generation	220000 kWh <b>(108%)</b>
Projected Annual Energy Consumption	203000 kWh
Conditioned Area	1115 sq.m.
Total Built up Area	1858 sq.m.

## **Bifacial solar PV modules**

- ❖ **Transparent & frameless**
- ❖ **Backside has a power rating of at least 90% of front side**
- ❖ **Energy yield enhanced with higher reflectivity**
- ❖ **Energy yield enhanced as the elevation of the modules from the roof surface increases (20 - 30% with an elevation of 1.5 m)**

**To demonstrate and showcase the viability of  
Net Zero Energy buildings**

# NZE – A Business Case : Study of IGBC HQ



- ❖ On-site RE System meets total energy demand
- ❖ Generated RE is utilized and extra power is fed to grid

# IGBC Net Zero Energy projects in India

**More than  
75 projects are working  
to achieve IGBC  
Net Zero Energy  
certification**



Plant - 13 Godrej & Boyce, Mumbai  
(Office Building)



Globicon Terminals Mumbai (Warehouse)



Capgemini EPIP Campus Bangalore  
(IT Campus)



ICICI RSETI Jodhpur  
(Training Institute)

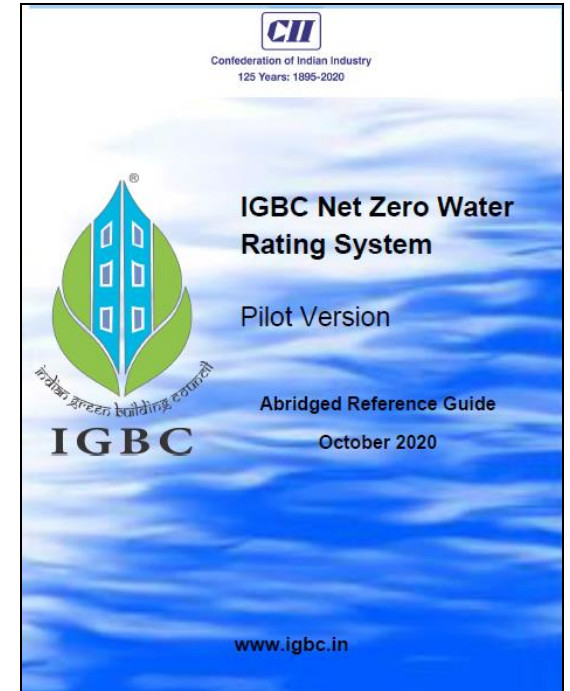




# 2. IGBC Net Zero Water

**Net Zero Water Buildings are those**

- **that consume minimum raw water**
- **produce alternate water to meet the balance requirement and give back such quantities to the original sources for use**



# Net Water Consumption in a Building

$$\text{Net Annual Water Consumption} = \text{Total Potable Water Used} - \text{Alternative Water Used (or) Harvested}$$

**Potable Water** → **Municipal water, borewell water (even if quality is not potable), tanker water purchased**

**Alternative Water** → **Rainwater used (or) harvested, treated grey water, condensate water, any purchased grey water**

**Ideal Scenario: *Quantity of Net Annual Water consumed should be ZERO***



# IGBC NZ Water – Reduce Demand

- ❖ **Demonstrate reduction in water consumption**
  - with respect to the **Baseline - Uniform Illustrated Plumbing Code of India**
- ❖ **Focus areas**
  - **Plumbing fixtures (Sanitation and Hygiene)**
  - **Mechanical equipment**
  - **Irrigation**





