

CLIMATE SMART BUILDINGS (CSB)

EAST CLUSTER CSB CELL



**LIGHT HOUSE PROJECT
RANCHI, JHARKHAND**

- TECHNOLOGY USED - PRECAST CONCRETE CONSTRUCTION SYSTEM - 3D VOLUMETRIC
- NO. OF HOUSES - 1,008
- NO. OF TOWERS - 08 (G+7)

Introduction

The Ministry of Housing & Urban Affairs (MoHUA) is committed to establish a world-class infrastructure in the affordable housing sector and the introduction of Climate Smart Buildings is a step in that direction

Climate Smart Buildings (CSB)

The Climate Smart Buildings initiative under the joint collaboration of GIZ-MoHUA aims to use new passive measures, local sustainable and low embodied energy materials, and the best-in-class proven technologies for the construction of affordable housing and thereby improving climate resilience and thermal comfort in buildings. These houses will be constructed and operated using the cutting-edge technology and adopt ultra-modern designs, resulting in increased building sustainability and reduced carbon emissions.

East Cluster CSB Cell

The CSB cell has been formed under one such initiative of GIZ, namely the "Indo-German Energy Programme" (IGEN), in collaboration with the Ministry of Housing and Urban Affairs (MoHUA). The cell is working with a goal to improve climate resilience and thermal comfort in buildings by incorporating modern passive measures, locally sustainable and low embodied energy materials and the best available technology in affordable housing projects and buildings in the following four states : Jharkhand, Bihar, Odisha, West Bengal



Major Goals of the Cell



Monitoring and evaluation of the Light House Projects (LHPs)



Technical assistance to enhance thermal comfort in Demonstration Housing Projects (DHPs) and Affordable rental housing complexes (ARHCs)



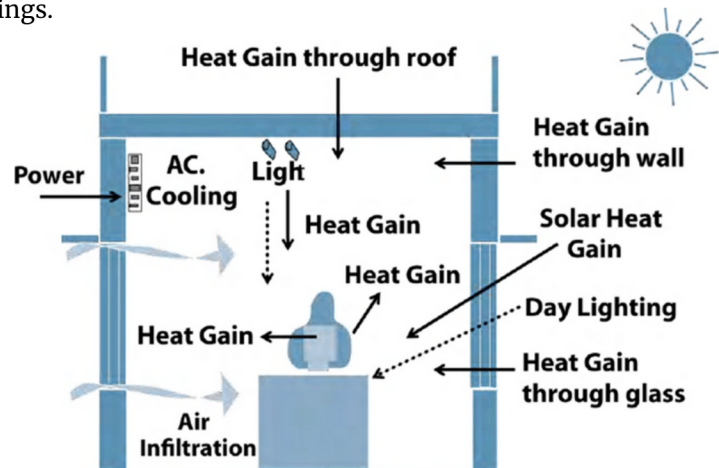
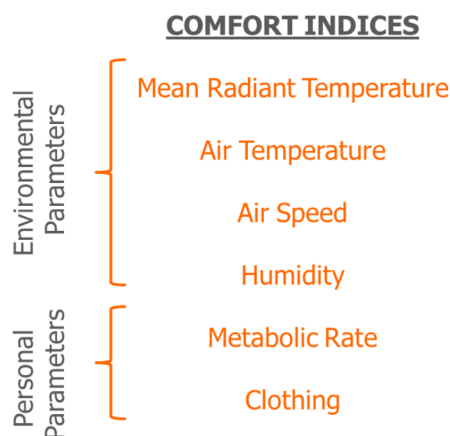
Inclusion of climate resilience & thermal comfort in state building bye-laws



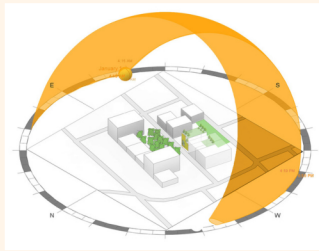
Capacity development of Govt. officials and private stakeholders on thermal comfort measures

What is Thermal Comfort ?

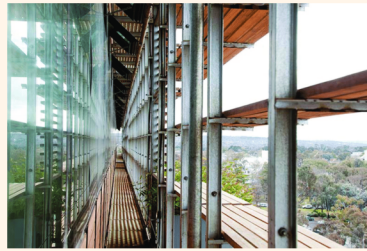
Thermal comfort is the condition of mind that expresses satisfaction with the thermal environment. Thermal neutrality is maintained when the heat generated by human metabolism is allowed to dissipate, thus maintaining thermal equilibrium with the surroundings.



