# Enhanced Thermal Comfort & Energy Efficiency in Building Sector

An innovative approach to make Building Sector more sustainable and Thermally Comfortable

*Indo German Energy Programme (IGEN)*

*Climate Smart Buildings (CSB)*

September 2022

# India Glasgow Commitment


## The Panchamrita

- India will get its non-fossil energy capacity to 500 gigawatt by 2030
- India will meet 50 per cent of its energy requirements till 2030 with renewable energy
- India will reduce its projected carbon emission by one billion tonnes by 2030
- India will reduce the carbon intensity of its economy by 45 per cent by 2030
- India will achieve net zero by 2070



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# Building Sector and Its Energy Consumption

Building itself accounts for 1/3rd of the total electricity consumption in India.

Country's building floor space is expected to increase **5-fold** from 2015 to 2050

Electricity consumption in buildings is expected to increase **7-fold** during the period 2012-2032

The commercial and high-rise residential structures is expected to increase **3-Fold** during the period 2015-2030.

**Factors fuelling this rapid Transition:**

1) High GDP Growth
2) Rapid Urbanization
3) Mass Government Construction Programme like Housing for All
4) Increased Living Standards and Cooling needs

# Energy Efficient Residential Buildings (IGEN-EERB)

## (2016 - 2020)

# Eco-Niwas Samhita 2021 and Residential Building Star Labelling


**Eco-Niwas Samhita 2021 (Launched in July 2021)**

- Eco-Niwas Samhita 2021 (ECBC – Residential) – Minimum Energy Performance Code to enhance energy efficiency inside residences as well as reduce external heat gains in residential buildings.
- A residential building label – Benchmarks and compare one home over the other on the energy efficiency standards.


**Star Label for EE Homes (Launched in Feb 2019)**

## ENS 2021 Compliance Tool & Professional Tools

BUILDING PERFORMANCE ANALYTICS




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# Demonstration projects
## (2017-20, with States and CPWD)

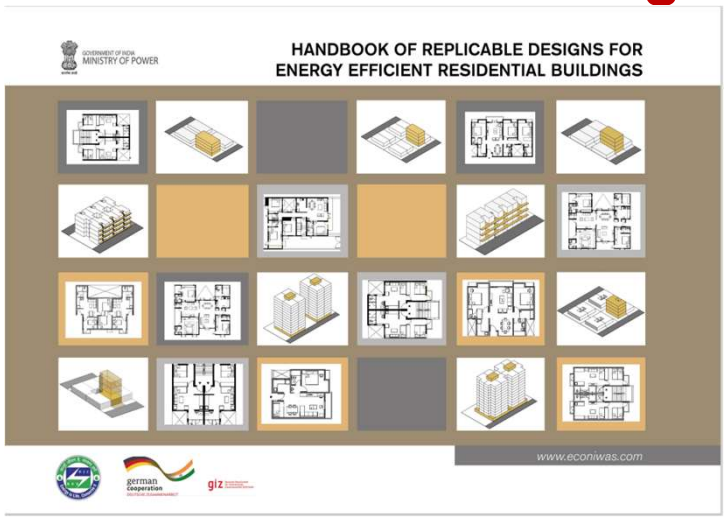
- Total **53** Nos of Projects in 5 states (4 Climatic Zones)
- More than **100,000** dwelling units

**Achievements**

- 18 Million kWh per annum saving recommendation
- 14000 Tonnes $CO_2$ mitigation recommended

✓ Eco-Niwas Samhita Compliant
✓ Thermally Comfortable Design
✓ Building Star Labelled Certified

# Catalogue of Replicable Designs for EE Residential Buildings




**Replicable Design Handbook**

- Various **residential types – replicable models**
- Across different **house sizes**
- In **different climatic zones** across India

# Learnings of EERB

- Energy efficiency Code needs to be “**Simple, User Friendly & Flexible**” to allow mass acceptance.
- Market Response Strategy - **Energy-Labelling** programme can help consumers by providing direct, reliable information.
- Market Transformation – New Age Businesses –
  - The directory of energy-efficient **Building Materials** – ease of access to the information
  - The catalogue of **Replicable Designs** – ease of access to new designs and concepts
- Need of Future ready vision - The Smart Homes R&D to optimize residential buildings for improving energy efficiency

# Important weblinks

- www.econiwas.com
- www.beeindia.gov.in



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# Climate Smart Buildings (IGEN-CSB)