# **IGBC NZ Water – Harness Alternate Water & Return Water Back to Source**

## **❖ Treat 100% of wastewater**

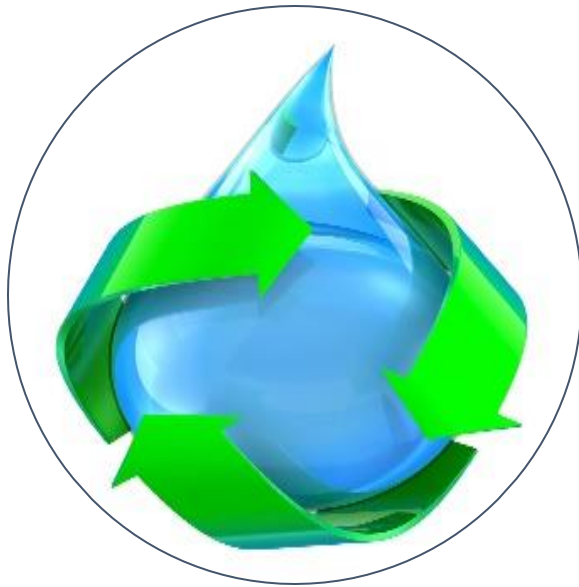
- **Treatment plant within premises or Centralised**
- **Purchasing wastewater is encouraged wherever generation is lower vis-à-vis consumption**
- **Maximise the utilisation of treated wastewater**

## **❖ Harvest rainwater**

- **Recharge the local aquifer**
- **If water table is high or regulations do not encourage recharging, project should donate / sell treated water for reuse**



# IGBC Impact on Water\*



**49 Billion litres /  
annum**

=



**2 Month's Water  
requirement of Hyderabad**

*\*From 2,581 certified projects with building footprint of 1,243 million sq ft*



# Sobha City, Thrissur, Kerala, India – 1st IGBC Net Water Positive Platinum



Artificial Lake spread over 6.5 acres with rainwater storage capacity of 191 ML - fulfils 100% of water requirement





# Sobha City, Thrissur, Kerala, India – Key Features



Aeration Tank of STP



STP Water used for landscaping



Water meters for Domestic water (treated lake water), HVAC & treated water for irrigation



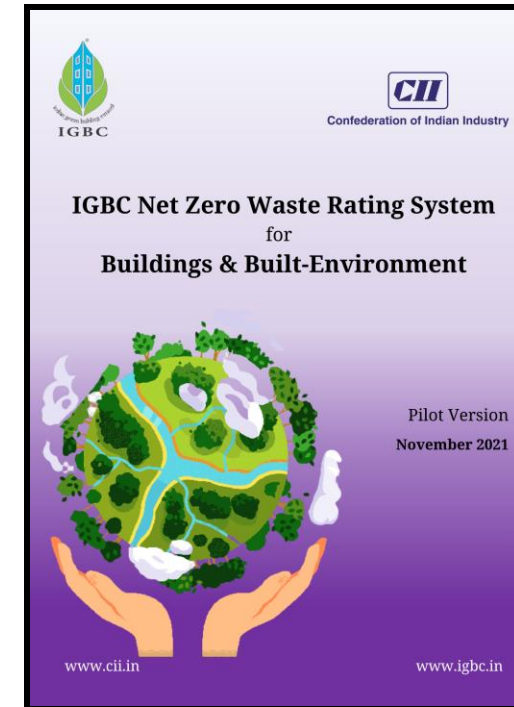
Overflow from Lake diverted to Irrigation Channel



