

GLOBAL HOUSING TECHNOLOGY CHALLENGE IN









Implemented by



COMPENDIUM OF 75 TRAININGS & WORKSHOPS

on

Innovative Construction Technologies & Thermal Comfort in Affordable Housing

under Azadi Ka Amrit Mahotsav

October, 2022



RESILIENT, AFFORDABLE AND COMFORTABLE HOUSING THROUGH NATIONAL ACTION



"

I believe these six projects are really like light towers. These six light house projects would give a new direction to the housing construction in the country. This will reduce the construction time and prepare the more resilient, affordable and comfortable homes for the poor. In a way, these projects will be incubation centres and our planners, architects, engineers and students will be able to learn and experiment with new technology. I urge all such universities and all engineering colleges across the country that professors involved in this field, faculty and students should make groups of 10-15 people who should go to these six sites for a week and study it thoroughly.

> Narendra Modi Hon'ble Prime Minister 01.01.2021

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Ministry of Housing and Urban Affairs Government of India

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Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH Climate Smart Buildings (IGEN-CSB)

Authors

R. K. Gautam, Director, MoHUA Dr. Shailesh Kr. Agrawal, BMTPC Manish Kumar, PMU, MoHUA S Vikash Ranjan, GIZ

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हरदीप एस पुरी HARDEEP S PURI



आवासन और शहरी कार्य मंत्री पेट्रोलियम एवं प्राकृतिक गैस मंत्री भारत सरकार Minister of Housing and Urban Affairs; and Petroleum and Natural Gas Government of India



Message

Under the visionary leadership of the Hon'ble Prime Minister, Shri Narendra Modi, Government of India launched the Pradhan Mantri Awas Yojana-Urban (PMAY-U) in June 2015 to provide a *pucca* house with basic amenities to all eligible families of urban India. Under this Mission, 1.23 crore houses have been sanctioned of which more than 63 lakh houses are already completed and delivered to the beneficiaries while the balance are at various stages of completion. Construction on this massive scale has its own challenges, primarily the climate concerns.

Keeping the environmental concerns in mind, the Global Housing Technology Challenge – India (GHTC-India) was launched in January 2019 for identifying technologies and materials for building homes that are sustainable, resilient and cost-effective. The Challenge brought together globally best available proven technologies that are innovative and fast paced.

Six technologies were shortlisted from among 54 such technologies which are now being used at the 6 Light House Projects, which will then further act as live laboratories for spreading awareness and technical knowhow to build speedy, cost effective houses which provide enhanced thermal comfort.

Within the Indo-German technical cooperation, the Federal Republic of Germany and the Government of India have been working towards building climate resilience, enhance thermal comfort and create awareness about the innovative technologies that are being used at the Light House Projects. As part of this initiative, 'Resilient, Affordable and Comfortable Housing Through National Action' (RACHNA) training programmes have been held. 75 training programmes have been organised across the country.

My congratulations to the team for coming up with the RACHNA compendium.

ardeep S.Puri)

New Delhi 12 October, 2022

Office:- Room No. 104-C, Nirman Bhawan, New Delhi-110011; Phone: 011-23061166, 23061162, 23062089 (Fax)

कौशल किशोर KAUSHAL KISHORE



With 1.3 billion people, India is rapidly urbanising. By 2030, 41 percent of India's population is expected to be living in urban areas. As an emerging economy, India has become an appealing market for the affordable housing segment. The demand for urban affordable housing has increased as a result of this transformational change. Affordable housing in India has now become a critical issue and a national priority, with a focus on urban areas.

Several interventions have been implemented around the world to provide affordable housing solutions. Government of India has launched a comprehensive mission "Pradhan Mantri Awas Yojana –Housing for All (Urban)" (PMAY-U). The mission aims to address the housing shortage caused by rapid urbanisation. All basic and social infrastructure is provided for the houses built under this mission. Under PMAY-U, the Ministry has sanctioned more than 12.3 million houses, of which 6.4 million have been delivered to beneficiaries. This mission will promote the Hon'ble Prime Minister's vision for a transformed and new Urban India.

In order to address the issues of rapid urban growth and the associated requirements, the Hon'ble Prime Minister emphasised the importance of adopting new and alternative building technologies. This aims to enhance the speed and quality of work under PMAY (U). The Global Housing Technology Challenge-India (GHTC- India) was launched in 2019 to enable a paradigm shift in the construction sector. Under GHTC-India, 6 Light House Projects using new and innovative construction technologies are being constructed in 6 different parts of the country namely Agartala, Indore, Lucknow, Rajkot, Ranchi & Chennai.

The houses being built now will last for 50-60 years and have a potential to improve energy efficiency and comfort conditions of occupants. Hence it is imperative that the capacities of govt. officials and private institutions are enhanced for mass replication of climate responsive buildings. The RACHNA initiative by the Ministry of Housing & Urban Affairs is one such attempt by conducting 75 trainings across the country for building sector professionals. This document provides a comprehensive overview of the RACHNA Program.

I hope that the RACHNA compendium would help in dissemination of new technologies and awareness on thermal comfort and its importance for policymakers, public and private construction companies, and other key stakeholders.

ademichant

(KAUSHAL KISHORE)

New Delhi 10th October 2022

> Office: Room No. 130-C, Nirman Bhawan, New Delhi-110011, Ph.: 011-23061999, 23063071, 23061103 Residence: No. 2-A, South Avenue Lane, New Delhi-110 001, Ph.: 011-21412001, 21412002

मनोज जोशी सचिव **Manoj Joshi** Secretary



भारत सरकार आवासन और शहरी कार्य मंत्रालय निर्माण भवन, नई दिल्ली–110011 Government of India Ministry of Housing and Urban Affairs Nirman Bhawan, New Delhi-110011



Message

Rapid urbanisation has resulted in numerous significant changes for humanity, society, and the environment. Urban growth, resulting in the increase of buildings has led to the transformation of the natural landscape to impervious urban land. Regional and global temperatures are rising as a result of the expansion of the urban fabric.

Urbanization describes the shift in population from rural to urban areas, towns, and cities. As more people move from rural to urban areas, the population density of cities increases on the whole. Urbanization has increased significantly over the last few decades. On a global scale, urban areas now house 56.2% of the world's population, with that figure expected to rise to 68% by 2050.

The built-up area is projected to increase five times by 2030, dominated by residential use. Therefore, the housing sector can be instrumental in shaping the affordable housing sector in fulfilling the UN Sustainable Development Goals for 2030, SDG 3 (Good health and well-being), SDG 11 (Sustainable and clean cities) and SDG 13 (Climate action). Hence it is imperative for improving the thermal comfort of the occupants in affordable housing sector and creation of sustainable built environment.

Thermal comfort for occupants is one of the central themes in addressing the residential challenge. Implementing energy-efficient and thermally comfortable housing provides an opportunity for improving the well-being of the occupants and sustainable utilization of energy that is being faced due to global warming and rapid urbanization. Climate-specific building design and operation solutions help maintain year-long comfort while reducing the cost-energy expenditure.

To promote climate responsive, disaster resilient and thermally comfortable construction and design practices in the affordable housing sector, Ministry of Housing and Urban Affairs (MoHUA) in collaboration between its subsidiary unit Building Material and Technology Promotion Council (BMTPC), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), has organised 75 RACHNA (Resilient Affordable Comfortable Housing through National Action) region wise training programs for more than 4,500 participants for a wide range of stakeholders in the built environment from practitioners/govt. officials to masons and artisans.

I am confident that this RACHNA compendium on Innovative Construction Technologies & Thermal Comfort in Affordable Housing developed by Climate Smart Buildings (CSB) programme under the "Indo-German Energy Programme" (IGEN), will be a guiding document and a source of inspiration to further the initiative to build capacities to design, construct, and operate affordable buildings that are thermally comfortable. I congratulate the GIZ team and Ministry on this remarkable accomplishment.

(Manoj Joshi)

VII

11th October, 2022 New Delhi.

> Office Address: Room No. 122 'C' Wing, Nirman Bhawan, New Delhi-110011 Tel.: 011-23062377, 23061179; Fax: 011-23061459; Email: secyurban@nic.in Website: www.mohua.gov.in

कुलदीप नारायण, भाष्रसे संयुक्त सचिव Kuldip Narayan, IAS Joint Secretary





भारत सरकार आवासन और शहरी कार्य मंत्रालय

Government of India Ministry of Housing & Urban Affairs



Message

The growth of Indian cities is unprecedented as more and more people from the rural India move to the cities in search of better livelihood and education. Urban population is on the rise and will require safe and sustainable housing that adds to the well-being and is built keeping in mind the several environmental limitations that entire global community faces in the form of climate change. Cities in India account for about 70% of the present day GHG emissions. Reduction in the electrical requirement of buildings while keeping the well-being and comfort of the occupants at the centre of our efforts will have long-term benefits.

The current methods of construction are very advanced in India; however, we need to remember how our ancestors used to build where the concepts of natural ventilation and adequate daylighting were at the core of design decisions. Implementing energy-efficient and thermally comfortable housing will reduce our dependence on active cooling and heating methods. This will not only be cost-effective and economical for the occupants but will greatly benefit our environment in the time to come. This approach aligns with the United Nations SDGs 7, 9, 11 and 13.

As part of the Azadi Ka Amrit Mohotsav, MoHUA in collaboration with GIZ and BMTPC have successfully organised 75 training programs across 25 states in India. The impact is such that through these training programs, more than 4500 stakeholders have been trained with delivery of content specifically designed for different stakeholders such as govt. officials, practitioners, academicians, students, and construction workers.

I also got the opportunity to attend some of these training programs myself and got to appreciate the visually appealing and easy to grasp content prepared by our team tailored made for various stakeholders. This Rachna compendium is a testimony to the successful organisation of training programs throughout India in a short period of time at such a large scale. I am confident this compendium will surely act as a source of inspiration to continue with the capacity building efforts for a transformed housing sector.

(Kuldip Narayan)

11th October, 2022 New Delhi.



Office : Room No.116-G Wing, Nirman Bhawan, New Delhi – 110011 Tel : +91-11-23061419, Fax : 23061420 e-mail : jshfa-mhua@gov.in website : http://mohua.gov.in



pulbc

DR. SHAILESH KR. AGRAWAL

Executive Director Building Materials & Technology Promotion Council Ministry of Housing & Urban Affairs Government of India



Message

I express my sincere congratulations and happiness towards the development of the RACHNA compendium. MoHUA in collaboration with BMTPC and GIZ - India has put in tremendous effort in organizing these 75 training programs across the country. As the name RACHNA implies Resilient Affordable Comfortable Housing through National Action, these training sessions have been focussed on developing the capacities of Government officials, Construction Agencies, Practitioners and Academicians on "Innovative Construction Technologies and Thermal Comfort in Affordable Housing".

This compendium examines an extensive training detail which have been conducted in over 25 States and 29 cities across the country on thermally comfortable affordable housing. Under PMAY (U) 12.3 million households are being built. Energy consumption and associated costs in these homes are expected to increase as income and comfort demands increase. This presents us with a unique opportunity to build resilient and thermally comfortable homes that avoid the need for cooling and associated energy use in the near future.

The series of RACHNA training programme focuses on importance of building materials, passive design strategies and cost-effective solutions for achieving thermal comfort and modern construction technologies which aid in meeting the housing demand. The training programs intends to enhance the awareness of thermal comfort and provide professionals and senior government officials with the necessary knowledge for framing thermal comfort policy and integration processes at the state level and motivate the developers, practitioners, construction workers etc. to adopt new technologies. Additionally, it will equip them with in-depth knowledge on thermal comfort, relevant international and national standards, and basic tools for thermal comfort analysis and know-how of new and emerging innovative materials and construction technology. Six pilot affordable housing projects are being built utilizing these innovative construction technologies.

BMTPC has played an important role in identifying new and innovative technologies and providing technical assistance and guidance to MoHUA. Further it supports in monitoring the construction progress, quality check and knowledge dissemination at the LHPs. It continues to extend the support to the PMAY-U in mainstreaming and adopting alternative building construction and materials for ensuring resilient, thermally comfortable, cost-effective homes for the urban population.

I congratulate the Climate Smart Buildings (CSB) programme, under "Indo-German Energy Programme" (IGEN) by GIZ, on organizing these training programmes and coming up with this RACHNA compendium highlighting the progress and outcomes of the training programs. The efforts will complement the national vision by creating knowledge products, awareness programmes and developing expertise to provide affordable and thermally comfortable housing.

(Dr. Shailesh Kr. Ågrawal)



DR. WINFRIED DAMM

Cluster Coordinator, Indo German Energy Program Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH



Message

Climate extremes are a reality that is being faced by both the rich and the poor alike. The frequency and the magnitude of such events are now a global concern and requires immediate action. Events of extreme temperatures, due to India's unique climatic placement and further intensified by climate change puts the urban population at a health risk, and reduced access to electricity during peak demand hours. The challenge of protecting the population from the climatic extremes, while ensuring their well-being, and financial independence, can be resolved by providing access to thermally comfortable, low-energy, and cost-effective buildings.

The national urban population is set to rise from ~380 million (in 2011) to ~600 million (in 2031). Consequently, the projections highlight a ~700% increase in residential energy consumption on a comparable timescale. The data further suggests that access to air-conditioning will increase comparably, putting huge amounts of burden at the supply end. The challenge is two-fold: reduction in GHG emissions by energy efficient building design and building housing that is affordable and provides enhanced thermal comfort levels.

The PMAY-U is set to address this by building 12.3 million affordable dwelling units. Providing such buildings coincides with the national visions of "housing for all", and "thermal comfort for all"; it also lies in line with the United Nation's Sustainable Development Goals 7, 9, 11, and 13.

Under the Indo-German technical cooperation, the Federal Republic of Germany and the Government of the Republic of India have been working towards the "Indo-German Energy Programme" (IGEN). The IGEN's programme Climate Smart buildings (CSB) extends technical assistance and cooperation in line with the aforementioned national visions and international goals.

The delivery of 75 training programs as part of the Azadi ka Amrit Mahotsav, called the Resilient, Affordable, and Comfortable Housing Through National Action (RACHNA) is now concluded. The training envisioned to add to the high-level understanding of the senior government officials at the levels of the urban local body level, state level, and central level and develop capacities for practitioners to develop and construct buildings that provide enhanced thermal comfort. I am proud to say that more than 4500 stakeholders attended the training programs, including govt. officials, academician, practitioners, students, and construction workers across 25 states. I would like to congratulate the team for compiling the proceedings and learnings of the Training program in this Rachna compendium.

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. Through these training programs, it is aimed to bring the knowledge on climate smart building designs for thermal comfort in affordable housing accessible to the masses and lead to sustainable development in India.

(Dr. Winfried Damm)

Acknowledgements

Ministry of Housing and Urban Affairs, through the flagship initiatives of PMAY-U, aims to provide Affordable Housing for all. The technology sub-mission under the yojna is facilitating the adoption of innovative, sustainable technological solutions for faster and cost-effective construction of houses suitable for different geo-climatic and hazard conditions of the country for transformation of the economy and the society. With growing urban demand and increased comfort requirements there is a need for adopting new construction alternatives which are sustainable, cost-effective and provide thermal comfort to the occupants. To ensure that thermal comfort as an in integral part of the construction, it is imperative to create awareness and improve capacity building of the relevant stakeholders for mass replication and adoption of these alternatives technologies which aid in achieving the necessary targets.

RACHNA has been an initiative by Ministry of Housing and Urban Affairs in collaboration with BMTPC and GIZ-India as a part of Azadi Ka Amrit Mahotsav. The vision of this program is to build capacities to achieve thermally comfortable, resilient and affordable homes through passive design measures, locally available and low embodied energy material coupled with best available technologies in construction. The modules developed by the team focuses on enhancing the technical capabilities of govt. officials at policy level, schemes and be equipped with monitoring and evaluating the impact to ensure thermal comfort in upcoming affordable housing projects. Also, the modules are helpful for practitioners, developers, construction workers etc who will be able to learn the use of the latest technologies, innovate and adapt as per the local contexts to ensure mainstreaming in the country.

On the successful completion of these 75 trainings, we would like to express our heartfelt gratitude to Shri Manoj Joshi, Secretary, MoHUA and Shri Kuldip Narayan, Joint Secretary & Mission Director (HFA), MoHUA, who was instrumental in advocating for and understanding the importance in ensuring thermal comfort in India's affordable housing and have been very encouraging and supportive of the entire team in their efforts to complete the compendium. Shri R K Gautam, Director (HFA), MoHUA contributed significantly in organising and execution of these training programmes and made sure all support was given for proper execution. We would also like to express our gratitude to Shri Manish Kumar, Consultant, HFA, MoHUA for his contributions for his valuable inputs and directions during the organisation and development of the compendium.

Our gratitude also goes to Dr. Shailesh Kumar Agarwal, Executive Director, BMTPC, and his team comprising of Shri Sharad Kr. Gupta, Shri C N Jha, Shri Pankaj Gupta and Shri Dalip Kumar for their guidance, technical support, and contribution in organising these series of trainings. BMTPC team has made significant impact during the training sessions by helping the participants understand new alternative technologies used at LHP sites and novel construction practices. We would also like to thank the GIZ team of Shri Govinda Somani, Ms. Divya Bansal Talwar, Shri Anurag Verma, Shri Gagandeep Singh, Shri Chawan Vijay Kumar, Shri Abdullah Nisar Siddiqui and Ms. Ananya Sinha under the guidance of Mr. S Vikash Ranjan, Project Head, IGEN-CSB for the development of this compendium.

Last but not the least, we would like to thank our colleagues at ULBs, GIZ's Climate Smart Building Cells (i.e CSB Cell in Rajkot, Lucknow, Chennai, Agartala, Indore and Ranchi), CEPT-CRDF and the entire team working at LHP sites. They were instrumental in the successful completion of the training at various locations of our country.

06th October 2022 New Delhi

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39 **Expert trainers** engaged

India covered

States & UTs 25 covered

> **12 Academic** Institutions involved

5142 Stakeholders trained







36000+ TECHNOGRAHIS ENGAGED













1. Introduction



The Government of India has been implementing its flagship programme- 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 agencies through States and Union Territories for providing houses to all. A Technology Sub-Mission (TSM) has been set up under PMAY-U to facilitate adoption of innovative, sustainable technological solutions for faster and cost-effective construction of houses suiting different geo-climatic and hazard conditions of the country.

MoHUA launched **Global Housing Technology Challenge India (GHTC-India)** in January 2019 to identify and source globally available **"proven demonstrable technologies"** and domestic **"potential future technologies"** that are sustainable, green, disaster-resilient, cost-effective and speedy through a challenge process which could bring a paradigm shift in construction practices for the housing sector in India.



Out of each of these, six distinct proven innovative technologies were selected for constructing six **Light House Projects (LHPs)** of about 1,000 houses each with allied infrastructure at **Indore, Rajkot, Chennai, Ranchi, Agartala, and Lucknow.** These LHPs serve as Live Laboratories in the country. Subsequently 84 **Indigenous Innovative Building Materials and Construction Technologies** were showcased during **Indian Housing Technology Mela (IHTM)** held in 2021 in Lucknow which can be considered as potential technologies in the second phase of this program.

1.1 Context

The homes built under PMAY-U are going to remain with us for the next 5-6 decades and thus have a potential to impact resource usage during their life span. Further, the decisions taken during implementation have an impact on the level of comfort that these dwellings provide to its occupants,



thus impacting their energy use and costs and the associated carbon emissions over the lifetime of the buildings. A significant portion of the projected electricity demand is expected to come from increased appliance ownership and cooling needs arising from enhanced access to housing, thus making thermal comfort an imperative concept to be considered while designing and building homes.

This presents us with a unique opportunity to build resilient and thermally comfortable homes that avoid the need for cooling and associated energy use in the near future. This will not only mitigate the stress on our environment and infrastructure, but also enhance the affordability and liveability of these homes. 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.

In this regard, MoHUA and the Federal Republic of Germany under the Indo- German Technical Cooperation, agreed to jointly promote the "Indo-German Energy Programme" (IGEN) with the aim to encourage sustainability in built environment. IGEN aims to advance the use of sustainability in built environment through Climate Smart Buildings (CSB) programme. The CSB programme is aligned with the commitments made by the Indian Government to meet its objectives submitted under several SDGs for and closely linked to the built-environment. The vision of this program is to build capacities to achieve thermally comfortable, resilient, and affordable homes through passive design measures, locally available and low embodied energy material coupled with best available technologies in construction.



Rising global temperatures A frightening reality in times of extreme weather

events like heatwaves.



India's energy commitment

Housing for all mission needs to fulfill housing needs without any compromise on environmental concerns.



Thermal comfort for all

Habitants need housing that is thermally comfortable to live in - reducing the need for active cooling means like AC/Desert coolers.



Rising electricity demand Seven-fold increase in electricity consumption

Seven-fold increase in electricity consumption between 2012-2032.

- SUSTAINABLE GOOALS SUBJECT OF THE REAL OF
 - 20 Trainings for Built-environment professionals & Govt. Departments
 - **12 Vocational Trainings**
 - 31 Trainings for Senior Govt. Officials & Policy makers
- 12 Awareness sessions for students
- 22 Additional Capacity Building Workshops
- 2 International knowledge exchange programs

The trainings' content will focus on the specific geo-climatic conditions of the region they are being conducted in.



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2. The Rachna Initiative



Ministry of Housing & Urban Affairs (MoHUA) in collaboration with Building Material and Technology Promotion Council (BMTPC) and GIZ's Climate Smart Buildings Program launched the initiative RACHNA: Resilient, Affordable and Comfortable Housing Through National Action. Under RACHNA 75 trainings and events were hosted on innovative construction technologies and thermal comfort for Affordable Housing to acquaint various stakeholders from the building construction industry with the nuances of thermal comfort through a multi-layered understanding in affordable housing. The trainings were designed in one day and two-day formats targeting different stakeholders including government officials, policy makers, academicians, students, architects, engineers, real estate developers, construction workers, masons etc.