June 2021- Mar 2024

# Climate Smart Buildings

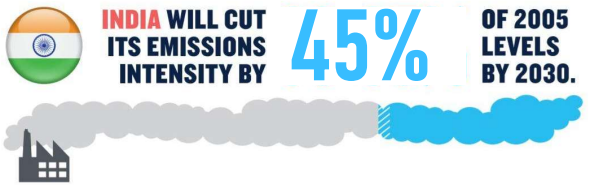
Ministry of Housing and Urban Affairs
Government of India

Federal Ministry for Economic Cooperation and Development

german cooperation
DEUTSCHE ZUSAMMENARBEIT

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

1. **Enhance Thermal Comfort by 35%**
2. **Reduce GHG emissions by 20 MtCO2e by 2030 & 30 MtCO2e by 2047**
3. **Capacity development of 1500 Building design professionals & Govt. officials**
4. **Vocational training and Awareness for >12000 Skilled Workers and Building professionals through more than 200 Workshops**
5. **Pilot construction of >10,000 thermally comfortable affordable DUs**



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# CSB Programme Key initiatives

### Thermal Comfort Standard & Action Plan

Compendium on use of innovative technologies and materials in affordable housing sector

### Replicable Design Catalogue

1000 Replicable designs for each climatic zone for mainstreaming thermal comfort in affordable housing

### Demonstration Projects

Technical assistance for 25 Housing Projects on achieving thermal comfort through low- cost passive strategies.

### International collaboration

International Universities to Support incubators & main-stream thermal comfort into educational system

### Training Modules

Training Modules for states on Thermal Comfort in 5 climatic zones

### Capacity Building

1400 Trained Government officials and Professionals on Thermal Comfort

# LIGHT HOUSE PROJECTS & RACHNA

**Monolithic Concrete Construction using Tunnel Formwork**

- LHP Location: Ranchi, Gujarat
- No. of Houses: 1144

**Prefabricated Sandwich Panel System**

- LHP Location: Indore, Madhya Pradesh
- No. of Houses: 1024

**Precast Concrete Construction System – Precast Components Assembled at Site**

- LHP Location: Chennai, Tamilnadu
- No. of Houses: 1152

**Precast Concrete Construction System – 3D Volumetric**

- LHP Location: Ranchi, Jharkhand
- No of Houses: 1008

**Light Gauge Steel Structural System & Pre-engineered Steel Structural System**

- LHP Location: Agartala, Tripura
- No of Houses: 1000

**PVC Stay in Place Formwork System**

- LHP Location: Lucknow, Uttar Pradesh
- No of Houses: 1040

RACHNA

RESILIENT, AFFORDABLE AND COMFORTABLE HOUSING THROUGH NATIONAL ACTION

**3492+ STAKEHOLDERS trained in 75 Trainings across 25 States**

**1045** Government officials

**1016** Practitioners & Professionals

**636** Contractors & Const. workers

**795** Students

# Learnings So far of CSB

- We need relevant, simple and cost-effective solutions for Thermal Comfort Standard Compliance
- Need to strategies replicability and scalability of sustainable construction technologies.
- Awareness and capacity development efforts to lead the replicability in thermal comfort related interventions
- Market development and acceleration Strategy – Need enabling environment, access to new technologies, pricing, supply chain, financing and new business models at scale
- Strategizing initiatives like ASHA – India (Affordable Sustainable Housing Accelerators) to mainstream sustainable technologies

# Important weblinks

- www.ghtc-india.gov.in; www.ghtc-india.gov.in/Content/rachna.html
- www.pmaymis.gov.in
- ww.bmtpc.org



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# Net Zero Energy Buildings Vision for India

## (2022-2070)

# Road map for the building sector to achieve net-zero

## Way Forward

### 1 POLICY & STRATEGIES

**Policy Support at Centre**

- Need of Net Zero Energy Building Action Plan (NZEBAP)
- After the successful completion of EC Act amended and launch of ENS & ECBC, need accelerated State Notification
- Policy Shift with clear goals of NZEB
- Policies to mandate the use of Solar Roof tops or RE generation/ purchase

### 2 IMPLEMENTATION & MARKET LINKED PROGRAMMES

**State Implementation & compliance**

- Amendments in Local Bye Laws with infrastructure at ULB level for having compliance and verification system in place
- Automation w.r.t. Building Approval System, Data base management and Template Design Layout
- Capacity building of govt officials and private sector professionals
- Implementation of India Cooling Action Plan (ICAP)
- Pan India advance demonstration projects and scalability strategies

### 3 RESEARCH & DEVELOPMENT

**R&D and Innovation**

- R&D under ASHA-India on enhanced thermal performance in Building Material and construction technologies
- Sustainable and locally available Building Material Mission
- Research on finance mechanisms
- End user awareness to create market demand

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# Thank you

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