

CLIMATE SMART BUILDINGS (CSB)

SOUTH CLUSTER CSB CELL, CHENNAI

RACHNA
RESILIENT, AFFORDABLE AND COMFORTABLE HOUSING THROUGH NATIONAL ACTION



LIGHT HOUSE PROJECT, CHENNAI, TAMIL NADU

**PRECAST CONCRETE CONSTRUCTION SYSTEM – PRECAST
COMPONENTS ASSEMBLED AT SITE**

**NO. OF HOUSES –
1152**

**NO. OF TOWERS – 12
(G+5)**

Introduction

The Government of India has been implementing its flagship program- Pradhan Mantri Awas Yojana- Urban (PMAY-U) since 2015 to fulfil the vision of Hon'ble Prime Minister of India to provide 'Housing for All' by 2022. Under the Mission, Ministry of Housing and Urban Affairs (MoHUA), provides Central Assistance to implementing the mission.

Light House Projects, LHPs are being implemented in six states (Uttar Pradesh, Gujarat, Madhya Pradesh, Tamil Nadu, Jharkhand, and Tripura) of India under Global Housing Technology Challenge (GHTC) – India. The GHTC-India is a programme that would lead to the construction of over 1,000 houses each in these cities in a span of 12 months.


Indo-German Energy Programme (IGEN)


For over 60 years, the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH has been working jointly with partners in India for sustainable economic, ecological, and social development.


The Federal Republic of Germany and the Government of India have agreed to jointly promote the “Indo-German Energy Programme” (IGEN) with the aim to foster sustainability in built environment in order to use sustainable materials for Thermal comfort and in turn improve the environment and climate conditions.


IGEN's programme, Climate Smart Buildings (CSB) proposes to extend technical assistance and cooperation to Ministry of Housing and Urban Affairs (MoHUA) in introducing thermal comfort in its flagship programme- Pradhan Mantri Awas Yojana- Urban (PMAY-U).


South Cluster Cell Tasks

 Technical assistance in developing a thermal comfort action plan for climate resilience building for mass-scale application in Affordable Housing.

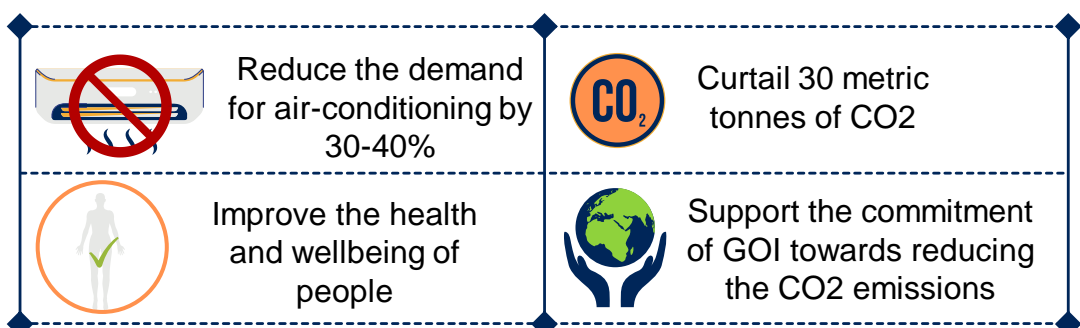
 Technical support in the implementation of Global Housing Technology Challenge-India (GHTC-India)

 1 Facilitate implementation and monitoring of Light House Project, Chennai.

 2 Enhancing thermal comfort in upcoming Demonstration Housing Projects (DHP) and Affordable Rental Housing Complexes (ARHC)

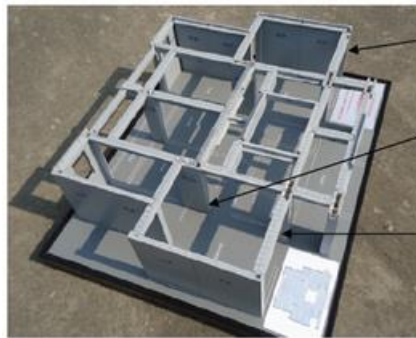
 3 Inclusion of climate resilience and thermal comfort requirements in Local building byelaws

 4 Capacity development of Govt. officials and private stakeholders on Thermal comfort.



Precast concrete construction system – Precast components assembled at site

- The 3S system incorporates precast dense reinforced cement concrete hollow core columns, structural RCC shear walls, T/L/Rectangular shaped beams, stairs, floor/roof solid Precast RCC slabs, lintels, parapets, and chajjas.
- 3S Prefab Technology completely eliminates the use of timber and forest produce of any category. On the contrary, the use of flyash and GGBS enhances sustainability.
- All the structural components are pre-engineered and manufactured in factories/site factories with objective quality control resulting into,
 - Dimensional accuracy
 - Correctness in spacing of reinforcement
 - Uniform protective cover
 - Full maturity of components and assurance on design strength due to use of design mix concrete having minimal water-cement ratio which ultimately results into durable structure.