2.1 75 Events across India





2.2 Focus Areas of RACHNA Trainings

The focus of the training programs is thermal comfort and its necessity in the affordable housing sector. And the modules developed cover the entire breadth of knowledge available, developed keeping in mind the different stakeholders involved in the construction process of affordable housing, to ensure mainstreaming design for thermal comfort. For instance, the trainings for govt officials cover the thermal comfort basics, material influences, low-cost solutions & codes that are available in India to create Climate-Smart Buildings. As officials working on ground in implementation and construction of housing, this specific delivery allows them to be mindful of design and material choices, utilize existing policy mandates and help build better housing. The training program was meant for a variety of stakeholders with different education and experience such as govt. officials responsible for implementing affordable housing in India, building professionals, academia, and students.

The topics covered began with the most crucial fundamentals of thermal comfort, its relationship with building physics along with passive design strategies in affordable housing utilizing innovative materials and construction technologies. To enable participants to design for affordable housing with enhanced thermal comfort while making sure the project is cost effective and sustainable in the long run, in-depth knowledge of existing relevant international and national standards and basic tools for thermal comfort analysis was imparted. An additional focus was kept on covering examples of best local and international practices, practical design and material recommendations, and exercises with special focus on environmental economics. Additionally, the trainings covered the evaluation process of thermal comfort, the statistics and indicators involved as well as affordable cooling technologies and their applicability in various climates. These programs catered to both the new learner and experienced professionals, and for which the trainers developed novel ways of content delivery.

The new and innovative construction technologies being utilized at LHPs are ground-breaking in their speed of construction, resilience, and green performance. These projects are live laboratories for testing and propagation of novel ways of construction for a new India. The trainings covered the process of construction with these technologies and explored ways for thermal comfort design. This was highly benefited by organising trainings at LHP sites where professionals and govt. officials alike, the construction workers were given hand on training to utilized and work with these technologies.

The trainings under the RACHNA initiative are tailored for different stakeholders and formats to have maximum impact and outreach. Each category of training is suited to deliver learnings on climate smart buildings and emerging construction technologies for thermal comfort to a specific set of stakeholders as discussed below.



RACINA



















RACINA







And Manual & Bridge

Capacity Building programme

011

"Climate Smart Buildings & Thermal Comfort Guidelines"







3. Training categories



3.1 Trainings for built-environment professionals & practitioners

For practitioners the content is spread over 2 days to include technical details, tools and maximum examples and case studies for practical understanding and application.

3.1.1 RACHNA: Training on emerging construction technologies & thermal comfort in Light House Projects for practitioners

10 trainings across India

3.1.2 RACHNA: Training on thermal comfort for practitioners

11 trainings across India

3.2 Workshops & trainings at architectural colleges for students

Workshops & trainings at various Architectural Colleges across the country involving students of architecture and engineering colleges. The delivery of the training content was spread over 2 days to include concepts of thermal comfort and building physics, tools and case studies for practical understanding. Their understanding was tested by way of design exercises on the second day of the workshop.

3.2.1 RACHNA: Awareness drive in Architectural college

12 trainings across India

3.3 Trainings for senior govt. officials & policy makers

For government officials the training material was concise and planned as a 1-day event focusing on policy formation, implementation and verification.

- **3.3.1 RACHNA: Training on thermal comfort for officers** 10 trainings across India
- 3.3.2 RACHNA: Training on emerging construction technologies & thermal comfort in Light House Projects for officers

13 Trainings across India

3.3.3 RACHNA: Training on climate smart buildings for Officers 13 trainings across India

3.4 Vocational Trainings for construction workers

For construction workers the trainings are organised on site where the content was delivered in easy to understand/ local languages with a tour of the site imparting practical knowledge about materials, products and workmanship.

3.4.1 RACHNA: Vocational training for construction workers

12 trainings across India

The following section details out the purpose, target audience and details of the sessions conducted under each category of the training.


3.1.1. RACHNA: Training on emerging construction technologies for thermal comfort Light House Projects for practitioners

Number of events	:	10 trainings across India
Duration	:	Two days
Purpose	:	The focus of this training is to familiarise practitioners with thermal comfort and its necessity in the affordable housing sector. The training covers the thermal comfort basics, material influences on thermal comfort in buildings, low-cost strategies to achieve thermal comfort in building through passive design & codes that are available in India to create climate smart buildings.
Target Audience	:	These trainings target practitioners ranging from builders, architecture and engineering professionals, technology providers, building sector stakeholders, technical officers in public administration

Detailed agenda of the trainings

Brief of all the technical sessions in these trainings is discussed below:

Session 1: Thermal Comfort, its indices, passive measures in achieving thermal comfort in affordable housing and case studies

Through the course of the session, participants gained a fundamental understanding of thermal comfort, including its detailed principles, its relevance for human productivity, factors affecting thermal comfort, techniques for assessing thermal comfort, and strategies for increasing thermal comfort in a building.

With the help of graphics, participants were introduced to the thermal comfort indices and their measurement through Thermometer, Psychrometer & Anemometer. In addition, scales of Indirect Indices were explained in terms of operative temperatures, air speed, Indexing etc.

The session was followed by discussion on passive design strategies such as forms & orientation, fenestration, window shading, daylight, mutual shading, and these concepts were demonstrated through a set of carefully curated case studies of thermally comfortable & energy efficient buildings constructed in India following the best practices.

Session 2: Thermal comfort standards, human body thermal balance & its regulatory mechanism, ASHRAE & Indian Model for Adaptive Comfort and effects of materials on thermal comfort

This session concentrated on the thermal comfort criteria such as IMAC and ASHRAE as well as the methods by which the human body achieves thermal comfort and regulates its internal temperature in line with its environment.

With the help of infographics, different codes were explained to the participants including ASHRAE 55, 62.1, 90.1, Adaptive Thermal Comfort model & typology of buildings covered under NBC 2016, ENS codes for residential buildings.

The session also discussed the impact of materials and their thermal properties on thermal comfort. The discussion revolved around how different types of insulations in external walls (cavity, AAC blocks), roofs (above deck insulation, under deck insulation, reflective paints, roof garden) help in achieving



thermal comfort inside the building.

The session proceeded with brief explanation of low energy comfort systems, BEE Star Labelling, and national and international best practices in addition to suggesting easy methods to tackle climate change.

Session 3: New age construction technologies at six Light House Projects.

This session gave an overview on new age construction technologies with a focus on the 6 technologies being used at the six Light House Projects across India. This was supported by an engaging discussion on construction technologies, focusing primarily on its methodology, components, advantages supported with site photos and videos. The session also brought in the aspects of efficiency in construction, mainstreaming & replication of technologies and aspects of thermal performance.

Session 4: Green building concepts, indigenous materials and best practices

This session gave an insight into aspects of sustainable designs relating to site planning, building design, building envelope, materials etc. It touched upon the concepts of conscious selection keeping in mind the embodied energy and overall impact of the construction and material choices on the environment.

Session 5: Eco Niwas Samhita 2021

This session gave the participants an insight into the practical application of the existing codes in India. The session focused on Eco Niwas Samhita 2021 and its requirement, scores, purpose, tools, scope, essential specifications, methods of compliance, etc.

Session 6: Eco Niwas Samhita 2021 compliance and tool

Participants were introduced to the terminologies like WFR, VLT, U value, RETV. Standard values, inputs required for calculations and compliance values as per ENS guidelines were also discussed in detail. The session saw a thorough presentation of the ENS compliance tool by evaluating the ENS compliance of a sample building envelope.

Session 7: Eco Niwas Samhita 2018

This session gave an overview of the parameters of ENS 2018. Concepts like Openable Window-to-Floor Area Ratio (WFRoof), Visible Light Transmittance (VLT), Thermal transmittance, Solar Heat Gain Coefficient (SHGC), Thermal transmittance of building envelope (except roof), Residential Envelope Transmittance Value (RETV) were explained in detail with examples.

Session 8: Residential Star Label and best practices

This session covered BEE Star Labelling for Residential Buildings, starting with program insight, need, objectives, scope, benefits and labelling types. Other aspects covered were preparation, registration, application, implementation, verification, M&V, EPI (kWh/sq. meter / year) calculations, their ranges from 01 star to 05 star as per the EPI values etc. The information was explained through case studies for easier grasp.



3.1.2 RACHNA: Training for practitioners

Number of events	:	11 trainings across India
Duration	:	Two days
Purpose	:	The Rachna for practitioners training is organised for professionals interested in understanding ways to enhance climate resilience and thermal comfort in buildings by adopting innovative passive measures, local and low embodied energy material coupled with best available technologies in construction of affordable housing.
Target Audience	:	The training targeted practitioners, architects, engineers and building energy experts from construction domain and academicians from various universities.

Detailed agenda of the trainings

Brief of all the technical sessions in these trainings is discussed below:

Session 1: Importance of thermal comfort

It provided the importance of thermal comfort, and an insight into the connections between comfort, physiology, health, and productivity. It briefly exposed the readers to the connection between buildings and comfort and the ways and means to achieve comfort in buildings. Using examples, the session explained the factors affecting occupant comfort in buildings. It ended with establishing a relation between comfort and associated energy consumption through cooling needs.

Session 2: Building Physics and its relationship with thermal comfort

This session dealt with building envelope, its heat transfer mechanism, and its effect on the thermal comfort. Further, each heat transfer modes were discussed with it's associated building elements. The session ended discussing the effect of building elements on comfort supported by case studies to understand the correlation between building envelope, HVAC, energy consumption and thermal comfort.

Session 3: Fundamentals of thermal comfort

In this session, the connection between comfort and human behaviour, physiology, and psychology were understood in detail. Various factors like local discomfort and thermal asymmetry were discussed which was followed by various theories on thermal comfort, thermal comfort induced behaviour and emerging trends in thermo-physiology. Through this session, the participants understood the overarching guidance about the ways and means to measure thermal comfort among occupants along with explanation of the metrics involved.

Session 4: Affordable housing passive design strategies

This session introduced passive design and its importance with a quick overview of various strategies, detailing a few of prime importance for incorporation in affordable housing. It provided insights into site level design decisions, as well as building-level design decisions with a comparative analysis of appropriate orientation, use of building mass to reduce radiative heat gains in warm climates, fenestration design, location, ventilation, and shading design appropriate for affordable housing. The session ended with best practice approaches adopted at the site and at the building level to implement



passive design strategies.

Session 5: Building materials and methods of construction for affordable housing

It started with the overview of affordable walling, roofing and fenestration materials and technologies and discussed the appropriateness of materials and methods for construction for various affordable typologies and climate. Other factors discussed were alternative construction technologies, low embodied carbon materials, availability of material locally and economics of it. Further, selected case studies that have adopted best practice approaches at the building level were discussed.

Session 6: Building codes, affordable housing and thermal comfort

The session provided understanding and insights into implementation of the provision of various thermal comfort-related clauses in the NBC, ENS, various guidelines provided by the government and the participants comprehended the process of implementing the code at the local level. It discussed the programming of code implementation, the economics of it as well as the benefits of the codes. Further, this section outlined the codes implemented internationally through the voluntary market-based systems, government byelaw, provisions in ISO, and ASHRAE standards.

Session 7: Application of thermal comfort in affordable housing- case studies

This session discussed salient features of the projects that have demonstrated approaches to achieve thermal comfort in affordable housing and were conceived using integrated design practices. The case studies highlighted more than one aspect of the project that meets the objective of affordability and comfort and further discussed methods to evaluate on site performance.

Session 8: Thermal comfort study methods

This session outlined the field-based methods, theory-based method and laboratory-based methods adopted in the past and in the contemporary world to understand the thermal comfort and their applicability. Furthermore, it introduced some handheld tools and research protocols that can help derive thermal comfort studies. In the end, analytical approach for data collection and data analysis using appropriate methods of statistics were discussed in detail.

Session 9: Low energy cooling technologies and comfort

It started with familiarizing the participants with low energy cooling systems and technologies in gaining comfort and provided climate specific guidance as well as insights into their benefits and challenges. Moving on, the design and operation aspects of low energy cooling systems that can work in conjunction with building envelope were discussed. The session concluded with discussion on spatial configuration of the building envelope to accommodate some of the low energy cooling systems.



3.2.1 RACHNA: Awareness drive in architectural college

Number of events	:	12 trainings across India
Duration	:	Two days
Purpose	:	The prime focus of this training is to make academicians and students aware about new technologies being used in building construction and the need for Thermal Comfort in residential buildings. The training focuses on the Light House Project technologies, passive architecture, thermal comfort, and the standards & tools for residential buildings.
Target Audience	:	These trainings target practitioners ranging from builders, architecture and engineering professionals, technology providers, building sector stakeholders, technical officers in public administration.

Detailed agenda of the trainings

Brief of all the technical sessions in these trainings is discussed below:

Session 1: Overview of thermal comfort indices and passive strategies with case studies

This session on thermal comfort standards, like IMAC and ASHRAE, explained the effect of building materials on thermal comfort and discussed few case studies and the best practices in attaining thermal comfort.

Session 2: A brief about ENS Part 1 & ENS Part 2 with the same recommendations for LHP

This session covered a comprehensive technical presentation on Eco Niwas Samhita and demonstrated the ENS Compliance tool in detail while evaluating an exemplary building envelope for participants.

Session 3: Design challenge for the students

This session started with the overview of building physics and building envelop calculations. Next, all the participants were given an affordable housing design challenge exercise to design a thermally comfortable affordable project. The participants were also asked to propose and submit a holistic response by demonstrating multiple attributes pertaining to the thermal comfort taking innovative approaches. All the participants were split into groups to carry out the design challenge exercise.



3.3.1 RACHNA: Training for officers

Number of events	:	10 trainings across India
Duration	:	One day
Purpose	:	The Rachna for officers is organised for professionals interested in understanding the basics of thermal comfort needs and its applicability in affordable housing. Post training, the professionals will be able to design polices on thermal comfort and be equipped with monitoring and evaluating the impact to ensure thermal comfort in upcoming affordable housing is ensured.
Target Audience	:	The training targeted senior officials having degree in engineering or architecture and serving in (a) Urban Local Bodies (b) State government and (c) Central government departments engaged in the development of affordable housing under various government schemes, officials dealing with implementation of codes and policy related to thermal comfort, energy efficiency and affordable housing.

Detailed agenda of the trainings

Brief of all the technical sessions in these trainings is discussed below:

Session 1: Importance of thermal comfort

It provided the importance of thermal comfort, and an insight into the connections between comfort, physiology, health, and productivity. It briefly exposed the readers to the connection between buildings and comfort and the ways and means to achieve comfort in buildings. Using examples, the session explained the factors affecting occupant comfort in buildings. It ended with establishing a relation between comfort and associated energy consumption through cooling needs.

Session 2: Affordable housing passive design strategies

This session introduced passive design and its importance with a quick overview of various strategies, detailing a few of prime importance for incorporation in affordable housing. It provided insights into site level design decisions, as well as building-level design decisions with a comparative analysis of appropriate orientation, use of building mass to reduce radiative heat gains in warm climates, fenestration design, location, ventilation, and shading design appropriate for affordable housing. The session ended with best practice approaches adopted at the site and at the building level to implement passive design strategies.

Session 3: Building materials and methods of construction for affordable housing

It started with the overview of affordable walling, roofing and fenestration materials and technologies and discussed the appropriateness of materials and methods for construction for various affordable typologies and climate. Other factors discussed were alternative construction technologies, low embodied carbon materials, availability of material locally and economics of it. Further, selected case studies that have adopted best practice approaches at the building level were discussed.

Session 4: Building codes, affordable housing and thermal comfort

The session provided understanding and insights into implementation of the provision of various



thermal comfort-related clauses in the NBC, ENS, various guidelines provided by the government. The reads comprehended the process of implementing the code at the local level. It discussed the programming of code implementation, the economics of it as well as the benefits of the codes. Further, this section outlined the codes implemented internationally through the voluntary market-based systems, government byelaw, provisions in ISO, and ASHRAE standards.

Session 5: Application of thermal comfort in affordable housing- case Studies

This session discussed salient features of the projects that have demonstrated approaches to achieve thermal comfort in affordable housing and were conceived using integrated design practices. The case studies highlighted more than one aspect of the project that meets the objective of affordability and comfort and further discussed methods to evaluate on site performance.

Session 6: Overview of innovative construction technologies implemented in Light House Projects (LHPs)

This session discussed the innovative technologies being implemented in six LHPs which were selected through GHTC and highlighted the aspects of speed, sustainability, and disaster-resilient construction.



3.3.2 RACHNA: Training on emerging construction technologies & thermal comfort for officers

Number of events	:	14 trainings across India
Duration	:	One day
Purpose	:	The theme of the one-day training is Innovative Construction Technologies & Thermal Comfort for Affordable Housing.
Target Audience	:	The training targeted participants from various government departments, building industry stakeholders, professionals, and academia.

Detailed agenda of the trainings

Session 1: Importance of thermal comfort

The session focussed on thermal comfort Indices, thermal comfort in affordable housing, passive strategies & building physics. It highlighted the importance of thermal comfort within a building and its impact on the productivity of residents.

Session 2: Thermal comfort models: Standards, codes and building materials

The session started with a brief on thermal comfort models, thermal comfort standards, IMAC, & ASHRAE Standards, and the effect of materials on thermal comfort. It highlighted the role of building materials in improving the overall comfort of occupants.

Session 3: New age innovative technologies along with the 6 LHP construction technologies

The session focussed on new age innovative housing technologies, briefly highlighting the Six Light House Projects construction technologies.

Session 4: EcoNiwas Samhita (ENS) part 1 &2 and its compliances

The session provided understanding and insights into implementation of the provision in ENS part I & II. It discussed the code implementation, the economics, and the benefits of the codes.

Session 5: Low energy comfort Systems, Star Labelling and best practices

This session discussed salient features of the projects that have demonstrated approaches to achieve thermal comfort in affordable housing.



3.3.3 RACHNA: Trainings on climate smart buildings

Number of events	:	6 trainings across India
Duration	:	One day
Purpose	:	The prime focus of this training is to make the govt officials, academicians and professionals aware about the latest construction technologies being used at LHPs, also about thermal comfort, green building concepts, Eco Niwas Samhita tool and standard.
Target audience	:	The participants include senior officials, architects, planners, and engineers from govt. departments. Also, professionals, practitioners who are senior resources in their organizations.

Detailed agenda of the trainings

Brief of all the technical sessions in these trainings is discussed below:

Session 1: New age innovative technologies along with the 6 LHP construction technologies

This session gave a detailed description about the emerging and globally proven innovative construction technologies which are currently being used at six Light House Projects in six different states of India to construct affordable housing under PMAY-U. The session also discussed the necessity of mainstreaming and replication of these technologies.

Session 2: Thermal comfort in affordable housing & passive designs

The session talked about need for and importance of thermal comfort for affordable housing. It touched upon all the aspects of thermal comfort and how it can be achieved in residential housing sector.

Session 3: Thermal comfort models: Standards, codes and building materials

The next session was on thermal comfort models, its standards, viz. IMAC and ASHRAE and the effect of material on thermal comfort. It also highlighted the selection of appropriate building materials in improving the overall comfort of occupants.

Session 4: EcoNiwas Samhita (ENS) part I and II and its compliances

The session provided understanding and insights into implementation of the provision in ENS part I and II It discussed the programming of code implementation, the economics of it as well as the benefits of the codes.

Session 5: Low energy comfort systems, Star Labelling and best practices

This session discussed salient features of the projects that have demonstrated approaches to achieve thermal comfort in affordable housing and were conceived using integrated design practices. The case studies highlighted more than one aspect of the project that meets the objective of affordability and comfort and further discussed methods to evaluate on site performance.



3.4.1 RACHNA: Vocational trainings

Number of events	:	12 trainings across India
Duration	:	Two days
Purpose	:	The purpose of this training is to educate masons, and contractors on the new construction technologies and building materials that are being used in affordable housing construction. The training covers the technical aspect and practical application of the technology, including components and materials that are being used.
Target Audience	:	The Rachna vocational training targeted contractors, masons, insulation applicators and other field workers. It is organised for contractors and masons interested in understanding the basics of thermal comfort needs and its applicability in affordable housing.

Detailed agenda of the trainings

Brief of all the technical sessions in these trainings is discussed below:

Session 1: Overview of thermal comfort and LHP Technologies

This session gave an overview of the Global Housing Technology Challenge (GHTC) – India and states coming under CSB Cells. The 6 LHPs were explained and how these projects are serving as live laboratories and playing a huge role in speeding up the technology transfer. Further Specific technologies and their insight were explained through videos and onsite demonstration. The focus areas of training were thermal comfort, technology transfer, mass housing, learning & replication, live laboratory, quality & sustainability, economics and speed of construction.

Session 2: Construction material and technology

This session covered the LHP construction technology process. The participants were briefed on the technology used at LHP site, step-by-step process of construction, technology advantages and disadvantages. Further, case studies, videos, practical challenges, planning aspect and technology comparison with respect to conventional construction process were covered in this session.

Session 3: Vocational training-LHP technology brief and practical implementation on site

This session gave an opportunity to participants to explore on site construction process. These include walling preparation, interconnection of components i.e., locking and jointing, inclusion of the services in the wall like plumbing & electrical conduiting, experience on thermal comfort in terms of temperature difference observed and explained during onsite activity etc.





4. Event proceedings



The following section is a compilation of the proceedings of the 75 training events organised under the RACHNA initiative. The events saw congregation of expert trainers and stakeholders from varied fields and professions. These training programs were designed focusing on different target groups. This brief documentation of the proceedings and the outcomes of the events brings out a wide range of ideas and learnings from this range of events. The following section highlight the key details under the following heads:

- Location
- Number of Participants
- About the event
- About the trainer
- Dignitaries present
- Outcome
- Feedback from the participants
- The event poster
- Event coverage on social media

All 75 trainings are documented on the GHTC-India website with event photographs and agenda available. The detailed presentation covered during these events is also available.

Detailed documentation of these events can be accessed at Global Housing Technology Challenge website.