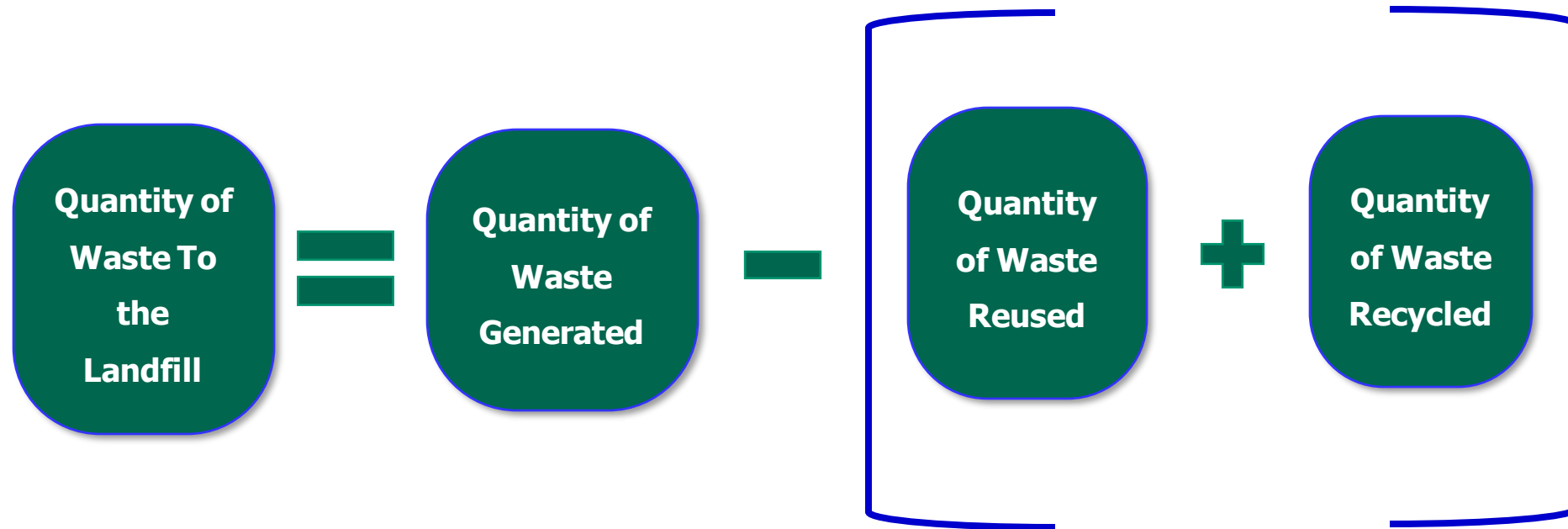
# 3. IGBC Net Zero Waste

**Net Zero Waste Buildings are those which**

- **eliminate the diversion of waste being sent to landfills by multi-pronged approaches**
  - nature-centric design
  - reducing debris during construction
  - responsibly handling waste during operation
  - recycling the remaining waste



# IGBC Net Zero Waste to Landfill

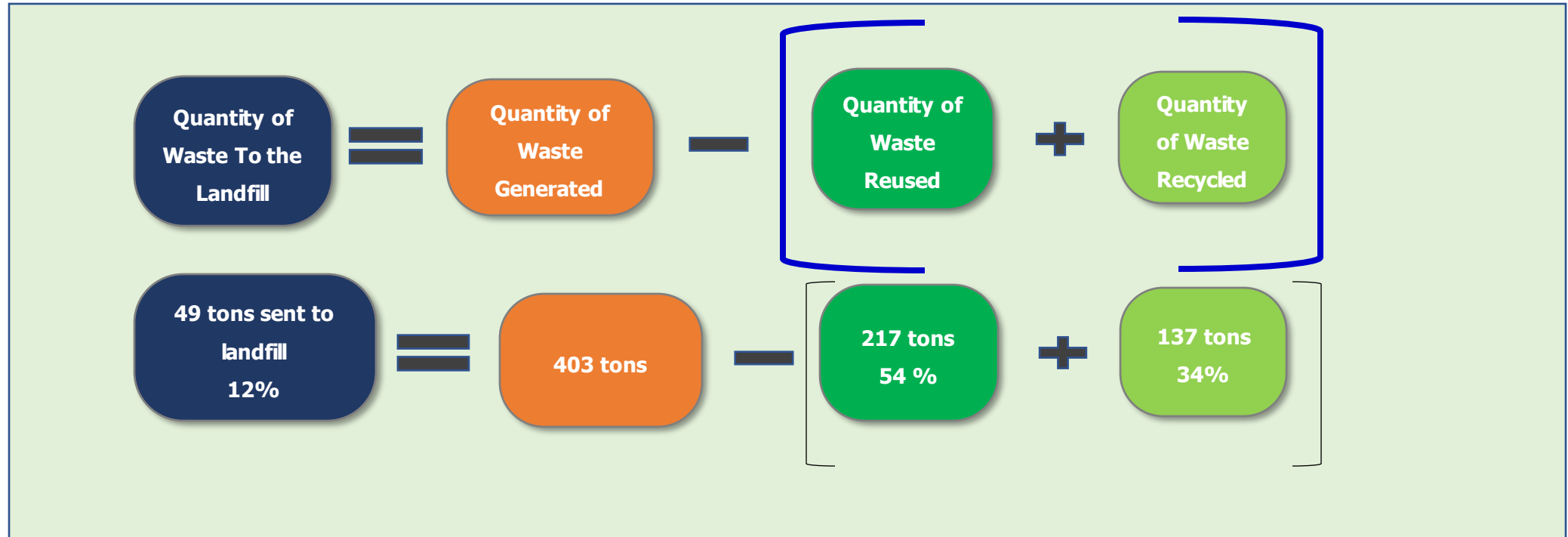


**Ideal Scenario: *Quantity of waste sent to landfill should be ZERO***



# IGBC Compliance to Net Zero Waste to Landfill

❖ Project to appoint **authorized thirty party** to demonstrate waste diverted from landfill



