

CLIMATE SMART BUILDINGS CELL, NORTH CLUSTER

LIGHT HOUSE PROJECT LUCKNOW UTTAR PRADESH

Technology Introduction and Thermal Comfort in affordable housing



Stay in Place Formwork (SIP) System with
Pre-Engineered Building (PEB) Structure

VISION BEHIND LHPs

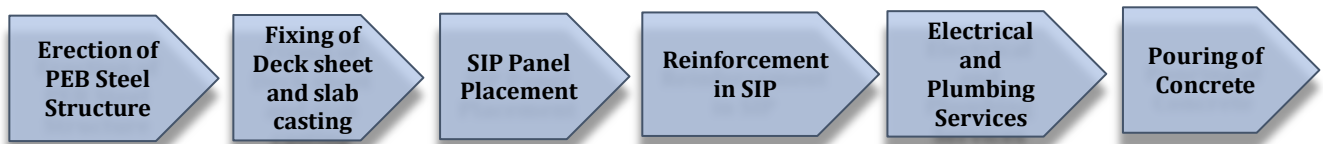
Ministry of Housing and Urban Affairs Under **PMAY(U)** set up a **Technology Sub-Mission (TSM)** for affordable housing to provide:

- ✓ **Alternative sustainable technological solutions.**
- ✓ **Better, Faster & cost-effective construction methodologies.**
- ✓ **Houses suiting to geo-climatic and hazard conditions of the country.**

TECHNOLOGY INTRODUCTION OF LHP LUCKNOW

Stay in place (SIP) formwork is an advanced **Hybrid Construction Technology** consisting of predesigned polyvinyl chloride (PVC) based polymer panel, bound with self-compacting concrete infill, installed as partition walls and building envelop.

PROCESS OF SIP FORMWORK INSTALLATION



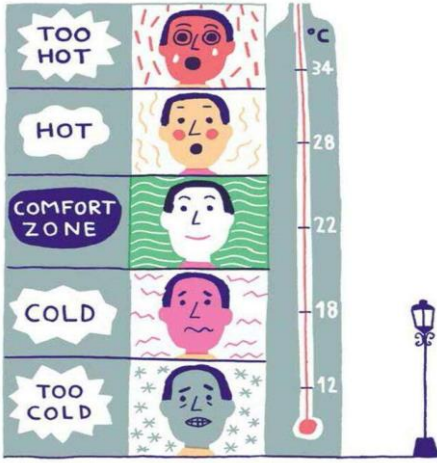
TECHNOLOGY COMPONENTS OF LHP LUCKNOW

- **Polyvinyl Chloride(PVC)** based polymer components serve as a permanent stay-in-place formwork with infilled **concrete** for building walls.
- **Self-Compacting Concrete** is being poured in SIP formwork as an infill to make it more rigid and thermally sound.
- **Hot Rolled Pre Engineered Building (PEB)** sections act as a structural framework of the building whereas SIP(Stay-in-Place) formwork works as a partition wall.
- **0.9mm Deck Sheet** used as slab support component over which concrete is casted for enhancing strength. It reduces casting time, propping, and shuttering and centering support.

BENEFITS OF SIP FORMWORK



WHAT IS THERMAL COMFORT?



WHILE EXTREMES IN TEMPERATURE, HOT OR COLD, CAN BE FATAL, EVEN MINOR FLUCTUATIONS CAN BRING PLEASURE OR DISCOMFORT.

Thermal Comfort is “the state of mind that expresses satisfaction within the thermal environment” and is generally assessed subjectively (ASHRAE, 2004).

What Affects The Thermal Indoor Environment?

The heat exchange between the human body and its environment occurs mainly in three ways, namely through:

- **Conduction**
- **Convection**
- **Radiation**

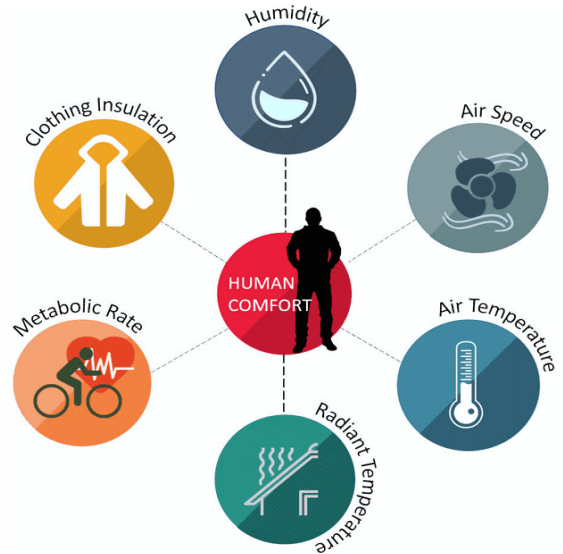
FACTORS AFFECTING THERMAL COMFORT

Environmental Parameters/Factors

- **Air Temperature**
- **Mean Radiant Temperature**
- **Air Velocity**
- **Humidity**