Training on emerging construction technologies & thermal comfort in Light House Projects for officers



Date: 07th April 2022No of participants: 115Location:



About the Event

Ministry of Housing and Urban Affairs (MoHUA), in collaboration with Building Material and Technology Promotion Council (BMTPC), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), and the Directorate of Municipal Administration (DMA) - Govt. of Jharkhand, organized a Training cum - Workshop Programme named RACHNA Affordable (Resilient, and Comfortable Housing through National Action) on April 7, 2022, (Thursday) at the Ranchi Smart City Auditorium, JUPMI Building, Dhurwa, Ranchi,

Jharkhand. The theme of the one-day training was 'Innovative Construction Technologies &

Thermal Comfort for Affordable Housing'. The event was simultaneously hosted online via the WebEx platform and streamed on Facebook & YouTube with participants joining in from other cities across the country.

Trainer profile



Trainer 01 – Shri Kumar Biplab is Energy an Engineer with 12 +years of experience in project management, energy audits, retrocommissioning works, site execution, technical delivery, liaising, and

coordinating with clients, vendors & consultants. He has experience in working with advanced technologies, including but not limited to, Combined Heat & Power, District Heating & Cooling, Thermal Energy Storage, Geothermal Heating and Cooling systems. He is a certified IBBI registered Valuer, LEED Ap (O+M), BEE ECBC Master trainer, Edge Expert, PQP, IGBC AP. He has been a master trainer in 48 training programs on ECBC.





Trainer 02 – Shri Saibal Saha has done postgraduation in "Urban Environment Management & Law" from National Law University, Delhi. He has over 28 years of experience. He is a BEE Certified Energy

Auditor, ECBC Master Trainer, GRIHA certified professional and is working as Third-Party Assessor for ECBC in Telangana and Andhra Pradesh. He is working on Building-Energy Efficiency, Green Building Certification, Energy –audits, and Environmental Management Plan for large construction (Buildings) projects. He has provided training on the implementation of the 'Energy Conservation Building Code of India' to different state government officials of the country, including more than 51 trainings and awareness programs on ECBC.

Brief event proceedings

Welcome address

Shri Shailesh Priyedarsi - Asst. Director -Directorate of Municipal Administration (DMA), Jharkhand started off the event with an inspiring address that established the tone for the day, greeting all dignitaries and attendees and giving them a brief background of the event.



Shri Shailesh Priyedarsi, Asst. Director - DMA, Jharkhand, delivering the welcome address.

Keynote Address:

Shri Rajesh Kumar Pathak - Director - Directorate of Municipal Administration (DMA), Jharkhand in his address expressed his joy and happiness on the inauguration of the RACHNA Training Programme at Ranchi. He also highlighted the key milestones achieved by the state of Jharkhand in providing affordable houses for the poor under the PMAY (U) scheme.



Shri Rajesh Kumar Pathak, Director - DMA, Jharkhand, delivering the keynote address

Theme Address (via Video Conference)

Dr. Shailesh Kr Agarwal, Executive Director - BMTPC, in his special address highlighted the objective of MoHUA, to introduce new and innovative housing technologies for mass housing in the country and briefly touched upon how it is transforming the entire construction sector. He also shared the primary goal behind launching RACHNA and other learning programs is to instil a sense of innovation and demonstrate the futuristic housing technologies among the building sector stakeholders from across the country.



Dr Shailesh Kr Agarwal, Executive Director, BMTPC addressing the audience via Video Conference

GIZ CSB introduction:

Shri S Vikash Ranjan, Program Head, GIZ-Climate Smart Buildings (CSB) Project, spoke at length about GIZ's initiatives in India in the sustainability, clean energy & energy efficiency sectors followed by a short presentation on the Climate Smart Buildings project. He shared the objective of introducing this project as



an attempt to increase climate resilience and thermal comfort in buildings constructed under Pradhan Mantri Aawas Yojana (Urban).



Shri S Vikash Ranjan, Program Head, GIZ-CSB Project introducing the project

Technical sessions:

The event covered the following technical sessions:

- Session 1: Importance of Thermal Comfort
- Session 2: Thermal Comfort models: Standards, Codes and Building Materials
- Session 3: New age innovative technologies along with the 6 LHP construction technologies
- Session 4: EcoNiwas Samhita (ENS) part 1 & 2 and its compliances
- Session 5: Low Energy Comfort Systems, Star Labelling and Best Practices

Outcome & impact of the event

The day-long event evoked great responses from over 100 participants from various government departments, building industry stakeholders & professionals from academia. They were trained on 'Innovative Construction Technologies & Thermal Comfort for Affordable Housing' with case studies and best practices being highlighted by the expert trainers. The training session was followed by a Site Visit to Light House Project, Ranchi where the participants were given a guided tour of the affordable housing project currently being built using the 3D Volumetric Precast Construction System.



Shri Rajan Kumar, Team Lead – SLTC – DMA, Jharkhand applauded the authorities and CSB Team for organising this training

Feedback from participants

The participants found the sessions insightful. They understood the importance of thermal comfort in buildings and its impact on the occupants. Further they understood the role of building materials & passive design strategies in making a building comfortable and latest construction technologies available in the market.



Group photo from the LHP Ranchi site visit organised at the end of the training session



Agenda

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Agenda for RACHNA #1

Rachna on Twitter



Training #1 program proceedings on twitter handle





Date: 08-09 April 2022No of participants: 31Location:



About the Event

The Rachna training on thermal comfort for practitioners was organised for professionals interested in understanding the basics of thermal comfort needs and its applicability in affordable housing. Through this training, the participants were equipped with tools and know-how to design and evaluate affordable housing that provides enhanced thermal comfort. The training targeted Senior officials having degree in engineering or architecture and serving

in (a) Urban Local Bodies (b) State government and (c) Central government departments engaged in the development of affordable housing under various government schemes and practicing architects, civil engineers and urban planners.

Trainer profile



Trainer 01 – Prof. Anand Achari is an architect, teaching graduate and postgraduate courses in architecture for 18 years. His focus areas are environmental architecture and sustainability. He is the principal at Vivekanand

Education Society's College of Architecture, Mumbai, Maharashtra. He was the Head of Department of Post Graduate course at Rizvi College of Architecture for 7 years.

Prof. Anand is practicing green building certification in India for over 10 years. He has certified many buildings under USGBC, IGBC,



and GRIHA. He is an IGBC AP, GRIHA Trainer, EDGE Auditor, and ECBC Master Trainer. He is registered with Council of Architecture - India, a fellow at Indian Institute of Architects, and a member of World Society of Ekistics, Greece. He also has a Ph.D. from IIT Bombay in Climate Studies.



Trainer 02 – Ms Smita Chandiwala is an architect with over 17 years of diverse global experience in providing sustainability solutions for the built environment. Smita's work has focused on the reduction of energy and

associated carbon emissions from buildings and cities, especially, incorporating and advancing climate change mitigation and adaptation strategies, including renewable energy technologies, in design, policies, and regulations for the built environment.

Prior to founding Energe-se, Smita worked in the development sector leading the Buildings and Appliance energy efficiency programs at Shakti Sustainable Energy Foundation, New Delhi. She also served as the Regional Director India at Global Buildings Performance Network (GBPN), Paris. Smita has worked on a range of research and consultancy projects as a research fellow at the Oxford Institute of Sustainable Development, UK. These have included projects for the World Bank, Swedish International Development Cooperation Agency and EU Research Councils, UK Government's Technology Strategy Board. She has also taught postgraduate architecture students as an Associate lecturer at Oxford Brookes University, UK.

Brief event proceedings

Welcome address

The training started with the welcome address given by Dr. Rajan Rawal, Senior Advisor, CARBSE, CEPT university and an overview of training by Ms. Bhavya Pathak. Mr. Rajan highlighted that the current Rachna training is designed specifically for practicing architects, engineers who post training will be equipped with tools and know-how to design and evaluate affordable housing using advanced knowledge of passive building design for thermal comfort in affordable housing.

GIZ CSB introduction:

This was followed by the introduction of Climate Smart buildings project delivered by Mr.SVikash



The 1st session set the context of this training showcasing the growth trends in the residential built-up area

Ranjan from GIZ team. The introduction session gave an overview of PMAY(U) and the GIZ-CSB project, its objectives and the team experts involved. He highlighted that GIZ on behalf of The Federal Ministry of Economic Cooperation and Development (BMZ), Germany, and in cooperation with the Ministry of Housing and Urban Affairs, Government of India aims to foster sustainability in built environment to use sustainable materials for Thermal comfort and in turn improve the environment and climate conditions.



Mr. S Vikash Ranjan, GIZ-CSB Project head, introduced the project objectives

Technical sessions:

The event covered the following technical sessions:





This session highlighted the impact of thermal comfort on energy demands

Session 2: Building Physics and its relationship with Thermal comfort

Session 3: Fundamentals of Thermal Comfort Session 4: Affordable Housing Passive Design Strategies

Session 5: Building Materials and Methods of Construction for Affordable Housing

Session 6: Building Codes, Affordable Housing and Thermal Comfort

Session 7: Application of Thermal Comfort in Affordable Housing- Case Studies

Session 8: Thermal Comfort Study Methods Session 9: Low Energy cooling Technologies and Comfort

Outcome & impact of the event

The event was attended by 18 participants from engineering, architecture, and urban planning background and 13 faculties from various institutions across India. A healthy participation and enthusiasm led to discussion on real life situations related to costs of materials, timeline of projects and highlighted projects that are already using sustainable materials that have been ensuring thermally comfortable living environments for the occupants.

Feedback from participants

The participants found the sessions thorough and much inspiring. They understood the importance of low cost thermally comfortable housing in India designed using passive strategies and really appreciated the interactive nature of the sessions and the quality of the content specifically designed for improving thermal comfort in affordable housing in India. The training programme was graced by Shri Bipin Talati, Joint Secretary, Climate Change Department, Government of Gujarat who encouraged the officers to understand and implement passive design for ensuring thermal comfort in new housing.



Agenda

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ession plan i	s as follows:	
1000-1005	Waterstein additions and latenduction to 24.8 VIII.	Man 14
10h05 - 10h10	inboduction to Climate Smart Buildings programme (GDI-CSE)	GIZ
10h10 - 10h15	Section 1: Overview of the workchop, introduction of the project and introduction of the trainers.	Bherys Fattal
10h15-11h15	Section 2: Importance of Thermal Comfort	Aniend Acheri
11n15+11n30	Questions and Answers	
11100-11145	Health Break	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
11h45 = 12h45	Scalion 3: Building Physics and its interferchip with Thermal condert	Analod Actual
12145 + 13100	Questions and Answers	
131100 - 141100	Lanch Break	
14h00 = 14h45	Session 4: Fundamentals of Thermal Constort	Anand Achiel
Minis - 15000	Guerdions and Answers	
15h00-15h45	Session 5: Affordable Housing Pacove Design Strategies	Anand Achael
15145-16100	Questions and Answers	
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16h05 16h15	Pleath Break	12			
16h15 ~ 17h00	5 - 17N00 Section fit duilding Materials and Methods of Construction for Attodable Housing				
17100=17115	Quertions and Answers	1			
17h15 - 17h30	Session 7: Day 1 Concluding Remarks	Etravya Pathak			
Dep 2: April 1.	2022 (Saturday)				
10h00-10h15	Session & Day 1 Recap	Ehergia Pathak			
10h15=11h15	5+11h15 Section III Building Codes, Affordable Housing and Thermal Comfort				
11h15=11b30	15=11630 Questions and Answers				
11h30=11h45	Pleast the Series				
11645+12645	Session 10 Application of Thermal Comfort in Attordable Housing- & Suite of Celle Studies	Smits Chandiwala			
12945 - 13900	Questions and Answers	1			
13h00= 14h00	Lunch Break				
14h00+15h00	Session 11: Thermal Cumfort Study Methods	Smita Chandiusla			
15h00+15h15	Questions and Answers				
15h15=16h15	Section 12 Low Energy Cooling Technologies and Comfort	Sinta Olandiwala			
16h15 = 16h30	Questions and Answes	1			
16h30= 17h15	Section 13. Distutcions on gaz-questionnaires and feedback from participant:	Smita Orandivala			
17n15-17h30	Sesson 14 Concluding Remarks	Etheniya Pathek			



RACINA



Date: 20-21 April 2022No of participants: 31Location:



About the Event

The Rachna training on thermal comfort for practitioners was organised for professionals interested in understanding the basics of thermal comfort needs and its applicability in affordable housing. Though this training, the participants were equipped with tools and know-how to design and evaluate affordable housing that provides enhanced thermal comfort.

The training targeted Senior officials having

degree in engineering or architecture and serving

in (a) Urban Local Bodies (b) State government and (c) Central government departments engaged in the development of affordable housing under various government schemes as well as practicing architects, civil engineers and urban planners.

Trainer profile



Trainer 01–Prof. Rajan Rawal is an architect by training and is a senior advisor at Centre for Advanced Research in Building Science and Energy (CARBSE), and a CRDF Professor at CEPT University. He was the Executive Director

of CARBSE between 2006 and 2021. He worked with Vastu Shilpa Foundation for Studies and Research in Environmental Design before joining Faculty of Design, CEPT University, Ahmedabad. He taught design and construction courses as part of the undergraduate program. He now teaches energy efficient built environment, energy policy, energy modelling and simulations at postgraduate level.





Trainer 02 – Dr. Yash Kumar Shukla is the Principal Researcher and Centre Head at the Centre for Advanced Research in Building Science and Energy (CARBSE). He has led several ground-

breaking research projects including low-energy cooling and ventilation systems in Indian residences, evaluation of innovative cooling technologies, and benchmarking of Indian buildings. He also teaches Master level courses at CEPT University.

His current research includes the calibration of simulation models, smart grids, low cooling energy systems, amongst others. He possesses several professional certifications including Certified Measurements and Verification Professional (CMVP), Home energy rating system (HERS), GRIHA trainer, and ECBC Master Trainer. He is an active member of ISHRAE, ASHRAE, and IBPSA.

Brief event proceedings

Welcome address

The training program began with a welcome address given by Mr. Markus Wypior, Deputy cluster coordinator at GIZ India who highlighted the work that GIZ has been undertaking with Indian partners on energy and carbon mitigation. He introduced the work that CSB project is undertaking and applauded the initiatives taken under CSB project in partnership with MoHUA and BMTPC.

Introduction to Rachna training program

Dr. Rajan Rawal, senior advisor at CARBSE, CEPT university, gave an overview of the Rachna series of training program specifically designed for govt. officers and practising professionals. Dr. Rajan highlighted that the current Rachna training was designed specifically for practicing architects, engineers who post training will be equipped with tools and know-how to design and evaluate affordable housing using advanced knowledge of passive building design for thermal comfort in affordable housing.



Dr Rajan Rawal, senior advisor at CARBSE, gave an overview of the training

Special Address

Dr. Shailesh Agarwal from BMTPC highlighted that the urban housing demand has risen significantly over the years and there is a need for developing and using innovative construction technologies which are fast, resilient and sustainable. He introduced the 6 Light House Projects that are using innovative technologies which act as live laboratories for understanding the features of the new construction and propagate the innovative features that they come with.

Keynote address

Shri Kuldip Narayan, JS (HFA), MoHUA, commended the initiative undertaken under the GIZ-MoHUA CSB project to mainstream thermal comfort in the affordable housing sector and highlighted the importance that capacity building holds for stakeholders to understand and implement novel passive design strategies and methods for construction. Giving examples



Shri Kuldip Narayan, JS (HFA), MoHUA, gave the keynote address highlighting the importance of capacity building



from his own experience of experiencing comfort and well-being through well day lit and ventilated spaces, he stressed that every human being must have access to a dwelling that provides comfortable living conditions while putting minimal stress on the climate and environment.

Vote of thanks

The vote of thanks was delivered by Mr. S Vikash Ranjan, Project head, CSB. He gave an overview of PMAY(U) and the GIZ-CSB project, its objectives and the team experts involved. He highlighted that GIZ on behalf of The Federal Ministry of Economic Cooperation and Development (BMZ), Germany, and in cooperation with the Ministry of Housing and Urban Affairs, Government of India aims to foster sustainability in built environment to use sustainable materials for Thermal comfort and in turn improve the environment and climate conditions.

Technical sessions:

The event covered the following technical sessions:

Session 1: Importance of Thermal Comfort



Dr Rajan taking the participants through the technical sessions

Session 2: Building Physics and its relationship with Thermal comfort

Session 3: Fundamentals of Thermal Comfort Session 4: Affordable Housing Passive Design

Strategies

Session 5: Building Materials and Methods of Construction for Affordable Housing

Session 6: Building Codes, Affordable Housing and Thermal Comfort

Session 7: Application of Thermal Comfort in Affordable Housing- Case Studies

Session 8: Thermal Comfort Study Methods

Session 9: Low Energy cooling Technologies and Comfort

Session 10: Overview of Innovative construction technologies implemented in Light House Projects (LHPs)

Outcome & impact of the event

The event was attended by 34 participants, including both govt. officials and practising professionals. The participants represented organisations such as MoHUA, BEE, CEEW, CRDF, Shakti, Vastu Kala Academy and many private energy and architecture firms. The participants discussed real life situations related to costs of materials, timeline of projects and highlighted projects that are already using sustainable materials that have been ensuring thermally comfortable living environments for the occupants. Govt. officials present from MoHUA shared their experience in implementing the PMAY(U) scheme across India related to costs, material choices, timeline and central assistance.

Feedback from participants

The participants found the sessions thorough and much inspiring. They understood the importance of low cost thermally comfortable housing in India designed using passive strategies and really appreciated the interactive nature of the sessions and the quality of the content specifically designed for improving thermal comfort in affordable housing in India.



Agenda



Agenda for RACHNA #3

Rachna on Twitter



Training #3 program proceedings on twitter





Awareness drive in architectural college



Date: 21st & 22nd April 2022No of participants: 80Location:



About the Event

The Rachna awareness drive in Architecture college was organised for students and faculty interested in understanding the basics of thermal comfort needs and its applicability in affordable housing. Post training, the students were able to design keeping thermal comfort aspect in mind and were equipped with tools for monitoring and evaluating the impact to ensure thermal comfort in upcoming affordable housing. The training targeted architecture students & faculty

of B. Arch & M. Arch courses.

Trainer profile



Mr Saif Uddin is an Energy Engineer by Qualification and Building Policy Expert by Profession having more than 8 years' experience in the domain of Energy Conservation Building Code, Eco-Niwas Samhita

implementation with Government of Uttar Pradesh, Himachal Pradesh, Rajasthan & Bihar. Building Energy Simulation for ECBC, ASHRAE 90.1 and general energy optimization is his key expertise. He is a certified IGBC Associate professional, and GRIHA certified professional.

He has been also involved in the development of ENS Tool and ECBC App developed by Bureau of Energy Efficiency, Ministry of Power for Commercial & Residential Buildings.

Brief event proceedings

Welcome address

The training started with the welcome address given by Dr Vandana Sehgal, Principal and



Dean, Faculty of Architecture, Dr A.P.J. Abdul Kalam Technical University, Uttar Pradesh. Prof. Sehgal advocated aligning conventional, vernacular, and future innovative technologies together to achieve ecological coherence. She urged the participants to evaluate and embrace the workshop learnings into their future projects.



Dr Vandana Sehgal, Principal and Dean, Faculty of Architecture, Dr A.P.J. Abdul Kalam Technical University, giving the welcome address

GIZ CSB introduction:

Mr. Saifuddin, Master Trainer, Climate Smart Buildings, GIZ, gave a brief introduction of the theme and outline of the workshop. He also mentioned about the 26th Conference of Parties (COP26), and cited India's commitment to a net-zero carbon emission target by 2070 and its interrelation with the objectives of Climate Smart Buildings programme.



Mr. Saifuddin gave a background of the RACHNA initiative

Technical sessions:

The event covered the following technical sessions:

Session 1: Overview of thermal comfort indices and passive strategies with case studies



Mr Saifuddin taking the technical sessions

Session 2: A brief about ENS Part 1 & ENS Part 2 with the same recommendations for LHP



Introduction to online tools available

Session 3: Design challenge theme & requirements for the students



The session culminated in an architectural design exercise

RACINA



The students working in groups on developing thermally comfortable design for the design challenge

Outcome & impact of the event

The event was attended by 71 students and 9 faculty members of the college. The training program saw a healthy discussion amongst each other, the trainer and discusses real life situations related to costs of materials, timeline of projects and highlighted projects that are already using sustainable materials that have been ensuring thermally comfortable living environments for the occupants.

Feedback from participants

The participants found the sessions thorough and much inspiring. They understood the importance of low cost thermally comfortable housing in India designed using passive strategies and really appreciated the interactive nature of the sessions and the quality of the content specifically designed for improving thermal comfort in affordable housing in India.