**Ideal Scenario: Quantity of waste sent to landfill should be ZERO**

# Reuse of Materials ( Salvaged)



Use of railway sleepers bought from railway auction



[www.shutterstock.com](http://www.shutterstock.com) · 720378700



Use of scrap Swedish pine wood in false ceilings.



Furniture from salvaged Pine Wood



Courtesy: Eicher Corporate Office, Gurgaon; IGBC Platinum



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Leadership. Innovation. Integrity.



# Reuse of Materials...



Optimize life cycle economic performance. Smarter material use.

*Courtesy: Essteam, Surat IGBC Platinum*

*Courtesy: Eicher Corporate Office, Noida, IGBC - Platinum*



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# IGBC NZ Waste – Green Procurement in *Existing Projects*

## ❖ Responsible Procurement Policy

### ➤ Prefer Ecolabelled products (GreenPro)

❑ Eg: Green Housekeeping chemicals, Office consumables, etc

### ➤ Star labelled appliances

### ➤ Eco- friendly Packaging

❑ Paper bag, Cloth bag

### ➤ 100% recycled & chlorine-free papers

### ➤ Biodegradable printing inks



ONE PERSON USING  
REUSABLE BAGS OVER  
THEIR LIFETIME WOULD  
REMOVE MORE THAN  
**22,000**  
PLASTIC BAGS  
FROM THE ENVIRONMENT.

# IGBC GreenPRO Green Certified Building Products



5,000 + building products certified  
175 companies registered  
25 sectors covered



[www.ciigreenpro.com](http://www.ciigreenpro.com)



# GreenPro leads to *Sustainable Procurement*

## Construction Materials

1. Cement
2. Ready Mix Concrete
3. Construction Aggregates
4. GGBS
5. Construction Blocks
6. Doors / Windows

## Building Envelope and Facade

1. Plasters
2. Insulation
3. High Performance Glass
4. High SRI Tiles

## Paints, Coatings and Chemicals

1. Construction Chemicals
2. Cleaning Chemicals
3. Paints and Coatings

## Building Interiors

1. Furniture
2. Wood Polymer Composite
3. Panels and Boards
4. Ceiling Systems
5. Tiles

## Technologies

1. IAQ Solutions
2. Rainwater harvesting
3. Solar PV
4. Plumbing Fixtures
5. Luminaries



**More than 90% Passive Building Products - certified under GreenPro**





# Aligned with Vision of World GBC

## Advancing Net Zero

A World Green Building Council global project

**WorldGBC definition:**  
A net zero carbon building is highly energy efficient with all remaining energy from on-site and/or off-site renewable sources

**100% of buildings** must operate at net zero carbon **2050**

**2030** **All new buildings** must operate at net zero carbon

**Key Principles**

- 1. Measure and disclose carbon**  
Carbon is the ultimate metric to track, and buildings must achieve an annual operational net zero carbon emissions balance based on metered data
- 2. Reduce energy demand**  
Prioritise energy efficiency to ensure that buildings are performing as efficiently as possible, and not wasting energy
- 3. Generate balance from renewables**  
Supply remaining demand from renewable energy sources, preferably on-site followed by off-site, or from offsets
- 4. Improve verification and rigour**  
Over time, progress to include embodied carbon and other impact areas such as zero water and zero waste