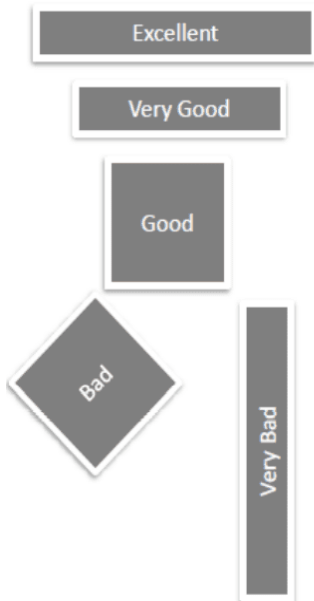
Personal Parameters/Factors

- **Physical Activity**
- **Clothing Level**

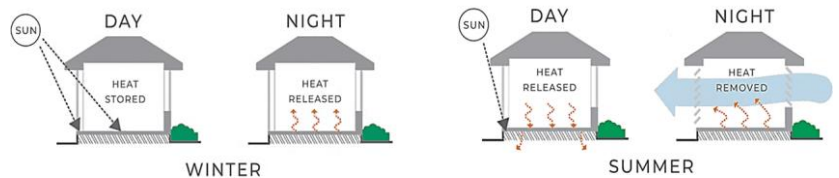


PASSIVE STRATEGIES TO ACHIEVE THERMAL COMFORT

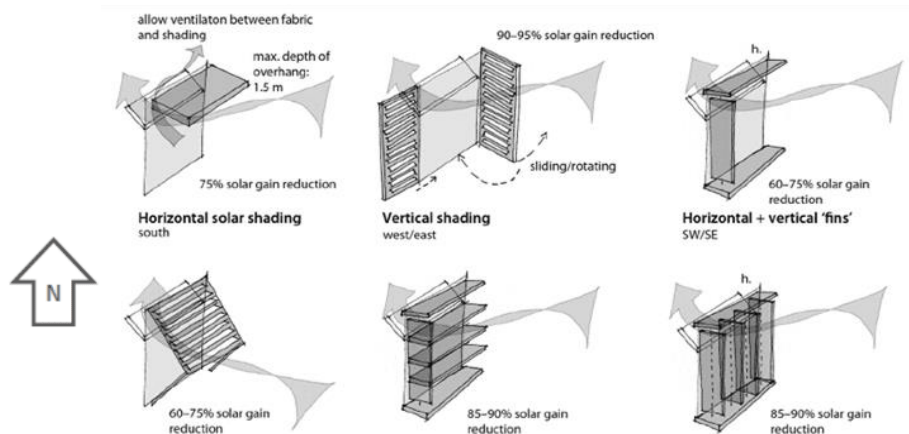
BUILDING CONFIGURATION & ORIENTATION



THERMAL MASS



SHADING



MoHUA & GIZ Collaboration under Indo-German Energy Program

The Ministry of Housing and Urban Affairs (MoHUA) through its flagship mission **Pradhan Mantri Awas Yojna-Urban (PMAY-U)** ensures a pucca house to all eligible urban households.

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

The Government of the Republic of India and the Federal Republic of Germany have, under the Indo-German Technical Cooperation, agreed to jointly promote the “Indo-German Energy Programme” (IGEN) with the aim to foster sustainability in the built environment.

GHTC-India & Light House Project

MoHUA initiated the **Global Housing Technology Challenge (GHTC)-India** to identify and mainstream a basket of innovative housing technologies across the globe.

LHPs are model housing projects with approximately 1,000 houses getting constructed at six different locations in six states built with alternate technologies shortlisted through GHTC-India, which are suitable to geo-climatic and hazard conditions of the region. The technology used in LHP Lucknow is the ‘**PVC Stay-In-Place Formwork System**’.

Climate-Smart Building Cell - Lucknow

Through **IGEN’s** programme, **Climate Smart Buildings (CSB)** Cluster cells are established in each of the six states where pilot affordable housing projects are being built under **PMAY-U** utilizing innovative construction technologies known as Light House Project. The CSB Cell aims to enhance climate resilience and thermal comfort of affordable housing stock by adopting sustainable and low-impact design, materials and best available construction technology and to provide technical support in implementation of **Global Housing Technology Challenge- India (GHTC-India)**.