Agenda

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nnovative Co Location: Lu	nstruction Technologies & Thermal Co icknow Date: 21 st April 2022, Thursday AGENDA – Day 1	nstruction Technologies & Thermal Co Lucknow Date : 22 nd April 2022 , Friday	mfort for Affordable Housing Time : 10:30 AM to 5:30 PM				
DURATION	TORIC	SPLAKER		AGENDA – Dav 2			
10:00 - 10:30	Registration		DURATION	TOBIC	SINGAVER		
	Welcome Address	Prof. Vandana Sehgal Dean, GCA, Fol.P. AKTU, Lucinew	Constitution	Session 3:	270404		
30:30- 30:45	e) Keynete Address	Mr. Munich Nassa Serier Consultant - BATHC.	10:30 - 11:00	Affordable Housing Design Challenge a) Design Problem Introduction	Mr. Saif Oddin M.Tech (Energy). IGBC AP, GRIHA CP, Energy Policy Expert		
	Introducing GIC and Climate Smart Buildings Cell (CIB) CSB Cell Activities New age innovative technologies along with the 6	Climate Smart Buildings (CSB) Cell	11:00 - 11:15	5) URUSING TEA BREA	x		
10-45 - 11-00	UP construction technologies floculing on – efficiency is construction, multi-the aming & replication of technologies, and outsinable cum thermal conflect aspects. () 0495 & antibits	Climate Smart Buildings (CSB) Cell	11:15 - 13:00	Session 3: (Conto) Design Challenge Exercise	Mr. Saif Uddin M. Tech (Energy). IGBC AP, GRIMA CP, Energy Policy Expert		
	c) Integration of Thermal comfort standards into Building Byelaws		13:00 - 14:00	LUNCH BRE	AX		
11:00-11:15	TEA BAEA Session 1:	ĸ	14:00 - 16:00	Session B(Conto) Design Challenge Exercise	Mr. Saif Uddin M. Tech (Energy), IGBC AP, GRIHA CP, Energy Policy Expert		
	a) Introduction to Affendable Neuring		16:00 - 16:15	HIGH TEA & NETWORKING			
11:15 - 12.00	 Need for thermal comfort in affordable housing Thermal Confect Indices Thermal comfort in Affordable Housing 	Mr. Sait Uddin M.Tech (Energy), IGBC AP, GRIML CP, Energy Policy Expert	16:15 - 17.15	Session 4: Design Challenge Judgement & Winner Announcement	Climate Smart Buildings (CSB) Cell		
	II. Passive architectural strategies		17:15 - 17:90	Vote of Thanks	Climate Smart Buildings (CSB) Cell		
12:00 - 13:00	Session 2. (Conto) Thermal Comfort standards i Thermal Comfort standards i ADR i ADR i Effect of Sociality materials on thermal comfort () Effect of Sociality materials on thermal comfort () Coce studies and Best Practices	Mr. Sail Uddin M.Tech (Energy), KBC AP, Global CP, Energy Parity Expert		END of AWARENESS PROGRAM	IME		
13:00 - 14:00	LUNCH BR	OAK					
14:00 - 15:00	Session 2: Fox Names Sembles (2012) Part 1	Mr. Saif Uddin M.Tech (Energy) IGBC AP, GRINA CP, Energy Policy Expert					
15:00 - 16:00	Session 2:(Contd) for Nimus Samhita (2022) Part 2	Mr. Saif Uddin M.Tack (Energy), IGBC AP, GRIMA CP, Energy Palloy Expert					
16:00 - 16:15	HIGH TEA & NET	WORKING					
16:15 - 17.15	Session 24(Contd) 4) BES San Usering for Residential Buildings 1) BIS San Users tool 1) Recommendation for designing of an Affentable Recursing project (for thermal conflict), Case studies (sath)abm2(2mm)	Mr. Saif Uddin M. Tech (Energy). IGBC AP, GRISK CP, Energy Policy Esperi					
17:15 - 17:90	Q&A	Climate Smart Buildings (CSB) Cell					

Agenda for RACHNA #4

Rachna on Twitter



Training #4 program proceedings on GHTC twitter handle





Vocational training for construction workers



Date: 27th April 2022No of participants: 70Location:



About the Event

The Rachna vocational training was organised for contractors and masons interested in understanding the basics of thermal comfort needs and its applicability in affordable housing. The training was to educate masons, and contractors on the new construction technologies and building materials that are prevalent in affordable housing construction. The training targeted contractors, masons, insulation applicators and other field workers. The training covered the technical aspect and practical application of the technology, also including systems and materials that are being used. The prime focus of this training was to make the construction field workers aware about the latest technology i.e., prefabricated sandwich panel system being used at LHP, Indore.

Trainer profile



Mr. Kashinath Kinge, KPR is B.E. Civil engineer with diverse experience of 23 years in managing Mass housing projects, high-rise Buildings & Industrial Buildings using Aluform shuttering, Tunnel formwork, and its allied

services like roads, sewage etc from stages of tendering and planning to handing over of the project.

Brief event proceedings

Welcome address

Ms Disha Jain CSB Cell member started off the event with an inspiring address that established the tone for the day, greeting all dignitaries



and attendees and giving them a glimpse of the sessions ahead.

Keynote address

Mr. Mahesh Sharma, IMC in his address expressed his joy and happiness by highlighting the key milestones achieved by the IMC. He informed about the key ongoing Projects and their features. He also added and encouraged attendees to participate in such events, take advantage and upgrade their knowledge on the technology. He further added insights about the LHP project, EPS Technology and its advantages relating to resource efficiency, waste reduction, energy efficiency and better thermal comfort.

Technical sessions:

The event covered the following technical sessions:

Session 1: Overview of thermal comfort and LHP Technologies

Session 2: Construction materials and Technology

Session 3: Vocational Training-EPS technology brief and practical implementation on site

Outcome & impact of the event

The event was attended by 38 contractors and masons from the site. The training program saw a healthy discussion amongst participants and trainers on real life situations related to costs of materials, timeline of projects and highlighted projects that are already using sustainable materials that have been ensuring thermally comfortable living environments for the occupants. The training introduced the contractors, masons, and field workers to the current technologies & best construction practices.

Feedback from participants

The participants found the sessions thorough and much inspiring. They were enlightened by the new technologies being used in India. They showed keen interest in receiving more practical knowledge and hands on training sessions focusing on the new construction technologies.



Participants at the vocational training session conducted at LHP Indore site



Agenda



Agenda for RACHNA #5

Rachna on Twitter



Training #5 program proceedings on GHTC twitter handle

RACINA









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Awareness drive in architectural college



Date: 10th May 2022No of participants: 22Location:



About the Event

The Rachna for officers is organised for professionals interested in understanding the basics of thermal comfort needs and its applicability in affordable housing. Post training, the professionals will be able to design polices on thermal comfort and be equipped with monitoring and evaluating the impact to ensure thermal comfort in upcoming affordable housing is ensured. The training targeted Senior officials having degree in engineering or architecture and serving in (a) Urban Local Bodies (b) State government and (c) Central government departments engaged in the development of affordable housing under various government schemes, officials dealing with implementation of codes and policy related to thermal comfort, energy efficiency and affordable housing



Trainer profile

Prof. Rajan Rawal is an architect by training and is a senior advisor at Centre for Advanced Research in Building Science and Energy (CARBSE), and a CRDF

Professor at CEPT University. He was the Executive Director of CARBSE between 2006 and 2021. He worked with Vastu Shilpa Foundation for Studies and Research in Environmental Design before joining Faculty of Design, CEPT University, Ahmedabad. He taught design and construction courses as part of the undergraduate program. He now teaches energy efficient built environment, energy policy, energy modelling and simulations at postgraduate level.


Brief event proceedings

Welcome address

The training started with the welcome address by Dr. Rajan Rawal, Senior Advisor, CARBSE, CEPT university and an overview of the training by Ms. Palak Patel. Mr. Rajan highlighted that the current Rachna training is designed specifically for govt. officers who will be instrumental in developing new policies and complement implementation of policies through advanced knowledge of passive building design for thermal comfort in affordable housing.



Dr Rajan Rawal delivering the welcome address

GIZ CSB introduction:

This was followed by the introduction of Climate Smart buildings delivered by Mr. Abdulla Siddiqui from GIZ team, The introduction session gave an overview of PMAY(U) and the GIZ-CSB initiative, the project objectives and the



Dr Rajan Rawal delivering the welcome address

team experts involved. He highlighted that GIZ on behalf of The Federal Ministry of Economic Cooperation and Development (BMZ), Germany, and in cooperation with the Ministry of Housing and Urban Affairs, Government of India aims to foster sustainability in built environment to use sustainable materials for Thermal comfort and in turn improve the environment and climate conditions.

Technical sessions:

The event covered the following technical sessions:

Session 1: Importance of Thermal Comfort



First session on importance of thermal comfort

Session 2: Affordable Housing Passive Design Strategies



The training was well attended by stakeholders from building construction sector

Session 3: Building Materials and Methods of Construction for Affordable Housing

Session 4: Building Codes, Affordable Housing and Thermal Comfort

Session 5: Application of Thermal Comfort in Affordable Housing- Case Studies



Dr Rajan delivering the technical sessions



Session 6: Overview of Innovative construction technologies implemented in Light House Projects (LHPs)



Mr Pankaj Gupta, BMTPC discussing on innovative construction technologies

Outcome & impact of the event

The event was attended by 19 government officials and 3 practitioners from energy and architectural domain. These officials represented organisations such as Gujarat Energy Development Agency, AILSG, Mahila Housing Trust, All India Institute of Local Self Govt., AUDA, AHM, Climate change department, Gandhinagar Urban development Authority and many practitioners from design2occupancy, centre for environment education, dev engineers, SPA, Sumukh builders etc. The training program saw a healthy discussion amongst each other, the trainer and discusses real life situations related to costs of materials, timeline of projects and highlighted projects that are already using sustainable materials that have been ensuring thermally comfortable living environments for the occupants.

Feedback from participants

The participants found the sessions thorough and much inspiring. They understood the importance of low cost thermally comfortable housing in India designed using passive strategies and really appreciated the interactive nature of the sessions and the quality of the content specifically designed for improving thermal comfort in affordable housing in India. The training programme was graced by Shri Bipin Talati, Joint Secretary, Climate Change Department, Government of Gujarat who encouraged the officers to understand and implement passive design for ensuring thermal comfort in new housing.



The sessions were interactive with participants putting forward interesting questions





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	Introduction to Climate Smart Buildings Programme (IGEN -		
10h10 + 10h15	CS81 and overview of workshop	GIZ and/or Pala Patel	
10h15 = 11h00	Session 2 (Technical): Importance of Thermal Comfort		
11000 + 11810	Quectors and Arseers	DL Kajan Ravia	
11010-11020	Health Break	1020 - 14	
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12x05 - 12x15	Questions and Answers	1	
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12515 - 13515	Construction for Affordable Housing	N 8414 844	
13615 - 13630	Questions and Answers	and other states	
13-35 - 12-35	Lunch Break	<u>.</u>	
1/10/1 - 155-15	Session 5 (Technical) Building Codes: Affordable Housing and	T	
14/100 - 13/13	Thermal Comfort		
15015 - 15030	Questions and Acovers	Dr. Rajan Ravis	
19930 - 19945	Health Ereak		
12645-16645	Session & (Technical): Application of Thermal Comfort in Affordable Housing - A Suite of Case studies	Dr. Rajan Raval	
	Quectors and Answers		
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10n45 - 10n35 10n55 - 17n25	Implemented in Light House Projects (LHPs)		

Agenda for RACHNA #6

Rachna on Twitter



Training #6 program proceedings on GHTC twitter handle





Training on emerging construction technologies & thermal comfort in LHPs for practitioners



Date: 12th May 2022No of participants: 44Location:



About the Event

The Ministry of Housing and Urban Affairs, in conjunction with GIZ India held a one-day training session for professionals called Rachna, -Training on emerging construction technologies & thermal comfort in LHPs for Practitioners. The training was especially designed for the stakeholders from building and construction sectors. Government officials from different divisions of State and Central Government (Officials from Urban Local Bodies, Engineers/ Architects/Technograhis from Rajkot, Gujarat) attended the event. The prime motive of the training was to create awareness about thermal comfort and its necessity in the affordable housing sector.

Trainer profile



Mrs. Maaz Dixit Bhatt is an architect and a building energy analyst with six years of experience in the field of architecture, building energy efficiency research and consultancy. She is currently working at Gujarat Energy

Development Agency as a consultant Architect and as a specialist consultant for Global Building Performance Network. Additionally, she is the founder and partner at Ahmedabad's Neev Energy and Sustainable Solutions, a company that provides energy consulting services.

Brief event proceedings

Welcome address

The Training Program was formally started by Mr. Winamra Negi, Engineer Consultant, Climate Smart Buildings Cell, GIZ, by warmly



welcoming all the participants and introducing the RACHNA, initiative and its objectives. He highlighted that this training is specifically designed for professionals from various government and private organisations.



Introduction Session by Mr. Winamra Negi

The Welcome Address was delivered by Dr. Amit Lathigara, Dean, Faculty of Technology, R. K. University, Rajkot. Dr. Lathigara thanked GIZ and MoHUA for allowing R. K. University the opportunity to participate in the drive to make affordable housing sustainable and thermally comfortable. He encouraged the participants to try practising the knowledge learned from such training programmes in the real world.



Dr. Amit Lathigara, Dean, Faculty of Technology, R. K. University, Rajkot, delivering the welcome address

GIZ CSB introduction:

Mr. Winamra Negi provided the participants with a quick overview of the Training Program. In accordance with the Training Program's theme, he explained the Sustainable Development Goals and India's commitment to meeting the Sustainable Development Goal of "Sustainable Cities and Communities," as well as its relationship to the objectives of GIZ's Climate Smart Building Project. He also highlighted GIZ & Ministry of Housing and Urban Affairs aim to foster sustainability in built environment by use of sustainable materials for Thermal comfort and in turn improve the environment and climate conditions.

Technical sessions:

The event covered the following technical sessions:

Session 1: Thermal Comfort, Passive Measures in achieving thermal comfort in Affordable Housing and Case Studies



Mrs. Maaz delivering the technical sessions

Session 2: Thermal Comfort Standards, Human Body Thermal Balance & its Regulatory Mechanism, ASHRAE & Indian Model for Adaptive Comfort and Effects of Materials on Thermal Comfort

Session 3: New Age Construction Technology at six Light House Projects, Eco Niwas Samhita 2018 & 2021, Residential Star Label and Best Practices.



Mr. Kanishk Bhatt explaining the Construction Methodology at LHP RajkotOutcome & impact of the event



Outcome & impact of the event

The one-day Training Program dated 12th May 2022 at Rajkot, was first in the series of Training Program and Awareness Workshops for Senior Govt. Officials, Policy Makers & Built-Environment Professionals. In addition to 23 government representatives from the energy and architectural fields, 21 Technograhis attended the event. These representatives came from organizations including the R.K. University, BITCOL, Gondal Nagarpalika, and the Rajkot Municipal Corporation. The training programme included a healthy exchange of ideas between participants and the trainer as well as discussions of real life cases involving the price of materials, project timelines, and projects that have already been using sustainable materials to provide their residents with comfortable dwellings.



Master Trainer during the Q & A Session talking about orientation and spacing of Buildings

Feedback from participants

The training program has been very informative for the participants as was evident from the responses received during the question and answer session.

According to the participants, the training content was well delivered and easy to understand. They appreciated the interactive format of the sessions and the information focusing on enhancing thermal comfort in lowcost housing in India. They also understood the impact and necessity of thermally comfortable low-cost housing in India.

The Training Program was concluded with a vote of thanks from Dr. Amit Lathigara. He praised the Ministry of Housing and Urban Affairs (MoHUA), Government of India & GIZ for taking the initiative to implement the idea of thermal comfort in the affordable housing sector, giving every citizen a chance to live a comfortable and dignified life. Additionally, he praised the CSB Cell Team members for their active participation in the planning and management of this event. He also expressed his gratitude to the attendees for their enthusiastic interest in the topic and contribution to the event's success.



Interactive session with the expert trainer





Agenda for RACHNA #7

Rachna on Twitter



Training #7 program proceedings on GHTC twitter handle









Date: 16th May 2022No of participants: 38Location:



About the Event

The Rachna awareness drive in Architecture college was organised for students and faculty interested in understanding the basics of thermal comfort needs and its applicability in affordable housing. Post training, the students learnt to be able to design keeping thermal comfort aspects in mind and were equipped with monitoring and evaluating tools to assess thermal comfort in upcoming affordable housing is ensured. The training targeted architecture students and faculty of B. Arch & M. Arch courses.

Trainer profile



Mrs. Rathnashree Prakash started her sustainability career as an energy modeler in 2008. Today, with more than 13 years of experience in the field of sustainability, she is part of the journey of the growth of the green building

sector in India. She has worked on more than 500 detailed energy modelling analyses for IGBC, LEED, and GRIHA rating systems. She also carries expertise in shading and sun path analysis, lighting simulations, and other predesign and design phase assessments which have supported clients and design teams in making design decisions. She has the capabilities to carry out Life cycle assessments for Buildings. As a unique contribution, she has worked on developing the web tool for a catalogue of replicable residential building designs.

Brief event proceedings

Welcome address

Dr. Saisanath, Prof. Reva School of Architecture, inaugurated the session with a warm welcome to the participants. The training proceeded





Dr Saisanath delivering the welcome address

with a keynote address & Cluster cell activities by Mr. Selvarasu, Team Leader, Climate Smart Buildings Cell, South India. In the session, Mr. Selvarasu emphasized the significance of this awareness session and the need to guide the construction happening under PMAY-U, especially the self-build Beneficiary Led Construction (BLC) towards thermal comfort and sustainability by use of passive design.



Mr Selvarasu delivering the keynote address

Technical sessions:

The event covered the following technical sessions:

Session 1: Overview of thermal comfort indices and passive strategies with case studies

Session 2: A brief about ENS Part 1 & ENS Part 2 with the same recommendations for LHP



Session Trainer Ms. Rathnashree explaining Thermal Comfort Parameters

Session 3: Design challenge theme & requirements for the students

Outcome & impact of the event

The event was attended by 33 students and 5 faculty members from the college. The training program saw a healthy discussion amongst participants and the trainer regarding practical applications related to costs of materials, timeline of projects and highlighted projects that are already using sustainable materials that have been ensuring thermally comfortable living environments for the occupants.

Feedback from participants

The participants found the sessions thorough and inspiring. They understood the importance of low cost thermally comfortable housing in India designed using passive strategies and appreciated the interactive nature of the sessions and the knowledge content shared.



Participants were encouraged to have a participative and interactive session



	Location: Bangal	are Date: 16 th Ma	y 2022, Monday Time : 10:00 Af AGENDA	M to 5:30 PM
	TIME	SESSION	TOPIC	SPEAKER
RESILIENT, AFFORDABLE AND COMFORTABLE HOUSING THROUGH INATIONAL ACTION	10:00am -10:15am	Introduction	Welcome Address Introducing GI2 & its activities GHTC LINPs	Mr Selvarana
Training #08: One-Day Awareness Programme on Thermal Comfort in Affordable Housing for Architectural Students' ration: Banealore Date : 16 th May 2022, Monday Time : 10:00 AM to 5:30 PM	10:15am - 10:45am	Climate Smart Buildings - Cluster cell	Cluster Cell Activities. Light House Project Implementation DHP & AHRCs Integration of Thermal comfort standards Into Ruleitor Res. Laws	CS8 Cell
	10:45am - 11:00am		Tea Break	
Ministry of Housing & Urban Affairs (MoHUA) in partnership with GiZ and the Building Material Technology Promotion Council (IMITPC) is hosting a series of training/workshops on innovative struction Technologies & Thermal Comfort for Affordable Housing named RACHAR (Realient, rdable and Comfortable Housing through National Action, The main focus of the training is mail comfort and its necessity in the affordable housing sector. The training covers the thermal fort basics, materials influences, low-cost solutions & codes that are available especially in India to the Climate-Smart Buildings, The outcome of the training would be to make the atudents erstand the need for thermal comfort & encourage them to include no cost or low-cost strategies her future projects. A design challenge for students will be shared and it will be judged based on inclusion of thermal comfort factors in their design & certificates will be provided.	11:00am - 01:00pm	Section - 1	Thermal Comfort Indices Thermal comfort in Affordable Housing Passive strategies Thermal Comfort standards O IMAC O ASHRAE Effect of materials on thermal comfort Case studies	Trainer – Mrs. Rathsashree
chitectural	01:00pm - 02:00pm		Lunch	
Pludents JOIN US AT	02:00pm - 04:00pm	Session - 2	ENS Part 1 Brief ENS Part 2 Brief Compliance tool	Trainer – Mrs. Rathnashree
Architecture	04:00pm - 04:15pm		Tea Break	
Nex Katpoolaali, Yokhanka, Bergaluru 500061, Kematoka	04:15 pm = 04.30 pm	Session - 2 Contd	LHP Technology & ENS compliance Recommendations for LHP	Trainer – Mits. Rathnashree
N GELTSTALL	04.30pm = 04.45pm		Q&A	Trainer & CSB Cell
	04.45pm - 05.15pm	Session-3	Design Challenge Theme & Requirements	Trainer – Mrs. Rathnashree
n Mr search for the second second			Audging Criteria	

Agenda for RACHNA #8



Photograph capturing event proceedings



Rachna on Twitter



GHTC INDIA @GhtcIndia · May 16 ···· Training #8 of #RACHNA held @ Reva University Bengaluru on 16 May.#ThermalComfort in #AffordableHousing,#LightHouseProject technologies w.r.t. convent'l mthds, how Precast Concrete Construcion System-Precast Components Assembled at Site used @#LHPChennai is beneficial, was expld.



Training #8 program proceedings on GHTC twitter handle



Training #8 program proceedings on GHTC twitter handle

RACINA



Vocational training for construction workers



Date: 17th & 18th May 2022No of participants: 46Location:



About the Event

The Rachna vocational training for construction workers for field workers was organised for professionals who are involved in onsite execution of the projects and interested in practical learning. Post training, the professionals gained hands-on knowledge in different construction aspects and improved their skill set by learning new techniques and specifications for enhancing thermal comfort for residential buildings. The training was attended by various field professionals such as masons, contractors, painters and site supervisors.

Trainer profile



Mr. Dinesh Patel is an Engineer - Third Party Quality Control for CUBE - IIT Madras at LHP Rajkot. For over 23 years, he has worked as a Site Engineer, Project In-Charge, and Project Manager for major construction projects

of the Department of Military Engineering, GoI in various locations across India. Mr. Patel has established competency in Project Execution, Document Preparation, Building Material Testing, Site Management, Liaison & Coordination, Site Management, Budget Control, and the Preparation of Detailed Project Reports and Control Performance Reports. His experience in Construction Site Management encompasses the whole scope of Civil Construction jobs, including Project Planning, B.O.M and B.O.Q preparation, Material Testing and Quality Control, Project Monitoring Supervision, Project Execution and and Management, and development of engineers and technicians at site.