**GOVERNMENT ENGAGEMENT**

**TRAINING & EDUCATION**

**CORPORATE ENGAGEMENT**

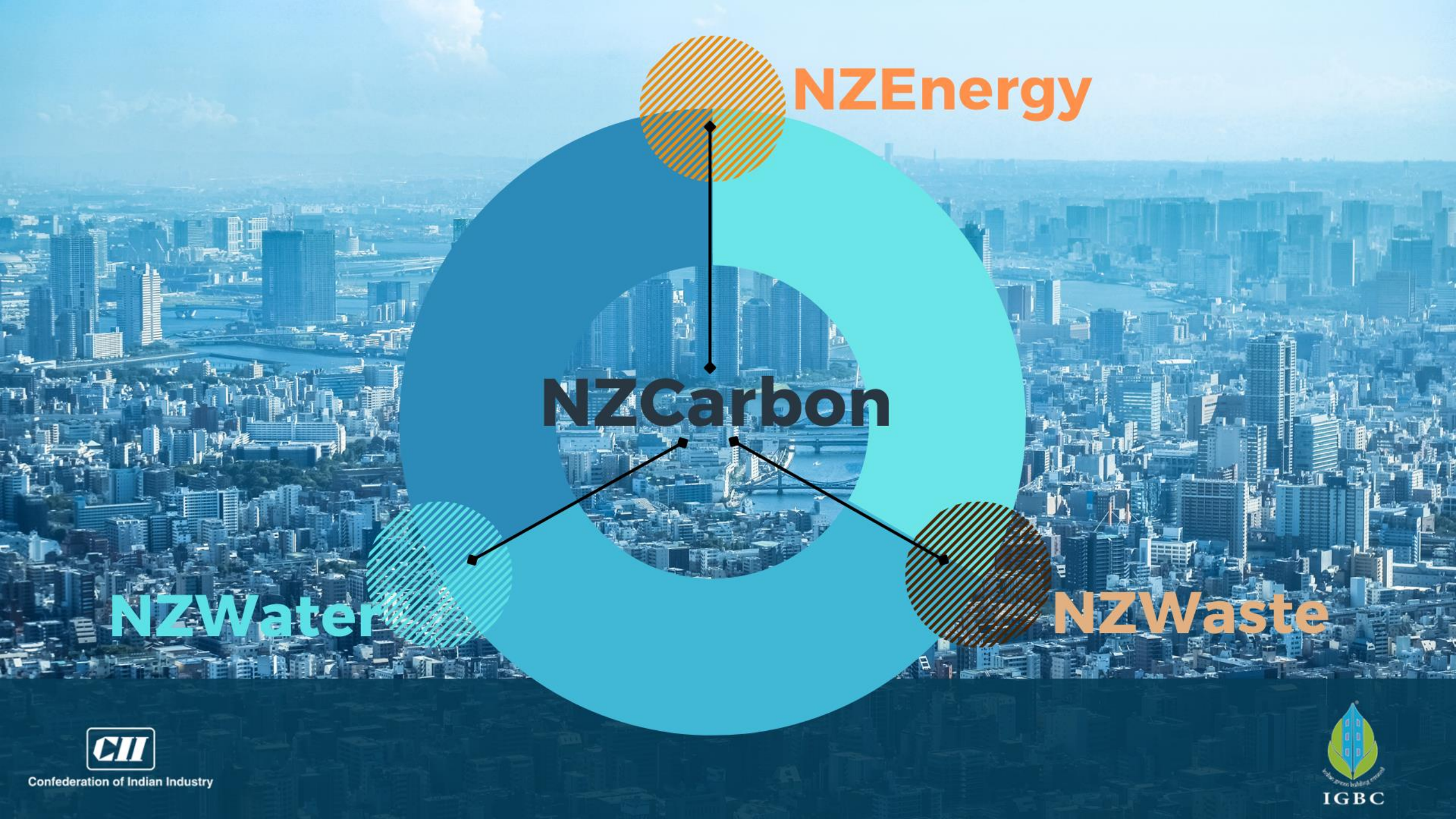
**CERTIFICATION**

**WORLD GREEN BUILDING COUNCIL**

**IGBC**

Version 1 | March 2018





**NZEnergy**

**NZCarbon**

**NZWater**

**NZWaste**



Confederation of Indian Industry



IGBC



# To Sum Up

- ❖ **India has huge potential to accelerate the Net Zero Movement**
  - **Innovative concepts, Futuristic – Products, Technologies, Solutions . . .**
- ❖ **Tremendous benefits**
  - **Tangible & Intangible**
  - **Society & Nation**
- ❖ **Instill a sense of pride**







***"If we can change the way you think about building,  
may be what you build will change the world"***

***- Dr (Late) Prem Jain, Chairman, IGBC***





***NET ZERO CARBON BUILDINGS  
ARE THE FUTURE!***