Precast RCC shear wall.

'3-S' precast RCC column - core concreted using self-compacting concrete.

'3-S' precast RCC beams - top part concreted using self-compacting concrete.

Construction process at LHP CHENNAI



1 Reinforcement cages are placed at the molds.



2 Compaction of concrete is done by shutter/ needle vibrator.



3 Cast components are moved to the stacking yard



4 Components are ready for transportation and erection at the site.



5 Precast components are installed at the site by crane

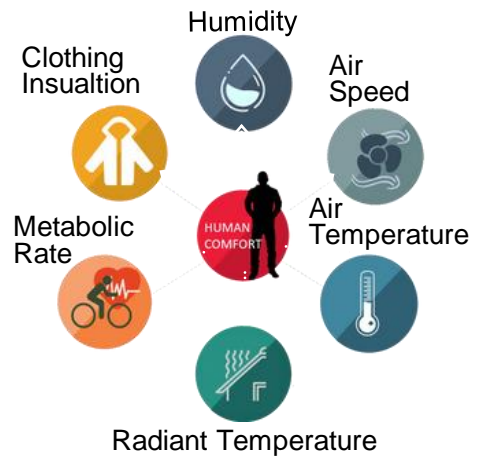


6 Assembled through in-situ jointing and/or grouting

Thermal Comfort - definition and indices

Thermal Comfort is defined as "the condition of mind which expresses satisfaction/comfort with the thermal environment".

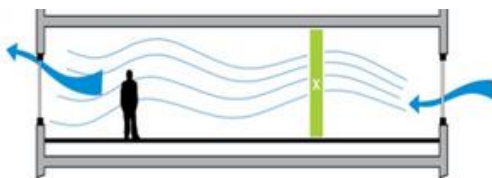
This condition is also sometimes called as "neutral condition", though in a strict sense, they are not necessarily same for everyone.



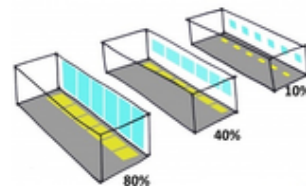
Various Indices that contribute to the Thermal Comfort

Achieving thermal comfort in residential buildings

- 1 Appropriate Window to Floor Area Ratio (WFR) - Ratio of Openable area to the carpet area of the dwelling Units.



- 2 Appropriate Window to Wall Area Ratio (WWR) - Ratio of Non-opaque area (glass area) to the Total Envelope area



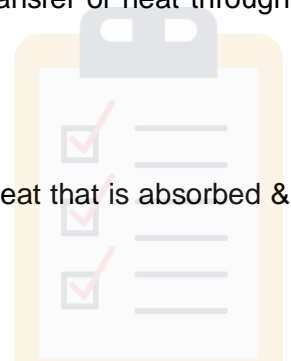
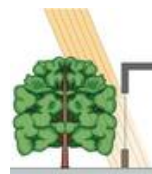
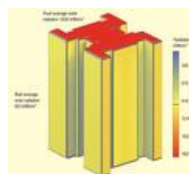
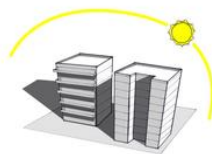
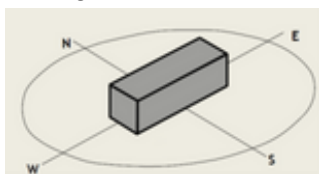
- 3 Thermal Transmittance (U value, walls, roof, glass) is the rate of transfer of heat through the surfaces divided by the difference in temperature across.

Lower U Value \propto Lesser Heat Transmittance

- 4 Solar Heat Gain Coefficient (SHGC, glass) is the measure of solar heat that is absorbed & transmitted inside the space.

Lower SHGC \propto Lesser Heat Transfer

- 5 Orientation, Thermal Mass, Mutual shading in Site design, Minimal Infiltration losses through Efficient construction



For Further
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