Brief event proceedings

Welcome address

The Training Program was formally started by Mr. Winamra Negi, Engineer Consultant -Climate Smart Buildings Cell, GIZ, by warmly welcoming all the participants and introducing RACHNA, the initiative by MoHUA & GIZ. He introduced the objectives of the training Program. The training was designed to provide the participants a balanced mix of technical knowledge and practical learning on the construction site.

The main intent was capacity building & dissemination of knowledge on innovative construction technologies used in LHPs.



Mr. Winamra Negi gave a brief introduction of the training program to the participants.

GIZ CSB introduction:

Continuing after the Welcome Address, Mr. Winamra gave a brief introduction of the CSB Program to the participants. In line with the



Mr Winamra introducing the CSB Project objectives

theme of the Training Program, he apprised the participants about the flagship missions towards

urban Transition, by Ministry of Housing and Urban Affairs (MoHUA) – GoI, Pradhan Mantri Awas Yojana (Urban), Global Housing Technology Challenge-India (GHTC-India), Indo-German Energy Programme & Climate Smart Buildings Cell at West Cluster, and their key activities.

Technical sessions:

The event covered the following technical sessions:

Session 1: Brief introduction of New Age Construction Technology employed at 6 LHPs



Technical sessions during the training introducing innovative construction technologies

Session 2: Detailed Technical Presentation on construction technology process

Session 3: Site visit for the participants showcasing on-site Building Construction through Tunnel Formwork

Outcome & impact of the event

46 construction workers attended the twoday seminar, and they found it beneficial for expanding their understanding of new building technology available in the market.



The participants were shown case studies for applicationbased learning



Additionally, participants gained exposure by visiting the actual site where the demonstrations were held. This made it much easier for them to observe and comprehend the techniques. Through this programme, participants were able to learn about new building technologies on a theoretical level while also seeing how the technology was used in live site. Following the sessions, the participants were tested with a quiz. The goal was to evaluate the attendees' level of understanding and construction knowledge gained.

Feedback from participants

The training was majorly focused on disseminating hands-on training to the professionals from the construction sector.

The two – day long event addressed topics on innovative construction technologies being deployed at Light House Projects and construction process of LHP Rajkot as per the "Monolithic Concrete Construction using.



The training session ended with a visit around the project site

Tunnel-Formwork. The training was beneficial in educating them about the latest construction technologies which are being used in the country, and to bring them up to date with the latest construction trends in the country. Mr. Winamra Negi, delivered the vote of thanks and applauded the initiative by MoHUA – GIZ to bring the concept of training the construction workers at the ground level. Thus providing an opportunity to the onsite team to learn.



The participants included masons, contractors, painters etc from the onsite construction workers



Image: Strategy of	V ittert	fondasi. Honoro Toronologo Graulande «cin. Benity af abusing and inter Ahlen Mentered Able	्रम्हा महोत्स्टन केलाकिट giz केलाकाला स्टान्स
	Innovat Location	ive Construction Technologies & The : Rajkot Date : 17 th & 18 th May 2022 , Tuesda	rmal Comfort for Affordable Housing y & Wednesday Time : 10:00 AM to 5:00 PM
	DURATION	AGEN	EDFAYER
KACIMPINA	10:00-10:30	Registration of Participants	SPEAKER Climate SmartBuildings (CSB) Cell
RESILIENT, AFFORDABLE AND COMFORTABLE HOUSING THROUGH NATIONAL ACTION	10:30-11:00	Welcome Address & Trainer Introduction	Climate Smart Buildings (CSB) Cell
Training #09: Two-Day Training Programme on	11:00-11:15	н	GH-TEA
'Innovative Construction Technologies for Affordable Housing' Location: LHP Rajkot Date : 17 th & 18 th May 2022 , Tuesday & Wednesday Time : 10:00 AM to 5:00 PM	11:15-12:15	Session 1: LHP & It's Construction Technology, GHTC Brief on other LHP Construction Technologies. a) Monolithic Concrete Construction using Tunnel Formwork - Raikot,	Mr. Dinesh Patel [Trainer] Engineer - Third Party Quality Control at LHP Rajkot from IIT Madras [CUBE - Center for Urbanization, Buildings and Environment]
ABOUT THE TRAINING: The Ministry of Housing & Urban Affairs (MoHUA) in partnership with GIZ and Building Material and Technology promotion Council (BMTPC) is hosting series of trainings/workshops on Innovative Construction Technologies & Thermal Comfort for Affordable Housing named RACHNA (Resilient, Affordable and Comfortable Housing through National Action. The prime focus of this training is thermal comfort and its necessity in the affordable housing sector. The training covers the thermal		b) b) b) Precast Components assembled at Site - Chennai c) Prefabricated Sandwich Panel System - Indore, d) Precast Concrete Construction System - JD Volumetric - Ranchi e) Light Gauge Steel Structural System & Pre- engineered Steel Structural System - Agartala d) PVC Stay in Place Formwork System - Lucknow	
comfort basics, material influences, low-cost solutions & codes that are available in india to create Climate-Smart Buildings. The outcome of the training would be to make the stakeholders in the affordable housing sector understand the need for thermal comfort & urge them to include no cost or low-cost strategies in upcoming projects. JOIN US AT: LIGHT HOUSE PROJECT.	12:15-13:15	Session 2: Detailed Presentation on Construction Technology Process 9) See Excavation & Stabilization b) Column Laying & Structure C) Technology specific construction & other walling & roof component details d) Platering & Finishes e) Improving efficiency in construction	Mr. Dinesh Patel (Trainer) Enginee - Third Party Quality Control at LHP Rajkot from IIT Madra (2008 – Center for Urbanization, Buildings and Environment)
8P2P+MHV, Raiya Road,	13:15-14:00		NCH BREAK
Rajkot, Gujarat - 360005	14:00-16:00	Session 3: Vocational Training a) Practical Implementation (Showcasing On Site Building Construction through Tunnel Formwork)	Mr. Dinesh Patel [Trainer] Engineer - Third Party Quality Control at LHP Rajkot from IIT Madras [CUBE - Center for Urbanization, Buildings and Environment]
Mr.Winamra Negi; in_rajkot_giz_csbcell@pwc.com;	16:00-16:30	Question & Answer Session	Climate SmartBuildings (CSB) Cell
TARGET STAKEHOLDERS	16:30-16:35	Vote of Thanks	Climate Smart Buildings (CSB) Cell
**	16:35-17:00	End of I	nigh-tea Day
Training Program tailored for Contractors, Masons, Plumber, Electrician, Insulation Applicators, and the construction field Workers			

Agenda for RACHNA #9

Rachna on Twitter



Training #9 program proceedings on GHTC twitter handle





Awareness drive in architectural college



Date: 17th & 18th May 2022No of participants: 49Location:



About the Event

Ministry of Housing and Urban Affairs (MoHUA) in collaboration between its subsidiary unit Building Material and Technology Promotion Council (BMTPC), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), is hosting a series of trainings on Innovative Construction Technologies & Thermal Comfort for Affordable Housing under the banner name RACHNA (Resilient, Affordable and Comfortable Housing through National Action). The prime focus of this training is to make the Academicians and students aware about the latest technology i.e., Prefabricated Sandwich Panel system is being used at LHP, Indore, also about Thermal Comfort, Green Building Concept, Eco Niwas Samhita tool and standard.

Trainer's profile



Shri. Kaushal Lodaya has 10+ years of experience in Sustainable Building Design and its implementation. Being a mechanical engineer, he has post graduated as M.Tech. in Energy Management, with core areas of expertise in

designing of passive cooling system, energy efficient/ EPCO-friendly building designing, and green building certification. During his professional journey he has worked in implementation of Energy Conservation Building Code in Madhya Pradesh and policy reformations, net-zero building design & green building certification.



Brief event proceedings

Welcome address

Ms Disha Jain, GIZ-CSB Cell, started the event with an inspiring address that established the tone for the day, greeting all guests, faculties and students and giving them a glimpse of the sessions ahead. Ms Yashika Garg, from SOA, IPS Academy also welcomed the participants and highlighted the importance of the event.

Keynote Address:

Ms. Yashika Garg, Associate Professor, SOA in her address expressed her joy and happiness at being associated with the RACHNA initiative. She highlighted the key achievements of the institute. She enlightened about the courses, thesis work and ongoing projects and their key features. She also encouraged students and faculty to participate in such events, take advantage of the knowledge being imparted on the design compliance tools and standards and innovative construction technologies and how these can be adopted and replicated in future projects.

GIZ CSB introduction:

CSB Cell started this session with introduction of "RACHNA" program, Ministry of Housing and Urban Affairs (MoHUA), Mission – Housing for All, overview of PMAY(U) and Global Housing Technology Challenge. Further the participants were informed about GIZ, their association with MoHUA on the CSB project and its objectives. Further the team elaborated on the interpretation of the project objectives and the roles of the relevant stakeholders.

Technical sessions

The event covered the following technical sessions:

Session 1: Thermal Comfort in Affordable Housing & Passive Designs, Standards

Session 2: Eco Niwas Samhita Part 1 & 2, Compliance & Tool Demonstration

Session 3: Affordable Housing Design Challenge

Session 4: Design Challenge Judgment and Certificate Distribution

Outcome & impact of the event

During the event, all the participants were encouraged to register themselves as Technograhi, to get updates on more such initiatives in the future. The two-day event evoked great response from the 45 participants through interactive sessions. Further, the students were given a design challenge to apply the knowledge gained in the technical sessions.

Feedback from participants

The participants and Ms Manita Saxena (HOD – School of Architecture) appreciated the efforts put in by GIZ-CSB team and MoHUA for the successful completion of the event. They found the training informative and interesting in terms of learnings and its approach towards practical implementation. They also emphasized the need to organize more such events & training sessions for academicians. They also shared their eagerness to incorporate this training material as a part of their academic courses.



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THERMAL COMFORT FOR AFFORDABLE HOUSING* Location: SOAJPS Academy, Indore Date: 17 th & 18 th MAY 2022 Time: 10:30 AM to 5:00 PM ABOUT THE TRAINING: The Ministry of Housing & Urban Affairs (MOHUA) in partnership with GIZ and Building Material and Technology promotion Council (IDMTPC) is hosting series of trainings/workshops on innovative Construction Technologies & Thermal Comfort for Affordable Housing mend RACHAN (Resilient, Affordable and Comfortable Housing Intercupi National Action). The prime focus of this training is to make Architectural Students aware about the Thermal Comfort,		11 3044 - 12 00PM	Person 3. Reveal of the second seco	KSH Carl member / Trainer	
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Agenda for RACHNA #10

Rachna on Twitter



 $Training \ {\#10} \ program \ proceedings \ on \ GHTC \ twitter \ handle$

RACINA



Photographs taken during event #10





Awareness drive in architectural college



Date: 18th - 19th May 2022No of participants: 47Location:



About the Event

The Rachna awareness drive in Architecture college is organised for students and faculty interested in understanding the basics of thermal comfort needs and its applicability in affordable housing. Post training, the students will be able to design keeping thermal comfort aspect in mind and be equipped with monitoring and evaluating the impact to ensure thermal comfort in upcoming affordable housing is ensured. The training targeted architecture students of B. Arch and faculty.

Trainer profile



Mr. Abu Talha Farooqui is an Assistant Professor and the Assistant Dean for Internships and Industry interface at the Jindal School of Art & Architecture, Jindal Global University, Sonipat. He has practised and taught

architecture and design for 10 years and has headed design studios, theory & research courses, and sustainability related courses in his teaching career. He is also a BEE-Certified Master-Trainer for Energy Conservation Building Code of India and has trained professors and government officials across India for the implementation of ECBC.

Brief event proceedings

Welcome address

Prof. Nisar stressed on the need of integrating passive design measures to optimally utilize the limited natural resources and encouraged the future architects to understand the relationship between architecture and environment and learn design strategies to deliver comfortable living spaces responding to local climate conditions.





Prof. Zeba Nisar Dean, Faculty of Architecture, Planning and Design, Integral University, Lucknow delivered the welcome address

Technical sessions:

The event covered the following technical sessions:

Session 1: Overview of thermal comfort indices and passive strategies with case studies



Technical session in progress

Session 2: A brief about ENS Part 1 & ENS Part 2 with the same recommendations for LHP



Mr Abu Talah delivering the session on thermal comfort & ENS

Session 3: Design challenge theme & requirements for the students



The participants being introduced to the design challenge in the last session

Outcome & impact of the event

The event was attended by 40 students and 7 faculty members of the college. The training program saw a healthy discussion on real life situations related to costs of materials, timeline of projects and highlighted projects that are already using sustainable materials that have been ensuring thermally comfortable living environments for the occupants.

Feedback from participants

The participants found the sessions thorough and inspiring. They understood the importance of low cost thermally comfortable housing in India designed using passive strategies and really appreciated the interactive nature of the sessions and the quality of the content specifically designed for improving thermal comfort in affordable housing.



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Agenda for RACHNA #11



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Rachna on Twitter



GHTC INDIA @GhtcIndia · May 23 Under #RACHNA initiative of @MoHUA_India, a 2-day awareness programme was recently organised at Integral University, Lucknow on innovative #ConstructionTechnologies & #ThermalComfort for #AffordableHousing.



Training #11 program proceedings on GHTC twitter handle



Training #11 program proceedings on Housing For All twitter handle

RACINA



Vocational training for construction workers



Date: 19tNo of participants: 45Location:

: 19th May 2022 : 45 :



About the Event

The Rachna vocational training for construction workers was organised at SPR India Site, ARHC, Chennai, Tamil Nadu for contractors and masons to help them understand the basics of thermal comfort, its need and its applicability in affordable housing. The training was to educate masons, and contractors on the new construction technologies and building materials that are prevalent in affordable housing construction. The training targeted contractors, masons, insulation applicators and other field workers.

Trainer profile



Late Mr. Syed Fazlullah Khan worked as General Manager – Engineering, M/s. Pithavadian and Partners, Chennai. He was a Civil Engineer with over 3 decades of experience in the field of Project Planning & implementation,

Site supervision, and Techno-commercial Operations and Team supervision. He had done bachelor's in Science (Civil engineering) from Kensington University, US through NIST, Chennai (Distance Education). He was an impressive communicator with interpersonal, team building, techno-commercial negotiation, and presentation skills. He had worked on key projects for ETA Properties & Investments Pvt. Ltd., Shriram Properties Ltd., and Olympia Infratech Pvt. Ltd. He had been recognized by IPMA as a certified Project Manager and Royal Institute of Chartered Surveyors - MRICS.

Brief event proceedings

Welcome address

The training started with a keynote address from Mr. Martin, Head of the Safety and Admin



department from SPR ARHC. He gave an introduction of the entire training schedule and the highlighted the importance of this training to the participants. He also encouraged the masons to learn in depth about the new technology.



keynote address from Mr. Martin, Head of the Safety and Admin department from SPR ARHC

Technical sessions:

The event covered the following technical sessions:

Session 1: Overview of thermal comfort and LHP Technologies



Session on Thermal comfort underway

Session 2: Construction materials and Technology

Session 3: Precast technology brief and practical implementation on site



Technical session on new construction technologies in progress

Outcome & impact of the event

The event was attended by 38 contractors and masons from the site. The training program saw a healthy discussion amongst each other, the trainer and discusses real life situations related to costs of materials, timeline of projects and highlighted projects that are already using sustainable materials that have been ensuring thermally comfortable living environments for the occupants. The training would make the contractors, masons, and field workers expertise in the current technologies & best construction practices.

Feedback from participants

The participants found the sessions informative and inspiring. They were enlightened with the new technologies being used in India. They were eager to have more practical and hands on training sessions focusing on the new construction technologies.



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Agenda for RACHNA #12



Rachna on Twitter



Training #12 program proceedings on GHTC twitter handle



Training #12 program proceedings on Housing For All twitter handle









 Date
 : 19th - 20th May 2022

 No of participants
 : 30

 Location
 :



About the Event

The Rachna awareness drive in Architecture college is organised for students and faculty interested in understanding the basics of thermal comfort needs and its applicability in affordable housing. Post training, the students will be able to design keeping thermal comfort aspect in mind and be equipped with monitoring and evaluating the impact to ensure thermal comfort in upcoming affordable housing is ensured. The training targeted architecture students of B. Arch and faculty.

Trainer profile



Ms. Ragini Goswami has done her post-graduation in Environmental Architecture from Pune University, Maharashtra. She is an Architect and a certified Green Building Professional with more than 9 years of work

experience in providing specialized services to obtain green certifications under LEED, IGBC, GRIHA, EDGE and ECBC compliance for the buildings. She has earned credentials like IGBC AP and GRIHA CP and is also a BEE Certified ECBC Master Trainer. She has conducted more than 15 training programs in Chhattisgarh, Assam, Manipur, Meghalaya, Mizoram, Nagaland on ECBC 2017 code (Commercial building) and Eco-Niwas Samhita (ENS) code (Residential buildings) as a Master trainer.

Brief event proceedings

Welcome address

Shri Rahul Bose, Team member – CSB Cell, East Cluster, Agartala gave the welcome address to the students and spoke in detail about the various



initiatives of GIZ in India in the sustainability, clean energy & energy efficiency sectors.



Shri Rahul Bose, GIZ – CSB Cell, East Cluster, delivering the welcome address

He also shared the objectives of this project and its focus on climate resilience and thermal comfort in buildings constructed under Pradhan Mantri Aawas Yojana (Urban).

Further, he introduced the 6 Light House Projects being constructed across six states of the country with different technologies with the sole intention of providing homes within minimal time and cost along with high-quality of construction in a sustainable manner.

Technical sessions:

The event covered the following technical sessions:

Session 1: Overview of thermal comfort indices and passive strategies with case studies



technical session underway at the training

Session 2: A brief about ENS Part 1 & ENS Part 2 with the same recommendations for LHP



Students being taught about ENS codes and tools

Session 3: Design challenge theme & requirements for the students



Students working on the design challenge in groups

Outcome & impact of the event

The event was attended by 30 students and 7 faculty members. The training program raised discussions around costs of materials, timeline of projects and tested the knowledge of the participants through a design challenge exercise.

Feedback from participants

The participants found the sessions thorough and inspiring. They understood the importance of low cost thermally comfortable housing in India designed using passive strategies and really appreciated the interactive nature of the sessions and the quality of the content delivered in the training.





Agenda for RACHNA #13



Rachna on Twitter



Training #13 program proceedings on GHTC twitter handle





Training on emerging construction technologies & thermal comfort in Light House Projects for officers



Date No of participants Location

: 120th May 2022 : 82 :



About the Event

Ministry of Housing and Urban Affairs (MoHUA) in collaboration with Building Material and Technology Promotion Council (BMTPC), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and the State Urban Development Agency under the Urban Development & Municipal Affairs Department, Govt. of West Bengal organized a Training Workshop under the initiative of RACHNA (Resilient, Affordable and Comfortable Housing through National Action) on May 20, 2022, (Friday) at the Conference Hall, Subhanna, DF-8, Sector-I, Salt Lake City, Kolkata. The theme of the one-day training was Innovative Construction Technologies & Thermal Comfort for Affordable Housing.

Trainer profile



Trainer 01 – Shri Abhijeet Ghosh is an Energy Conservation Building Code (ECBC) Master Trainer. He has 36 years of professional experience in the field of Project Execution, Project Management, Quality

Control, Energy and Water Auditing, Green Building Technology including Energy Efficient material use. He also acts as a key resource person for the Bureau of Energy Efficiency, Ministry of Power, Govt. of India to impart trainings for Govt. and Industry professionals in different states of India on energy conservation and efficiency in building sector. Till date, he has trained more than 500 Engineers and Architects on the relevance of Energy Conservation Building Code and its applications.





Trainer 02 – Shri Saibal Saha has done post-graduation in Urban Environment Management & Law from the National Law University, Delhi. He holds above 28 years of industry experience. He is a BEE Certified Energy Auditor

and ECBC Master Trainer, GRIHA certified professional and is working as Third-Party Assessor for ECBC in Telangana and Andhra Pradesh. He is working on Building-Energy Efficiency, Green Building Certification, Energy –audits, and Environmental Management Plan for large construction (Buildings) projects. He has provided training on the implementation of the 'Energy Conservation Building Code of India' to different state government officials of the country, including more than 50 training and awareness programs on ECBC.

Brief event proceedings

Welcome address

Shri Supriya Ghoshal, WBCS(EXE), Director-State Urban Development Agency, (SUDA) started off the event with an inspiring address that established the tone for the day, greeting all dignitaries and attendees. He highlighted the progress achieved by the Banglar Bari/Housing For All (U) under PMAY scheme in the state.



Shri Supriya Ghoshal, WBCS(EXE), Director-SUDA delivering the welcome address

Keynote Address:

Shri Biswajit Das – Chief Engineer - Municipal Engineering Directorate, Govt. of West Bengal, Kolkata in his special address highlighted that the adoption of newer technologies into the mass housing sector is the need of the hour. He urged the officials present from his department to take note of the learnings from the training program and see how they can put it into practice and build houses that are thermally comfortable with ease of living.



Shri Biswajit Das delivering the keynote address

GIZ CSB introduction:

Shri Govinda Somani, Technical Expert, GIZ-Climate Smart Buildings Project, began his presentation by highlighting the key initiatives of GIZ in India in the sustainability, clean energy & energy efficiency sectors. Further, he highlighted that apart from creating awareness about the innovative construction technologies, a major objective of hosting RACHNA Training programme throughout the country is to aim towards the capacity development of the relevant stakeholders involved in the mass housing sector.



Mr Govinda Somani, GIZ- CSB Project, introducing the project

Technical sessions:

The event covered the following technical sessions:



Session 1: Importance of Thermal Comfort

Session 2: Thermal Comfort models: Standards, Codes and Building Materials

Session 3: New age innovative technologies along with the 6 LHP construction technologies

Session 4: EcoNiwas Samhita (ENS) part 1 &2 and its compliances

Session 5: Low Energy Comfort Systems, Star Labelling and Best Practices

Outcome & impact of the event

The day-long event evoked great responses from over 82 participants from various government departments, building industry stakeholders & professionals from academia as they were trained on Innovative Construction Technologies & Thermal Comfort for Affordable Housing. Some glimpses of the training program were also simultaneously streamed on the official Facebook page of the Housing for All-Banglar Bari - Govt. of West Bengal.