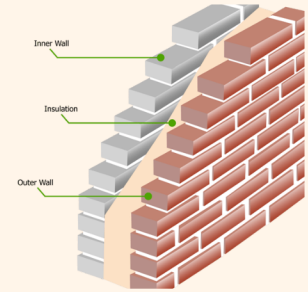
Measures to improve Thermal Comfort



Orientation



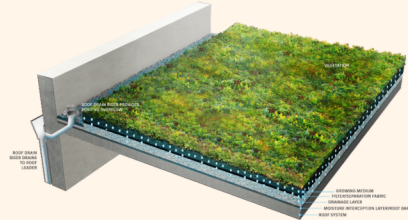
Shading & Glazing



Proper Insulation



Cool Roofs



Green Roofs



Controlled Ventilation

Need for Thermal Comfort and its impact (Qualitative and Quantitative)

The comfort zone is determined by the combinations of the six parameters for which the Predicted Mean Vote (PMV) is within the recommended range (-0.5PMV+0.5), with the PMV equal to zero denoting thermal neutrality. While anticipating a population's thermal feeling is a crucial step in determining what conditions are pleasant, it is more vital to assess whether individuals will be satisfied.



Light House Project (LHP) Ranchi

On January 1, 2021, the Prime Minister announced the commencement of Lighthouse projects, which will use cutting-edge technology to complete housing projects faster and make them more robust. The project is employing 'NAVARITIH' construction technology (new, affordable, validated, research innovation technologies for Indian housing).

At Light House Project Ranchi, a total of 1,008 affordable houses for the poor and middle class are being built quickly, serving as incubation centres for planners, architects, engineers, and students to learn about and experiment with new technology.



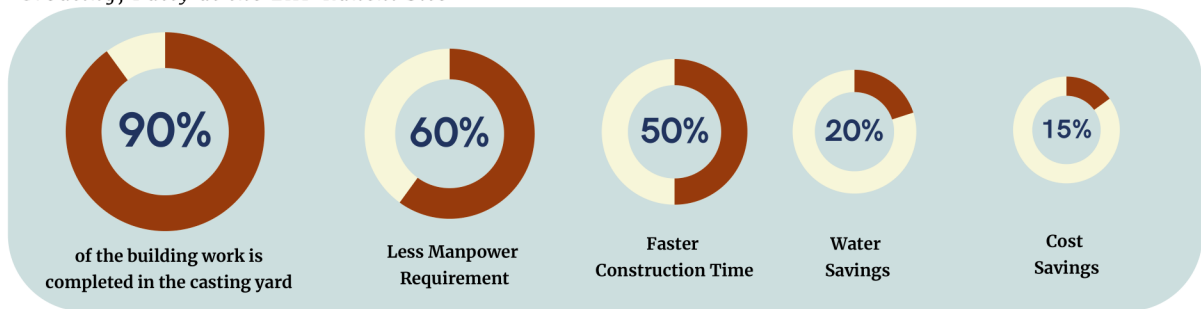
The technology being used is **3D Precast Concrete Construction** method from Germany where each unit is built separately under a controlled environment at the on-site factory, and then the complete structure will be put together in the same way as Lego blocks are put together. Thousands of residences will be erected quickly in each site to serve as incubation centres.

Salient Features of LHP Ranchi:



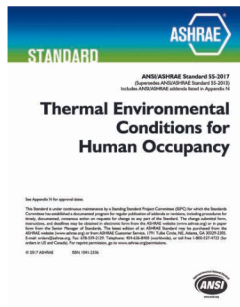
Photo: Building 1 - Pod & Panel Erection, Internal Wall Grouting, Putty at the LHP Ranchi Site

The project's sequential construction starts with maintaining the building's intended foundation ready, while precast concrete structural modules are being manufactured at the factory. Tower cranes are used to install factory-finished building units/modules on the job site. The sides of the building are terminated with gable end walls, followed by pre-stressed slabs being used as flooring elements. Finally, rebar mesh is used to link all of the parts in the structural screed. To complete the structure, successive floors are erected in a similar fashion.



• The above figures are tentatively computed in comparison to a conventional project of similar size as analysed by the construction agency

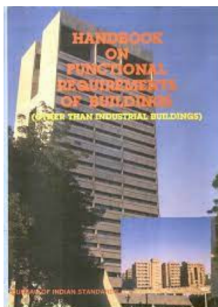
Existing standards for improving thermal comfort (NBC-IMAC, BEE Star-labelling & ENS Code)



ASHRAE - 55



National Building Code 2016



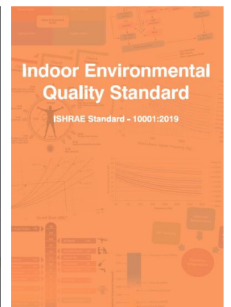
Handbook of Functional Requirements of Buildings 1987 by BIS



Eco Niwas Samhita 2018



Eco Niwas Samhita 2021



ISHRAE - IEQ Standards 2018-19

Climate Smart Buildings aims to provide a unique and illuminating viewpoint to achieve the 2030 Sustainable Development Goals in the building sector and aspires to set gold standards for the adoption of newer & innovative technologies to improve thermal comfort in affordable housing. The Cell hopes that the east cluster at Ranchi will not only increase public awareness of the climate catastrophe through the dedicated awareness and training programs, but also encourage stakeholders to take concrete action towards global warming.

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