Feedback from participants

The participants found the sessions insightful. They understood the importance of thermal comfort in buildings and its impact on the occupants. Further they understood the role of building materials, passive design strategies in making a building comfortable and latest construction technologies available in the market. Shri Govinda Somani, Technical Expert -GIZ applauded all the authorities and staff from the PMAY (U) Team, CSB Cell Team members, the BMTPC Team, and the volunteers involved for their active efforts in the overall coordination and arrangement of this event.



The session was interactive with questions & discussions coming from the participants



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Agenda for RACHNA #14

Rachna on Twitter



Training #14 program proceedings on twitter handle





Awareness drive in architectural college



Date No of participants Location

: 24th – 25th May 2022 : 46 :



About the Event

The two-day training program was organised for the budding Architects of North Eastern Hill University (NEHU), Shillong, Meghalaya interested in understanding the basics of thermal comfort needs and its applicability in affordable housing. Post training, the students will get the exposure climate smart building designs will be able to implement the techniques in their designs. The intent of the training was Capacity Building & knowledge transfer about the 'Innovative Construction Technologies used in LHPs & Thermal Comfort for Affordable Housing' with a design submission on thermally comfortable affordable housing. The event was attended by the 46 enthusiastic students from the department of Architecture along with their subject professors.

Trainer profile



Smt. Ragini Goswami is an Architect and a certified Green Building Professional with more than 9 years of work experience in providing specialized services to obtain green certifications under LEED, IGBC, GRIHA, EDGE

and ECBC compliance for the buildings. She has earned credentials from IGBC AP and GRIHA CP and BEE as Certified ECBC Master Trainer. She has conducted more than 15 training programs in Chhattisgarh, Meghalaya, Manipur, Meghalaya, Mizoram, Nagaland on ECBC 2017 code (Commercial building) and Eco-Niwas Samhita (ENS) code (Residential buildings) as a Master trainer.


Brief event proceedings

Welcome address

Shri L Joyprakash Singh, Dean - School of Technology, NEHU, opened the event with an inspiring message that set the tone for the day, introducing all dignitaries and participants and providing a quick overview of the session. he highlighted that this training is designed specifically for delivering advanced knowledge of passive building design for thermal comfort in affordable housing.



Shri L Joyprakash Singh, Dean - School of Technology, NEHU delivered the welcome address

GIZ CSB introduction:

Shri Rahul Bose, Team member – CSB Cell, East Cluster, Agartala spoke in detail about the various initiatives of GIZ in India in the sustainability, clean energy & energy efficiency sectors. He also shared the objective of introducing this project to introduce climate resilience and thermal comfort in buildings constructed under Pradhan Mantri Aawas Yojana (Urban). Further, he informed the participants about the six Light House Projects of the country with different technologies with the intention of providing homes within minimal time and cost.



Rahul Bose, Team member – CSB Cell, giving the project introduction

Technical sessions:

The event covered the following technical sessions:

Session 1: Session 1: Thermal Comfort:

- Indices
 - b) Thermal comfort in Affordable Housing,
 - c) Passive strategies and building physics.

Session 1 (cont.): Thermal Comfort Models:

- Thermal Comfort Standards i. IMAC and ii ASHRAE
- Effects of materials on Thermal Comfort
- Case Studies and Best Practices.

Session 2: Eco Niwas Samhita-1, Eco Niwas Samhita-2

Session 2 (Cont.):

- ENS 2021 Compliance
- ENS Compliance Tool
- Recommendations to design Affordable Housing Projects
- Case Studies

Session 3: Affordable Housing Design Challenge

- Design Problem Introduction
- Grouping
- Design Challenge Exercise

Session 4: Design challenge judgement and winner announcement.



The participants being introduced to the design challenge



Outcome & impact of the event

The event was an amalgamation of theoretical, design & compliance knowledge along with practical facets. With the help of presentations and design challenge sessions students got the exposure of implementing thermal comfort standards in their designs. Technical application of the standards helped them to learn and get in-depth knowledge about Thermal Comfort Principles.



Students working in groups on the design challenge

Feedback from participants

The participants found the sessions thorough and inspiring. They understood the importance of affordable thermally comfortable housing in India. With the help of hands-on training and implementation exercise students understood the basic concept of Thermal Comfort. Evaluation of design challenge was successfully executed. Shri Banbhalang Swer, Professor -Architecture, NEHU ended the session with the vote of thanks.



The students and faculty participated actively in the event

He applauded MoHUA team, GIZ team, CSB Cell Team members and the volunteers involved for their active efforts in the overall coordination and arrangement of this event. He was also extremely delighted to understand that Light Gauge Steel Frame technology that is being implemented at LHP Agartala.



The event was well attended by students of Architecture.





Agenda from RACHNA #15

Rachna on Twitter



Training #15 program proceedings on GHTC twitter handle

RACINA



Vocational training for construction workers



Date: 25th - 26th May 2022No of participants: 70Location:



About the Event

The Rachna vocational training was organised for contractors and masons to help them in understanding the basics of thermal comfort, its need and applicability in affordable housing. The training is to educate masons, and contractors on the new construction technologies and building materials that are prevalent in affordable housing construction. The training targeted contractors, masons, insulation applicators and other field workers.

Trainer profile



Trainer 01 –Mr. Munish Nassa, Consultant at BMTPC under the Ministry of Housing and Urban Affairs, is qualified in Civil Engineering and has 26 years of professional experience in spheres of residential, commercial,

and industrial large-scale projects including structural steel highrise sculptures & buildings, infrastructure development. He also has vast experience in the areas of project planning, execution, scheduling, materials management, and budgeting of projects.



Trainer 02 –Mr. Girish K Kuttan, Project Manager with JAM Sustainable LLP is a B-tech in Civil Engineering and has more than twenty years of experience in the field of Civil Engineering. He has an extensive understanding

of Costing- Estimation Coordination and the development of construction strategies.



He is currently working as Project Manager at Light House Project, Lucknow, under Global Housing Technology Challenge-India the initiative of the Ministry of Housing and Urban Affairs, Government of India.

Brief event proceedings

Welcome address

The training started with a welcome address from Mr. Munish Nassa who encouraged and motivated all the participants to not only understand and learn the technical aspects of the new innovative technologies but simultaneously also acquire and strictly follow the safety norms while incorporating these new technologies in their current and future projects.



Welcome address by Mr. Munish Nassa

Technical sessions:

The event covered the following technical sessions:

Session 1: Overview of thermal comfort and LHP Technologies

Session 2: Construction materials and Technology

Session 3: Precast technology brief and practical implementation on site

Outcome & impact of the event



Technical session underway

The event was attended by 70 contractors and masons from the site. The training program saw a healthy discussion amongst participants related to costs of materials, timeline of projects and highlighted projects that are already using sustainable materials that have been ensuring thermally comfortable living environments for the occupants.



The construction workers learning about new construction technologies

Feedback from participants

The participants found the sessions thorough and inspiring. They were introduced to the new technologies being used in India. They were given practical and hands on training focusing on the new construction technologies during the site visit.



The participants were encouraged to share feedback & questions



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Agenda for RACHNA #16



Rachna on Twitter



Training #16 program proceedings on GHTC twitter handle





Vocational training for construction workers



Date : No of participants : Location :

: 26th & 27th May 2022 : 40



About the Event

The Rachna vocational training was organised for construction workers to help them in understanding the basics of thermal comfort , its need and applicability in affordable housing. The training aimed to educate masons, and contractors on the new construction technologies and building materials that are being used in affordable housing construction. The training targeted contractors, masons, insulation applicators and other field workers. It covers the technical aspect and practical application of the technology and also includes system and materials that are being used. The prime focus of this training is to make the construction field workers aware about the latest technology i.e., 3D Volumetric Precast Construction Technology system is being used at LHP, Ranchi

Trainer profile



Shri Lakshman Varma R has 15 years of experience managing projects of various sizes and scales for reputed national organizations. He is currently working with Magicrete Building Solutions as the Assistant General

Manager, where he oversees all the facilities and services essential to the construction of the Light House Project at Ranchi. A strong proponent of the precast technology, some of his notable projects include spearheading the construction 100+ Precast Bus Shelters, Bridges and earthwork embarkment in Andhra Pradesh and Odisha for Indian Railways and a series of 'Baalika Sauchalaya' in five districts of Andhra Pradesh's Government Schools. A graduate of JNTU Hyderabad with a degree in civil engineering, his passion for quality control and



surveying on large-scale projects stands out among his many other skills

Brief event proceedings

Welcome address

Sri Ramesh Kumar, LHP Site Engineer – BMTPC delivered the welcome address by highlighting that this is the most important training category out of all under RACHNA, as the vocational workers are the ones who are in the forefront of the construction on any site, and they need to be upskilled from time to time.



Sri Ramesh Kumar, LHP Site Engineer – BMTPC delivered the welcome address

Keynote address

Shri Lakshman Varma - Asst Manager - LHP Ranchi, SGC Magicrete LLP briefly highlighted the technology used at LHP Ranchi and showcased a series of short videos giving an introduction of the Light House Project, Ranchi.



Shri Lakshman Varma - Asst Manager - LHP Ranchi, SGC Magicrete LLP giving the keynote address

Special address

Shri Vitrang Sompura, Project Manager - LHP Ranchi – SGC Magicrete LLP delivered an inspiring special address and briefed about the journey of construction progress of LHP Ranchi. He discussed in depth about the unique features of the 3D Volumetric Precast Construction Technology and highlighted further that the design life of this project is 50-60 years which is almost twice the conventional system in use in the country.



Special address by Shri Vitrang Sompura, Project Manager -LHP Ranchi

Technical sessions

The event covered the following technical sessions:

Session 1: Overview of thermal comfort and LHP Technologies

Session 2: Construction materials and Technology

Session 3: Vocational training - 3D Volumetric precast concrete construction and practical implementation on site

Outcome & impact of the event

The two-day vocational training event aimed at the capacity development and skill enhancement of construction workers, masons, labourers, and site officials. The event was attended by 40 participants and they appreciated the program content very much. The training would make the contractors, masons, and field workers gain expertise in the current technologies & best construction practices.

Feedback from participants

The participants found the sessions thorough and inspiring. They were introduced to new technologies being used in India. They appreciated the practical and hands on training session focusing on the new construction technologies.



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Agenda for RACHNA #17

Rachna on Twitter



Training #17 program proceedings on GHTC twitter handle

RACINA



Photographs captured during the event #17





Training on emerging construction technologies & thermal comfort in Light House Projects for officers



Date No of participants Location : 30th June 2022 : 50 :

one-day training was 'Innovative Construction Technologies & Thermal Comfort for Affordable Housing'.



About the Event

Ministry of Housing and Urban Affairs in collaboration with Building Material and Technology Promotion Council (BMTPC) & Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) organized this Training –Programme under the initiative RACHNA (Resilient, Affordable and Comfortable Housing through National Action) on June 30, 2022 at Karnataka Engineering Services Association, KR Circle. Bengaluru, Karnataka. The theme of the

Trainer profile



Trainer 01 – Mrs. Rathnashree Prakash started her sustainability career as an energy modeler in 2008. Today, with more than 13 years of experience in the field of sustainability, she is part of the journey of the growth of the

green building sector in India. She has worked on more than 500 detailed energy modelling analyses for IGBC, LEED, and GRIHA rating systems. She also carries expertise in shading and sun path analysis, lighting simulations, and other predesign and design phase assessments which have supported clients and design teams in making design decisions. She has the capabilities to carry out Life cycle assessments for Buildings. As a unique contribution, she has worked on developing the web tool for a catalogue of replicable residential building designs.





Trainer 02 – Ms Neha V Vyas is the Founder of Enverte Consultancy, a greenbuilt environment design consultancy that she started in 2021. She is an Architect and Green Building Consultant with 10+ years of experience

in Green Building Certification, Green Building Design Solutions, Sustainable and Energy efficient buildings. Her expertise ranges from design to execution of green buildings and green building certification projects. She has worked on over fifty Green Building Certification projects for LEED, IGBC, and GRIHA. She holds M. Arch in Sustainable Architecture from Bharathi Vidyapeeth University, Pune, and B. Arch from Mumbai University. She is a Registered Architect with COA-India, BEE Certified ECBC Master Trainer, LEED AP(ID+C), IGBC AP, and GEM CP.

Brief event proceedings

Welcome address

Mr. Selvarasu, Team Lead, Climate Smart Buildings started off the event with an inspiring address that established the tone for the day, greeting all dignitaries and attendees and giving them an overview of the sessions ahead.



Lamp lighting by the dignitaries

GIZ CSB introduction:

Govinda Somani, Technical Expert, GIZ spoke at length about the various initiatives of GIZ in India in the sustainability, clean energy & energy efficiency sectors followed by a short presentation on the 'Climate Smart Buildings' project. He also shared the objective of the project as 'to increase climate resilience and thermal comfort in buildings constructed under Pradhan Mantri Aawas Yojana (Urban).

Technical sessions:

The event covered the following technical sessions:

Session 1: Importance of Thermal Comfort



Technical session on Thermal comfort underway

Session 2: Thermal Comfort models: Standards, Codes and Building Materials

Session 3: New age innovative technologies along with the 6 LHP construction technologies

Session 4: Eco-Niwas Samhita (ENS) part 1 & 2 and its compliances



Technical session on cooling systems underway

Session 5: Low Energy Comfort Systems, Star Labelling and Best Practices

Outcome & impact of the event

The day-long event evoked great responses from over 50 participants from various government departments, building industry stakeholders, professionals and academia as they were trained on 'Innovative Construction Technologies & Thermal Comfort for Affordable Housing'.



Feedback from participants

The participants found the sessions insightful. They understood the importance of thermal comfort in buildings and its impact on the occupants. Further they understood the role of building materials, passive design strategies in making a building comfortable and latest construction technologies available in the market.



Photos captured at the event





Agenda for RACHNA #18

Rachna on Twitter



Training #18 program proceedings on GHTC twitter handle





Training on emerging construction technologies & thermal comfort in LHPs for practitioners



Date No of participants Location : 26th & 27th May 2022 : 86 :



About the Event

Ministry of Housing and Urban Affairs (MoHUA) in collaboration with Building Material and Technology Promotion Council (BMTPC) & Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), hosted a series of trainings on Innovative Construction Technologies & Thermal Comfort for Affordable Housing under the banner name RACHNA (Resilient, Affordable and Comfortable Housing through National Action). The focus of this training is thermal comfort and its necessity in the affordable housing sector. The training covers the thermal comfort basics, material influences, low-cost solutions & codes that are available in India to create Climate-Smart Buildings.

Trainer profile



Shri. Kaushal Lodaya has 10+ years of experience in Sustainable Building Design and its implementation. Being a mechanical engineer, he has post graduated as M.Tech. in Energy Management, with core areas of expertise in

designing of passive cooling system, energy efficient/ EPCO-friendly building designing, and green building certification. During his professional journey he has worked in implementation of Energy Conservation Building Code in Madhya Pradesh and policy reformations, net-zero building design & green building certification.



Brief event proceedings

Welcome address

Ms Disha Jain started off the event with an inspiring address that established the tone for the day, greeting all dignitaries and attendees and giving them a glimpse of the session.

Keynote Address

IAS Ms Bhavya Mittal, (Additional Commissioner, IMC) in her address expressed her views towards adoption of the technology. She was keen to interact with the participants and to know about the expected take aways from the training session. Also, as professionals, practitioners, academicians she encouraged the participants to support such initiatives taken towards adoption of the technology in local construction market.

Theme Address

Mr. Mahesh Sharma, (Superintendent Engineer, PMAY, IMC) in his address expressed his joy and happiness by highlighting the key milestones achieved by the IMC. He shared about the ongoing Projects and their key features. He also encouraged attendees to participate in such events and enhance their knowledge on new technologies.

GIZ CSB introduction

CSB Cell started this session with introduction of "RACHNA" program, Mission – Housing for All, overview of PMAY(U) and Global Housing Technology Challenge. The participants were informed about GIZ, their association with Indian Govt on different projects, about Climate Smart Building program and CSB cell initiative, project objectives and the team experts involved. Further the team elaborated on interpretation of the project objectives and the roles of the relevant stakeholders.

Technical sessions

The event covered the following technical sessions:

Session 1: Thermal Comfort in Affordable Housing & Passive Designs

Session 2: Thermal Comfort Standards & Materials Effect on Thermal Comfort

Session 3: New age innovative technologies along with the 6 LHP construction technologies

Session 4: Green Building Concept

Session 5: Eco Niwas Samhita 2021

Session 6: Eco Niwas Samhita – 2021 Compliance & Tool Demonstration

Session 7: Eco Niwas Samhita 2018

Session 8: BEE Star Labelling for Residential Buildings and Indian & International Best Practices

Outcome & impact of the event

During the event, all the participants were encouraged to register themselves as Technograhi and 50+ registrations were done. The day-long event evoked great responses from over 80 participants from various government departments, building industry stakeholders & professionals from academia and they were trained on Innovative Construction Technologies & Thermal Comfort for Affordable Housing.

Feedback from participants

The participants found the sessions insightful. They understood the importance of thermal comfort in buildings and its impact on the occupants. Further they understood the role of building materials, passive design strategies in making a building comfortable and latest construction technologies available in the market. Mr. Mahesh Sharma (Superintendent Engineer, PMAY, IMC) appreciated the efforts put in by CSB Cell members towards successful completion of the event. He shared his experiences on the event, found it informative and interesting in terms of practical learnings.





Agenda for RACHNA #19

Rachna on Twitter



Training #19 program proceedings on GHTC twitter handle

Compendium of Trainings & Workshops

RACINA



Photographs taken during event #19





Vocational training for construction workers



Date: 30th & 31st May 2022No of participants: 41Location:



About the Event

The Rachna vocational training was organised for construction workers interested in understanding the basics of thermal comfort, its need and its applicability in affordable housing. The training aimed to educate masons, and contractors on the new construction technologies and building materials that are prevalently used in affordable housing construction. The training targeted contractors, masons, insulation applicators and other field workers. The training covers the technical aspect and practical application of the technology, also includes system and materials that are being used. The prime focus of this training is to make the construction field workers aware about the latest technology i.e., 3D Volumetric Precast Construction Technology system is being used at LHP, Ranchi.

Trainer profile



Shri Ashish Sharma earned his B.Tech in civil engineering from UPTU, and he is now employed at the Magicrete Building Solutions as the Deputy Manager-Production for Ranchi's Light House Project. With a total of six

years of experience in the precast industry, his responsibilities include, maintaining the precast element production cycle, planning, and scheduling the work, assuring the job's quality, and managing the materials in the most efficient and economical ways. After spending months closely studying the precast construction systems, he believes that his goal is to produce high-quality work that will speak for itself. Additionally, he enjoys creating content about the many unexplored aspects of precast



construction technology, as well as how it is used in mass housing and industrial settings.

Brief event proceedings

Welcome address

Sri Ramesh Kumar, LHP Site Engineer – BMTPC delivered the welcome address by highlighting that this is the most important training category out of all under RACHNA, as the vocational workers are the ones who are in the forefront of the construction on any site, and they need to be upskilled from time to time.



Sri Ramesh Kumar, LHP Site Engineer – BMTPC delivered the welcome address

Keynote address

Shri Lakshman Varma - Asst Manager - LHP Ranchi, SGC Magicrete LLP briefly highlighted the technology used at LHP Ranchi and showcased a series of short videos which giving an introduction of the Light House Project, Ranchi.



Shri Lakshman Varma - Asst Manager - LHP Ranchi, SGC Magicrete LLP delivered the keynote address

Special address

Shri Lakshman Varma, Asst. Project Manager – LHP Ranchi – SGC Magicrete LLP took a special session where he interacted with the participants about their learnings from the day-1 before moving ahead to highlight the key elements of the technology in use at the LHP Ranchi site. He also guided them about the vast opportunities in the field of innovative construction technology and mass housing.



Shri Lakshman Varma, Asst. Project Manager –LHP Ranchi – SGC Magicrete LLP delivered the special address

Technical sessions

The event covered the following technical sessions:

Session 1: Overview of thermal comfort and LHP Technologies

Session 2: Construction materials and Technology

Session 3: Vocational training - 3D Volumetric precast concrete construction and practical implementation on site

Outcome & impact of the event

The two-day vocational training event aimed at the capacity development and skill enhancement of construction workers, masons, labourers, and site officials. The event was attended by 41 participants and they appreciated the program content very much. The training would make the contractors, masons, and field workers gain expertise in the current technologies & best construction practices.

Feedback from participants

The participants found the sessions thorough and inspiring. They were introduced to the new technologies being used in India. They appreciated the practical and hands on training sessions focusing on the new construction technologies.



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Agenda for RACHNA #20

Rachna on Twitter



Training #20 program proceedings on GHTC twitter handle

RACINA



Photographs captured during event #20

RACINA



Training on thermal comfort for officers



Date: 31st May 2022No of participants: 22Location:

n : Bhubaneshwar, Odisha

About the Event

The Rachna Training on thermal comfort for officers was organised for professionals interested in understanding the basics of thermal comfort needs and its applicability in affordable housing. Post training, the professionals would be equipped to design polices on thermal comfort and tools for monitoring and evaluating the impact of thermal comfort in upcoming affordable housing. The training targeted Senior officials having degree in engineering or architecture and serving in (a) Urban Local Bodies (b) State government and (c) Central government departments engaged in the development of affordable housing under various government schemes, officials dealing with implementation of codes and policy related to thermal comfort, energy efficiency and affordable housing.

Trainer profile



Prof. Rajan Rawal is an architect by training and is a senior advisor at Centre for Advanced Research in Building Science and Energy (CARBSE), and a CRDF Professor at CEPT University. He was Executive Director of

CARBSE between 2006 and 2021. He worked with Vastu Shilpa Foundation for Studies and Research in Environmental Design before joining Faculty of Design, CEPT University, Ahmedabad. He taught design and construction courses as part of the undergraduate program. He now teaches energy efficient built environment, energy policy, energy modelling and simulations at postgraduate level.



Brief event proceedings

Welcome address

The training started with a welcome address by Dr. Rajan Rawal, Senior Advisor, CARBSE, CEPT university. Followed by an overview of the training by Ms. Palak Patel. Mr. Rajan highlighted

that the current Rachna training is designed specifically for govt. officers who will be instrumental in developing new policies and complement implementation of policies through advanced knowledge of passive building design for thermal comfort in affordable housing.



Welcome address by Dr Rajan Rawal

GIZ CSB introduction

This was followed by the introduction of Climate Smart buildings delivered by Mr. Abdullah Siddiqui from GIZ team. The introduction session gave an overview of PMAY(U) and the GIZ-CSB initiative, the project objectives and the team experts involved. He highlighted that GIZ on behalf of The Federal Ministry of Economic Cooperation and Development (BMZ), Germany, and in cooperation with the Ministry of Housing and Urban Affairs, Government of India aims to foster sustainability in built environment to use sustainable materials for Thermal comfort and in turn improve the environment and climate conditions.

Technical sessions

The event covered the following technical sessions:

Session 1: Importance of Thermal Comfort

Session 2: Affordable Housing Passive Design Strategies

Session 3: Building Materials and Methods of Construction for Affordable Housing

Session 4: Building Codes, Affordable Housing and Thermal Comfort

Session 5: Application of Thermal Comfort in Affordable Housing- Case Studies

Session 6: Overview of Innovative construction technologies implemented in Light House Projects (LHPs)

Outcome & impact of the event



Dr Rajan Rawal made the technical session interactive & interesting

The event was attended by 19 government officials and 3 practitioners from energy and architectural domain. These officials represented organisations such as SDA Odisha, Odisha Urban Housing Mission, Behrampur Municipal Corporation, Odisha state police housing and welfare corporation, smart city corporation, Bhubaneshwar development authority etc. The training program saw a healthy discussion around real life situations related to costs of materials, timeline of projects and highlighted projects that are already using sustainable materials that have been ensuring thermally comfortable living environments for the occupants.



Feedback from participants

The participants found the sessions thorough and inspiring. They understood the importance of low cost thermally comfortable housing in India designed using passive strategies and really appreciated the interactive nature of the sessions and the quality of the content specifically designed for improving thermal comfort in affordable housing in India.



Dr Rajan explaining the concepts of thermal comfort





Agenda of RACHNA #21

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Rachna on Twitter



Odisha & Rajasthan recently hosted 2 trainings under #RACHNA for Govt officials in Bhubaneswar & Jaipur. Both events focused on innovative construction technologies & #ThermalComfort in #AffordableHousing & saw huge participation from officials of different Govt organisations.



Training #21 program proceedings on GHTC twitter handle





Vocational training for construction workers



Date: 2nd & 3rd June 2022No of participants: 46Location:



About the Event

RACHNA The Vocational training for workers designed for construction was professionals who are mostly engaged onsite and interested in vocational trainings on thermal comfort as well as hands-on experience on the building site. Following the training, the field experts would be able to exhibit their hands-on expertise at various construction sites while also expanding their skill set by learning innovative techniques and requirements for

improving thermal comfort in residential structures. The training was attended by 46 various field professionals and construction workers such as masons, contractors, painters and site supervisors.

Trainer profile



Mr. Jaydip Patel is currently engaged as a Site Engineer from Building Material Technology Promotion Council at Demonstration Housing Project Hathijan, Ahmedabad for last 1 Year and 7 Months. He has a total experience of 7

years in Project Management Consultancy work in building construction sector and has good experience in the field of precast technology related construction. His work at Demonstration Housing Project site at Ahmedabad entails, Project Execution, Document Preparation, Building Material Testing, Site Management, Liaison & Coordination, Site Management, Budget Control and preparing Construction Progress Reports and Project Appraisal Reports.



Brief event proceedings

Welcome address

All the participants were welcomed at the Demonstration Housing Project, Ahmedabad, post completion of a registration process by taking their initials in the participants list.

The Training Program was formally started by Mr. Kanishk Bhatt, Architect Consultant -Climate Smart Buildings Cell, GIZ, by warmly welcoming all the participants and introducing RACHNA. Mr. Jaydip Patel, Site Engineer DHP Ahmedabad, Building Materials & Technology Promotion Council (Government of India) welcomed the training program attendees and appreciated the initiative by MoHUA, BMTPC and GIZ of imparting training and dissemination knowledge regarding advanced of and innovative construction technology to the Construction Workers through these training programs.

GIZ CSB introduction

Continuing after the Welcome Address, Mr. Kanishk Bhatt gave a brief introduction of the Training Program to the participants.



Mr. Kanishk Bhatt gave a brief introduction of CSB project

In line with the theme of the Training Program, he apprised the participants about the flagship missions towards urban transition, by Ministry of Housing and Urban Affairs (MoHUA) – GoI, Pradhan Mantri Awas Yojana (Urban), Global Housing Technology Challenge-India (GHTC-India), Indo-German Energy Programme & Climate Smart Buildings Cell at West Cluster, and their key activities.

Technical sessions

The event covered the following technical sessions:

Session 1: Brief introduction of New Age Construction Technology employed at 6 LHPs

- Monolithic Tunnel Formwork Technology LHP Rajkot
- Prefabricated Sandwich Panel System LHP Indore
- Precast Concrete Construction System Precast Components Assembled at site – LHP Chennai
- Precast Concrete Construction System 3D Volumetric – LHP Ranchi
- Light Gauge Steel Structural System & Pre

 engineered Steel Structural System LHP
 Agartala
- PVC Stay in Place Formwork System LHP Lucknow

Session – 2: Detailed Technical Presentation on construction technology of LHP Rajkot [Monolithic Concrete Construction using Tunnel Formwork]

- Construction Process at LHP Rajkot:
- Site Excavation and Stabilization
- Column Laying & Structure
- Technology specific construction & other walling & roof components details
- Plastering & Finishes



The participants gaining knowledge on new construction technologies



Session – 3: Site visit for the participants showcasing on-site Building Construction through Tunnel Formwork



The participants asking questions during the session

Outcome & impact of the event

The two-day event was attended by 46 construction workers and the attendees found the training helpful as it enhanced their knowledge about new construction technologies in the market. In addition to that, they got the exposure of visiting the live site where the demonstrations are taken up. This helped them to see and understand the techniques in a better way. With this initiative, not only did they gain theoretical knowledge about the new construction technologies but also seen the practical implementation of the technology. Following the sessions, several questions were asked by the trainers related to the trainings provided.



The sessions included learning on the site

The intent was to analyse the level of understanding and construction knowledge of the attendees.

Feedback from participants



A group photo captured at the conclusion of the event

The two - daylong event addressed topics on Innovative Construction Technologies being deployed at Light House Projects and construction process of DHP Ahmedabad as per the "Integrated Hybrid Solution-One (HIS-One)". The training was beneficial in order to educate them about the latest construction technologies which are being used in the country. Mr. Jaydip Patel, Site Engineer DHP Ahmedabad, Building Materials & Technology Promotion Council, delivered the vote of thanks and applauded the initiative by MoHUA - GIZ to bring the concept of training the construction workers at the ground level about the latest construction technologies in the Affordable Housing sector, thus providing an opportunity to learn and keeping up to date with the latest trends in the construction sector free of cost.



A group photo captured at the conclusion of the event





Agenda for RACHNA #22

Rachna on Twitter



Training #22 program proceedings on GHTC twitter handle





Training on thermal comfort for practitioners



Date: 15-16 July 2022No of participants: 28Location:



About the Event

The Rachna training on thermal comfort for practitioners was organised for professionals interested in understanding the basics of thermal comfort needs and its applicability in affordable housing. Post training, the participants were equipped with tools and know-how to design and evaluate affordable housing that provides enhanced thermal comfort. The training targeted practitioners having degree in engineering or architecture and serving in (a) Urban Local Bodies (b) State government and (c) Central government departments engaged in the development of affordable housing under various government scheme and practicing architects, civil engineers, and urban planners.

Trainer profile



Trainer01–Prof. Rajan Rawal is an architect by training and is a senior advisor at Centre for Advanced Research in Building Science and Energy (CARBSE), and a CRDF Professor at CEPT University. He was Executive Director of

CARBSE between 2006 and 2021. He worked with Vastu Shilpa Foundation for Studies and Research in Environmental Design before joining Faculty of Design, CEPT University, Ahmedabad. He taught design and construction courses as part of the undergraduate program. He now teaches energy efficient built environment, energy policy, energy modelling and simulations at postgraduate level.

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Trainer 02 – Prof. Anand Achari is an architect teaching graduate and postgraduate courses in architecture for 18 years. The primary focus of his teaching domain is on environmental architecture and sustainability. He is the

principal at Vivekanand Education Society's College of Architecture, Mumbai, Maharashtra. He was the Head of the Department of Post Graduate course at Rizvi College of Architecture for 7 years.

Prof. Anand is practicing green building certification in India for 10 years. He has certified many buildings under USGBC, IGBC, and GRIHA. He has credentials in IGBC AP, GRIHA Trainer, EDGE Auditor, Expert, and ECBC Master Trainer. Registered with Council of Architecture - India, Fellow at Indian Institute of Architects, and a member of World Society of Ekistics, Greece, he has a Ph.D. from IIT Bombay in Climate Studies.

Brief event proceedings



Dr Rajan Rawal delivering the welcome address

Welcome address

The training program began with a welcome address given by Dr. Rajan Rawal, senior advisor at CARBSE, CEPT university who welcomed all the participants and gave a brief introduction to the Rachna initiative. Dr. Rajan highlighted that the current Rachna training is designed specifically for practicing professionals who post training would be equipped with tools and know-how to design and evaluate affordable housing using advanced knowledge of passive building design for thermal comfort in affordable housing.

Introduction to GIZ-CSB

Mr. Govinda Somani from GIZ gave an overview of PMAY(U) and the GIZ-CSB project, its objectives and the team experts involved. He highlighted that GIZ on behalf of The Federal Ministry of Economic Cooperation and Development (BMZ), Germany, and in cooperation with the Ministry of Housing and Urban Affairs, Government of India aims to foster sustainability in built environment using sustainable materials for Thermal comfort and in turn improve the environment and climate conditions.

Technical sessions:



Technical sessions underway

The event covered the following technical sessions:

Session 1: Importance of Thermal Comfort

Session 2: Building Physics and its relationship with Thermal comfort

Session 3: Fundamentals of Thermal Comfort

Session 4: Affordable Housing Passive Design Strategies

Session 5: Building Materials and Methods of Construction for Affordable Housing

Session 6: Building Codes, Affordable Housing and Thermal Comfort



The participants were a varied group of professionals

Session 7: Application of Thermal Comfort in Affordable Housing- Case Studies

Session 8: Thermal Comfort Study Methods

Session 9: Low Energy cooling Technologies and Comfort

Session 10: Overview of Innovative construction technologies implemented in Light House Projects (LHPs)

Outcome & impact of the event

The event was attended by 28 practicing professionals coming from several reputed building design, energy and architecture firms. The participants discussed real life situations related to costs of materials, timeline of projects and highlighted projects that are already using sustainable materials that have been ensuring thermally comfortable living environments for the occupants. Govt. officials present shared their experience in implementing the PMAY(U) scheme across India related to costs, material choices, timeline and central assistance.

Feedback from participants

The participants found the sessions thorough and inspiring. They understood the importance of low cost thermally comfortable housing in India designed using passive strategies and really appreciated the interactive nature of the sessions and the quality of the content specifically designed for improving thermal comfort in affordable housing.



4 The participants found the content engaging and relevant



Target Stakeholders			1\$h1\$-15h00	Session S: Affordable Housing Passive Design Strategies	Ahand Athari	
-		-	16h00-16h15	Questions and Answers		
0			10h15- 10h3	2. Health Break		
) (AAA) (HAAA)	$\bigcirc \bigcirc \bigcirc$	16h30 - 17h	5 Section & Building Materials and Mathods of Construction for Affordable Housing	Anand Azhari	
	Contraction of the second		17h15 - 17h1	0 Questions and Answers		
mior Govt. Off	icials Built environment professionals Building sector	Technograhis	10NES - 11N	5 Session 7: Day 1 Concluding Remarks	Dr. Rajan Raval	
fk Policy main	rs & Sovt, Departments etabeliciders		+			
ACHINA for Prac	ctooners' training program will deliver in-depth knowledge on thermal comfor	t, its mustoes, and its	Dieg 2-July	5, 2022 Gaturbay)	14	
chriques. policy	documents building codes, international practices, and other aspects relevant	to thermal comfort in	10h00 = 10h1	S Section 8: Day 1 Recap	Dr. Rajan Raiva	
Rondable housing through a suite of case studies. Additionally, it will discuss the evaluation process of thermal comfort. He statistics and indicators involved as well as affordable cooling technologies and their applicability in versous climates.			10h15 = 11h	5 Session 9: Building Codes, Affordable Housing and Thermal Comfort	Dr. Rajan Raval	
anion often la	s as follows:		11015 - 110	© Questions and Answers	1	
bar 1 key 11	2022 (histori		11h30 = 11h	5 Heath Break		
10100 + 10105	Welcome address and introduction to PMAYUI	Dr. Rajan Rawal	11h45 = 12H	Session 10. Application of Thermal Comfort in Affordable Housing- A Sube of Case Section	Arland Actiant	
0n05 - 10n10	introduction to Climate Smart Buildings programme (IGEN-CSE) and overview	612	12/30 = 12%	Control and Amment	-	
1 10 10 10 10	of workshop		12545 - 126	Disputions on built quetilionname	1	
0h10 + 10h15	Session 1. Overview of the workshop, introduction of the project and introduction of the trainers	Dr. Rajan Rawal	13H00 - TAN	2 Lunch Break		
10h15 - 11h15 101 - 11h	Session 2: Importance of Thermal Comfort	Dr. Rajan Kewal	14400 - 1510	0 Session 11: Thermal Comfort Study Methods	Dr. Rajan Rava	
1615 - 11630	Questions and Anamers		15h00 - 15h1	5 Questions and Anovers	1000000	
2400 - 12615	Haatta Braak		15h15 - 10h1	5 Session 12: Low Energy Cooling Technologies and Comfort	Dr. Rajan Ranal	
12h18 - 15h16	Latrian 2: Building Physics and its relationship with Dearmal comfort	Dr. Ralan Raval	161/15 - 1610	Cuestions and Answers		
13×13 + 13×30	Questions and Answers		76H30 - 17H	0 Overview of Innovative construction technologies implemented in Light House	BATPE	
3530+14515	Lunch Break			Projects (ENPc)		
Lax15 - 15h00	Session 2: Fundamentals of Thermal Combin	Dr. Rajan Rakal	17h00 = 17h1	5 Session 13: Discussions on quiz-questionnelines	Dr. Rajan Rawa	
			17b15 = 17b1	6 Session 14: Feedback from participants Concluding Ramarks	Ter Dalars David	

Agenda for RACHNA #23





Training on thermal comfort for officers



Date: 7thNo of participants: 22Location:

: 7th June 2022 : 22



About the Event

The Rachna Training on thermal comfort for officers was organised for professionals interested in understanding the basics of thermal comfort needs and its applicability in affordable housing. Post training, the professionals were equipped to design polices on thermal comfort and gained knowledge on tools for monitoring and evaluating the impact of thermal comfort in upcoming affordable housing. The training targeted Senior officials having degree in engineering or architecture and serving in (a) Urban Local Bodies (b) State government and (c) Central government departments engaged in the development of affordable housing under various government schemes, officials dealing with implementation of codes and policy related to thermal comfort, energy efficiency and affordable housing

Trainer profile



Dr. Yash Kumar Shukla is the Principal Researcher and Centre Head at the Centre for Advanced Research in Building Science and Energy (CARBSE). He has led several ground-breaking research projects including low-energy

cooling and ventilation systems in Indian residences, evaluation of innovative cooling technologies, and benchmarking of Indian buildings. He also teaches Master level courses at CEPT University.

His current research includes the calibration of simulation models, smart grids, low cooling energy systems, amongst others. He possesses several professional certifications including
RACINA

Certified Measurements and Verification Professional (CMVP), Home energy rating system (HERS), GRIHA trainer, and ECBC Master Trainer. He is an active member of ISHRAE, ASHRAE, and IBPSA.

Brief event proceedings

Welcome address

The training started with the welcome address given by Dr. Yash kumar Shukla, centre head and principal researcher, CARBSE, CEPT university an gave the participants an overview of training by. Dr. Yash highlighted that the current Rachna training is designed specifically for govt. officers who will be instrumental in developing new policies and complement implementation of policies through advanced knowledge of passive building design for thermal comfort in affordable housing.



Dr Yash Shukla delivered the welcome address to all participants

Keynote address

The keynote address was given by Mr. Pradeep Garg, Project director (Housing), RUDISCO, the implementing agency for PMAY-U in Rajasthan. His address highlighted the presence of innovative materials and designs that have proven to provide enhanced thermal comfort in Rajasthan in affordable housing project. He took this opportunity to motivate and instil confidence in officers present to undertake this training program with utmost enthusiasm and implement the learnings in the upcoming affordable housing stock.



Mr. Pradeep Garg, Project director (Housing), RUDISCO delivering the keynote address

GIZ CSB introduction

This was followed by the introduction of Climate Smart buildings delivered by Mr. Anurag Verma from GIZ team, The introduction session gave an overview of PMAY(U) and the GIZ-CSB initiative, the project objectives and the team experts involved. He highlighted that GIZ on behalf of The Federal Ministry of Economic Cooperation and Development (BMZ), Germany, and in cooperation with the Ministry of Housing and Urban Affairs, Government of India aim to foster sustainability in built environment to use sustainable materials for Thermal comfort and in turn improve the environment and climate conditions.

Technical sessions

The event covered the following technical sessions:

Session 1: Importance of Thermal Comfort



Technical session on thermal comfort underway



Session 2: Affordable Housing Passive Design Strategies

Session 3: Building Materials and Methods of Construction for Affordable Housing



Dr Yash Shukla delivering the technical sessions

Session 4: Building Codes, Affordable Housing and Thermal Comfort



BMTPC delivering the session on innovative construction technologies

Session 5: Application of Thermal Comfort in Affordable Housing- Case Studies

Session 6: Overview of Innovative construction technologies implemented in Light House Projects (LHPs)

Outcome & impact of the event

The event was attended by 20 government officials, and 1 practitioner from HVAC industry. These officials predominantly represented

government officials of junior, assistant, executive, superintending engineer ranks from many various municipalities in Rajasthan such as Lakheri, Bundi, Kaithoon etc. These officials also represented development authorities and Urban Improvement trusts of Ajmer, Jaipur, Udaipur, Bharatpur etc. The training program saw a healthy discussion on real life situations related to costs of materials, choosing right material/design, timeline of projects and highlighted projects that are already using sustainable materials that have been ensuring thermally comfortable living environments for the occupants.

Feedback from participants

The participants found the sessions thorough and inspiring. They understood the importance of low cost thermally comfortable housing in India designed using passive strategies and appreciated the interactive nature of the sessions and the quality of the content specifically designed for improving thermal comfort in affordable housing in India. The training programme was graced by Shri Bipin Talati, Joint Secretary, Climate Change Department, Government of Gujarat who encouraged the officers to understand and implement passive design for ensuring thermal comfort in new housing.



Special address by Shri Bipin Talati, Joint Secretary, Climate Change Department, Government of Gujarat



Agenda

	Target Stakeholders		
Trainings on Innovative Construction Technologies & Thermal Comfort for Affordable Housing	b) Policy subtry NACHTA for Offices: Itali Mansmet it will apult the desirable thermal confor policy at runtersal, itsne is international, itsne is international practices, an itsdeat.	A Gove, Departments, stakeholders ing program with tamitariae participants with the concept of thermal of participant with necessary knowledge to identify and implement typ to concepter of defattable housing along with with the concept of the al. It will stinger design tamingles, construction techniques, policy stor d other appears relevant to thermal comfort in altocable housing to bowic	onfort and its twans constitutes of provid- oprate thermal comf aments, building cod trough a suite of co
Climate Smart Buildings - Training - One day	Thermal Comfort There	ng Module (One-day)	
Deter 7th Long 2022 The L Times 40.00 and to 5.20	"will channels of the presidents	ntifically are placeholders	
Venue- Vermallo I, Sarovar Premiere, Jaipur	10H00 - 10H10	Reynote and Introduction to PMAY (U)	Stri Pradeep Garg Project Director (Housing), RUDSICO
ABOUT THE TRAINING	10010 + 10019	Introduction to Climate Smart Buildings Programme (IGEN -	i incerta
	100.15 - 110.00	(S8) and overview of workshop	62
Ministry of Housing & Urban Affairs in partnership with 0/2 is hosting series of trainings on innovative	10015 - 11000	Second a Contraction of Programmer Contract	Ber March day 1911
Construction Laconologies at Thermal Conton for Antarsatile Housing Hames RACHIA (Retilent, Affordable and Comfortable Housing shrough National Action). The focus of this training is thermal manifest	1000-1100	Disalify Break	12, Tath Shutta
and to recessity in the affortuable housing enter. The training covers the thermal constant basics, material influences, low-cost solutions & codes that are evaluable in India to stream Cimute-Smart Buildings. The	11820-12805	Session 3 (Technical): Affordable housing Pastive Design Destantes	1
outcome of the training would be to make the stakeholders in the affortable housing sector understand	12905 + 12915	Queltions and Answers	Do Yest Doors
the need for themat content & urge them to include no cost or few cost strategies in upcoming projects. CONTACT:	12115 - 13115	Session 4 (Technical): Building Materials and Methods of Construction for Attortable Housing	On Task Shutta
Phone: +\$179 6831 0000; Ert. 388.	13615 - 13650	Quettions and Antwert	AN OW ADD
Webshe www.carboe.org. Small ashqioshi@cept.ac.in	10/30 - 14/50	Lunch Break	
	14430 - 15415	Sension 5 (Technical): Building Codel, Altontable Housing and Thermal Comfort	
	15455 - 15430	Quertions and Answers	Dr. Yash Shukla
	15800 - 15MB	Health Break	And services
	15h45 = 16h45	Session 6 (Technical): Application of Thermal Comfort in Affordable Housing - A Suite of Case mutilet	Dr. Yesh Shuilte
	10h43 - 10h53	Questions and Antimers	
	16n55 = 17n25	Session 7: Overview of innovative construction technologies implemented in Light House Projects (LHPs)	Pankaj Guota. BM/TPC
	17625 - 17630	Session & Feedback and Concluding Ramarks	Dr. Yash Shukla

Agenda for RACHNA #24

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Rachna on Twitter



Odisha & Rajasthan recently hosted 2 trainings under #RACHNA for Govt officials in Bhubaneswar & Jaipur. Both events focused on innovative construction technologies & #ThermalComfort in #AffordableHousing & saw huge participation from officials of different Govt organisations.



Training #24 program proceedings on GHTC twitter handle





Training on emerging construction technologies & thermal comfort in Light House Projects for officers



Date: 09th June 2022No of participants: 41Location:



About the event

Ministry of Housing and Urban Affairs (MoHUA) in collaboration with Building Material and Technology Promotion Council (BMTPC), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) hosted a series of trainings on Innovative Construction Technologies & Thermal Comfort for Affordable Housing under the RACHNA (Resilient, Affordable and Comfortable Housing through National Action) initiative. The focus of these training programs is to increase awareness of govt officials, academicians, and professionals about the latest innovative technologies being used at LHPs alongside thermal comfort, green building Concept, Eco Niwas Samhita tool and standards.

Trainer's profile



Shri. Kaushal Lodaya has 10+ years of experience in Sustainable Building Design and its Implementation. He has an M.Tech in Energy Management, with core areas of expertise in passive cooling system design,

energy efficient/ EPCO-friendly building design, and green building certification. During his professional journey he has worked in implementation of Energy Conservation Building Code in Madhya Pradesh extensively.

Brief event proceedings

Welcome address

Ms. Disha Jain, CSB Cell Indore, started off the event with an inspiring address that established the tone for the day, greeting all dignitaries and attendees and giving them a glimpse of the upcoming sessions. During the welcome of the dignitaries, she also added few words about the dignitaries highlighting their background and experience.

Keynote Address

Mr. Mahesh Sharma, Superintendent Engineer, PMAY, Indore Municipal Corporation (IMC) in his address expressed his joy and happiness by highlighting the key milestones achieved by the IMC and the team. He enlightened about the ongoing projects and their key features. He also added and encouraged attendees to participate in such events, take advantages and upgrade their knowledge on the technology. He further explained the LHP project, the EPS technology and its advantages like reduction in use of water during construction, energy efficiency, better thermal comfort and recommended its adoption and replication in the upcoming projects.

GIZ CSB introduction

CSB Cell began with introduction of RACHNA program, Ministry of Housing and Urban Affairs (MoHUA), overview of PMAY(U), its mission, and Global Housing Technology Challenge. The cell further informed about GIZ, their association with the Indian Govt. on different projects. It further explained what climate smart buildings are and the CSB cell initiative, project objectives and the team experts involved. Further the team elaborated on the interpretation of the project objectives and the roles of the relevant stakeholders.

Technical sessions

The event covered the following technical sessions:

Session 1: Thermal comfort in affordable housing & passive designs

Session 2: Thermal comfort models: Standards, codes and building materials

Session 3: New age innovative technologies along with the 6 LHP construction technologies

Session 4: Eco-Niwas Samhita (ENS) part I & II and its compliances

Session 5: Low energy comfort systems, Star Labelling and best practices

Outcome & impact of the event

The event evoked great response from 41 participants who understood and appreciated concept of new technologies, green building concepts and the need to adopt & include in their practices and upcoming projects. The participants included senior officials, architects, planners and engineers from govt. departments such as ULBs, TCPO, UDDs, IMC, Smart City, PMAY, IDA, MPHIDB, MPPHIDC, MPEB, PWD, CPWD. Alongside govt. officials, practitioners who are senior resources in their organizations were also present. During the event, all the participants were encouraged to register themselves as TECHNOGRAHIs in their continued capacity building endeavour.

Feedback from participants

The participants shared their experiences on the event, found it informative and interesting in terms of learnings and its approaches towards practical implementations. They emphasized for organization of more such events. Mr. Mahesh Sharma from IMC appreciated the efforts put in by CSB Cell members and successful completion of the event. He shared his experiences on the event, found it informative and interesting in terms of practical learnings.



Agenda

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	L ange of the second s	TIME	TOPIC	SPEAKER
		10-20am - 11-00am	Welcome Address - 1	Central Cluster
		TO AND A LEVEL IN	Keynote Address - 1	Chief Guest
RESILIENT, AFFORDABLE AND COMFORTABLE HOUS	ING THROUGH NATIONAL ACTION	11.00am - 11:15am	Introduction to MoHUA's Housing for All Programme, GIZ and the Bilateral Programme - Climate Smart Buildings	Central Charter CSB Cell
Training #25: One Day Traini	ng Program on		Provide the Provide All All Andrews and a second seco	
"INNOVATIVE CONSTRUCTION TECHNOLOGIES	& THERMAL COMPORT FOR	anapame anapam	Experience sharing in Automasie Housing	anend & Avastate
	0	11:45am - 12:00pm	High Tea & Networking	
Location: Sarovar Portico, Indore Date: 9 th June 2022 Time: 10:10AM to 04:30PM <u>AIROUT THE TRAINING:</u> The Ministry of thosing & Urban Affairs (MOHCIA) in partnership with GIZ and Building Material and Technology reomotion Council (BMTPC) is hosting series of trainings/werkibops on innovative Construction Technologies & Thermal Confort for Affordable Housing named RACHNA (Beallert, Affordable and Confortable Housing through National Action. The participants will be a mix of builde/ developer, and government departments (senior officials like commissioner of Urban Local bodies, senior officials from urban development departments, senior engineent/ architectu/ planners/ professionals under TEUMOGRAPU/ relevant construction technology provider (UTF) & OEMs in government department) etc. who are working an a leader in their respective organization.		12:00pm - 01:00pm	Session 11 Thermal Comfort: a) Indice: b) Thermal conduct in Affondable Housing () Pathies trategies d) Care studies Session 2: Thermal Conduct models: a) Thermal Conduct standards b) Effort of materials conduct	Trainer
the Innovative Construction Technologies & Thermal Comfort for Nwiss Samhita Tool and its Application. The outcome of the train the control of the train of the train the second	Affordable Housing. This also focus on Eco ning would be to make the stakeholders in	01:00pm - 02:00pm	Lunch Break	
Include in their upcoming luture project. Training Programmer Ridored for Senior officials from porement departments (Ridord, for Senior officials from porement departments (Ridor, MEC, 1000, MC, Smirt OK, rMAY, 100, AMMADI, MINYMOC, MEC, 1940) S. MINAVIN Ma or technical resources in their department, Authors, Development who are Senior Resource in their Organization. EOR FURTHER DETAILS, PLEASE CONTACT		02:00pm - 01:30pm	Session.3: New age innovative technologies along with the 6 DMP construction technologies focusing on - efficiency in construction, mainstreaming & replication of technologies, and sustainable can thermal comfort aspects. Session.4: Eco Niwas Samhita Part 1.6:2 and its compliance	Central Cluster CSD Cell Trainer
			Session 5; a) Low Energy Comfort Systems and BEE Star Labelling b) Indian & International Best Practices	Trainer
CSB Cell, Central Cluster Light House Project,	GIZ, India	05:30pm - 04:00pm	OBA	Central Cluster CSB Cell
kanadia ext., Sanyogitaganj Mandal, (Landmark: near Gulmarg Parisar)	New Delhi, 110 029	04:00pm - 04:15pm	High Tea & Networking	
Indore, Madhya Pradesh Sindore, gizcsbeell@gmail.com	⊠ vikash.ranjan@giz.de	04:15pm - 04:50pm	Vote of Thanks	Central Cluster C58 Cell

Agenda for RACHNA #25

Rachna on Twitter



Training #25 program proceedings on GHTC twitter handle



Event Photographs



Photographs taken during event #25

RACINA



Training on emerging construction technologies & thermal comfort in Light House Projects for officers



Date: 08th June 2022No of participants: 40Location:



About the event

Ministry of Housing and Urban Affairs (MoHUA) in collaboration with Building Material and Technology Promotion Council (BMTPC), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) hosted a series of trainings on Innovative Construction Technologies & Thermal Comfort for Affordable Housing under the RACHNA (Resilient, Affordable and Comfortable Housing through National Action) initiative. The focus of these training programs is to increase awareness of govt officials, academicians, and professionals about the latest innovative technologies being used at LHPs alongside thermal comfort, green building Concept, Eco Niwas Samhita tool and standards.

Trainer profile



Trainer 01 – Mr. Kumar Biplab is an energy engineer with more than 12 years of experience in project management, energy audits, retro-commissioning works, site execution, technical delivery, liaising, and

coordinating with clients, vendors & consultants. He is a certified IBBI registered Valuer, LEED Ap (O+M), BEE ECBC Master trainer, Edge Expert, PQP, IGBC AP. He has been a master trainer in about 48 training programs on ECBC.

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Trainer 02 – Miss. Ragini Goswami is an architect and a certified green building professional with more than 9 years of work experience in providing specialized services to obtain green certifications under LEED, IGBC, GRIHA,

EDGE and ECBC compliance for buildings. She has earned credentials from IGBC AP and GRIHA CP and BEE as Certified ECBC Master Trainer. She has conducted more than 15 training programs in Chhattisgarh, Meghalaya, Manipur, Meghalaya, Mizoram, Nagaland on ECBC 2017 code (Commercial buildings) and Eco-Niwas Samhita (ENS) code (Residential buildings) as a Master trainer.

Brief event proceedings

Welcome address

Shri Mihir Kanti Gop, Chief Planner, Tripura Urban Development Authority (TUDA) started the event with inspiring words that established the tone for the day. He greeted all dignitaries and attendees, sharing a brief of the session. Shri Sayan Maitra, Team member – CSB Cell, East Cluster, Agartala was the moderator of the session. Post running through the in-house rules for the audience, the session was commenced by inviting the key dignitaries to light the lamp and start the proceeding.



Shri Mihir Kanti Gop, Chief Planner - TUDA, addressing the participants

GIZ CSB introduction

Shri Rahul Bose, team member – CSB Cell, East Cluster, Agartala spoke in detail about the various initiatives of GIZ in India in the sustainability sector, clean energy & energy efficiency services. He also shared the objective of introducing this project as to bring in climate resilience and thermal comfort in buildings constructed under PMAY (U).

Further, he updated that the Light House Projects is happening across six states of the country with different technologies and minimal execution time.

Technical sessions

The event covered the following technical sessions:



Shri Rahul Bose, Architect, CSB Cell East Cluster – Agartala, explaining to the participants the Light House Projects

Session 1: Thermal comfort:

- Indices
- Thermal comfort in affordable housing
- Passive strategies and building physics
- Case studies.

Session 2: Thermal comfort models:

- Thermal comfort standards i) IMAC and ii) ASHRAE
- Effects of materials on thermal comfort

Session 3: New age innovative technologies along with the 6 LHP construction technologies.

Session 4: Eco-Niwas Samhita I and II and its compliance





Smt. Ragini Goswami presenting ENS Part I & II

Session 5:

- Low energy Comfort System and BEE Star Labelling
- Indian International Best Practices.

Outcome & impact of the event

The event was attended by 40 government officials from energy and architectural domain. These officials represented organisations such as Tripura State Electricity Corporation Ltd. TUDA, Techno College of Engineering, Tripura Institute of Technology, ICFAI University, IIT Chennai, Mitsumi Housing, Rural Development Department, NIT Agartala, Agartala Municipal Corporation etc. The training program saw a healthy discussion amongst each other and the trainer and discussed real life situations related to costs of materials, timeline of projects and highlighted projects that are already using sustainable materials that have been ensuring thermally comfortable living environments for the occupants.



Participants having an interactive session with the Chief Planner & the Master Trainer

Feedback from participants

The participants found the sessions thorough and much inspiring. They understood the importance of low cost thermally comfortable housing in India designed using passive strategies and really appreciated the interactive nature of the sessions and the quality of the content specifically designed for improving thermal comfort in affordable housing in India.



A glimpse from the heavy turnout at the training session

Shri Mihir Kanti Gop from TUDA applauded MOHUA team, GIZ team, CSB Cell team members and the volunteers involved for their active efforts in the overall coordination and arrangement of this event. He was also extremely delighted to understand that Light Gauge Steel Frame technology that is being implemented at LHP Agartala will deliver ready to live-in homes in minimal time and cost with high-quality of construction in a sustainable manner.



Agenda



Agenda for RACHNA #26

Rachna on Twitter



Training #26 program proceedings on GHTC twitter handle





Training on thermal comfort for officers



Date: 08th June 2022No of participants: 37Location:



About the event

The Rachna for officers is organised for professionals interested in understanding the basics of thermal comfort needs and its applicability in affordable housing. Post training, the professionals will be able to design polices on thermal comfort and be equipped with monitoring and evaluating the impact to ensure thermal comfort in upcoming affordable housing is ensured. The training targeted senior officials having degree in engineering or architecture and serving in (a) Urban Local Bodies (b) State government and (c) Central government departments engaged in the development of affordable housing under various government schemes, officials dealing with implementation of codes and policy related to thermal comfort, energy efficiency and affordable housing



Trainer profile

Prof. Rajan Rawal is an architect by training and is a senior advisor at Centre for Advanced Research in Building Science and Energy (CARBSE), and a CRDF

Professor at CEPT University. He was Executive Director of CARBSE between 2006 and 2021. He worked with Vastu Shilpa Foundation for Studies and Research in Environmental Design before joining Faculty of Design, CEPT University, Ahmedabad. He taught design and construction courses as part of the undergraduate program. He now teaches energy efficient built environment, energy policy, energy modelling and simulations at postgraduate level.



Brief event proceedings

Welcome address

The training started with the welcome address given by Dr. Rajan Rawal, Senior Advisor, CARBSE, CEPT university who gave an overview of training. Mr. Rajan highlighted that the current training is designed specifically for govt. officers who will be instrumental in developing new policies and complement implementation of policies through advanced knowledge of passive building design for thermal comfort in affordable housing.



Dr. Rawal briefing the participants about various training modalities under RACHNA

GIZ CSB introduction

This was followed by the introduction of Climate Smart buildings (CSB) delivered by Mr. Abdulla Siddiqui from GIZ team, The introduction session gave an overview of PMAY(U) and the GIZ-CSB initiative, the project objectives and the team experts involved. He highlighted that GIZ on behalf of The Federal Ministry of Economic Cooperation and Development (BMZ), Germany, and in cooperation with the Ministry of Housing and Urban Affairs, Government of India aim to foster sustainability in built environment to use sustainable materials for Thermal Comfort and in turn improve the environment and climatic conditions.

Technical sessions:

The event covered the following technical sessions:

Session 1: Importance of thermal comfort

Session 2: Affordable housing passive design strategies

Session 3: Building materials and methods of construction for affordable housing

Session 4: Building codes, affordable housing and thermal comfort

Session 5: Application of thermal comfort in affordable housing- Case studies

Session 6: Overview of innovative construction technologies implemented in Light House Projects (LHPs)

Outcome & impact of the event

The event was attended by 35 govt. officials, and 2 other practicing professionals and faculties. The officials were representing organisations such as GHMC, MEPMA, TSHCL, RCUES, TSREDCO, Public Health and Municipal Engineering services, 2-BHK housing collectorate etc. A healthy participation and enthusiasm led to discussion on real life situations related to costs of materials, timeline of projects and highlighted projects that are already using sustainable materials that have been ensuring thermally comfortable living environments for the occupants.

Feedback from participants

The participants found the sessions thorough and much inspiring as they understood the importance of low cost thermally comfortable housing in India designed using passive strategies and really appreciated the interactive nature of the sessions.



A glimpse from the training session



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Agenda



folicy makers	Ealth environment professionals. Building sector & Govt. Departments stateholders	Texhenuesd		
HiA for Officers' tra over, it will equip the bie thermal comfor at national/state is ational practices, a st	ving program will familiarize participants with the concept of thermal or e participants with necessary knowledge to Sentify and implement toge to occupants of affordate heuring Jandy with settists to develop and into real, it will discuss design strategies, construction techniques, policy door nd other aspects relevant to thermal comfort in affordable housing th	order and its rua ortunities of prov oprate thermal cor memory, building o yough a suite of		
ion plan is as fo	Bows:			
and coefficient right	and the second			
10h00 = 10h10	Welcome address and introduction to PMAY (U)	MoHUA		
10h10 - 10h15	Introduction to Climate Smart Buildings Programme (IGEN - CS8) and overview of workshop	92		
10h15 = 11h00	Session 2 (Technical): Importance of Thermai Comfort			
11900-11910	(N00 - 11h10 Questions and Answers			
11610-11620	Health Break			
11620-12605	Session 3 (Technical): Afflortable Muscing Passive Design Strategies			
12805-12815	Questions and Answert	Dr. Asian Rann		
12+15 = 13+15	Session 4 (Technical): Building Materials and Methods of Construction for Affordable Housing	Dr. Ralan Raw		
13015+13035	Questions and Antalens	100		
13x30 - 14x30	Lunch Break			
14x30 - 15k15	Session 5 (Technical): Building Coder, Affordable Housing and Thermal Comfort			
10x15 - 15x30	Questions and Answers	Dr. Raian Raw		
15830-15845	Health Break			
19:45 - 19:45	Session 6 (Technical) Application of Thermal Comfort in Affordable Housing - A Suite of Case studies	Dr. Talar Tao		
18h45 - 16h55	Questions and Answers	14.0		
16855-17825	Session 7: Overview of Innovative construction technologies Imalemented in Light House Protects (LHP)	BWIDC.		
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Agenda for RACHNA #27

Rachna on twitter



GHTC INDIA @GhtcIndia · Jun 16

Recently, senior government engineers & professionals in Ranchi, Hyderabad, Delhi & Bhubaneswar attended trainings designed to make them aware of innovative **#constructiontechnologies** & **#thermalcomfort** in affordable housing.



Training #27 program proceedings on GHTC twitter handle



Event pictures



Pictures taken at the event

RACINA



Vocational training for construction workers



Date: 09-No of participants: 60Location:

: 09–10 June 2022 : 60



About the Event

The vocational training is organised for contractors and masons interested in understanding the basics of thermal comfort needs and its applicability in affordable housing. The training is to educate masons, and contractors on the new construction technologies and building materials that are prevalently used in affordable housing construction. The training targeted contractors, masons, insulation applicators and other field workers.

Trainer profile



Ms. K. Hamsalatha is a coordinator of the Bangalore Branch office of M/S Pithavadian and Partners. She is a Civil engineer and has done her B– Tech in Civil Engineering from Jawaharlal Technical University in

Kakinada in East Godavari District, Andhra Pradesh State. She has 16 years of experience. At Pithavadian Partners, she has been involved in project execution and coordination for various projects of the firm in Karnataka. Some of the notable projects include the Karnataka Housing Board, Bosch, Rajiv Gandhi Housing Projects, NDDB, Indian Institute of Astrophysics, and Interior Projects like IDBI, IOB, and BOB.

Brief event proceedings

Welcome address

The training started with a keynote address from Mr. Vinoth Kumar who encouraged and motivated all the participants to not only understand and learn the technical aspects of the new innovative technologies but simultaneously



also acquire and strictly follow the safety norms while incorporating these new technologies in their current and future projects.



Mr Vinoth Kumar giving the welcome address

Technical sessions:

The event covered the following technical sessions:

Session 1: Overview of thermal comfort and LHP Technologies

Session 2: Construction materials and technology

Session 3: Precast technology brief and practical implementation on site



Ms. Hamsalatha showcasing some training materials

Outcome & impact of the event

The event was attended by 60 contractors and masons from the site. The training program saw a healthy discussion amongst each other, the trainer and discussed real life situations related to costs of materials, timeline of projects and highlighted projects that are already using sustainable materials that have been ensuring thermally comfortable living environments for the occupants. The training would make the contractors, masons, and field workers expertise in the current technologies & best construction practices.



Participants and CSB cell members together with the trainers.

Feedback from participants

The participants found the sessions thorough and much inspiring. They were enlightened by the new technologies being used in India. They would like to have more practical and hand on training sessions focusing on the new construction technologies.





Agenda

REGILIENT, AFFORDABLE AND COMFORTABLE HOUSING THROUGH NATIONAL ACTION Training #28: Two-Days Training Programme on "Innovative Construction Technologies & Best Construction practices" Location: Bengaluru (Date : 09" & 10" June (Time : 10:30 AM to 5:30 PM	BURATION 10:30-11:00	TOPIC Welcome Address Trainer Introduction	SPEARER ESR Cell
RESILIENT, AFFORDABLE AND COMPORTABLE HOUSING THROUGH NATIONAL ACTION Training #28: Two-Days Training Programme on "Innovative Construction Technologies & Best Construction practices" Location: Bengaluru (: Date : 00 th & 10 th June): Time : 10:30 AM to 5:30 PM	10:10-11:00	Welcone Address Trainer Introduction	CS8 Cel
Training #28: Two-Days Training Programme on "Innovative Construction Technologies & Best Construction practices" Location: Bengaluru (_Date : 00 th & 10 th June) Time : 10:30 AM to 5:30 PM		A CONTRACTOR OF	C18.C+3
Innovative Construction Technologies & Best Construction practices Location: Bengaluru Date : 09 th & 10 th June Time : 10:30 AM to 5:30 PM		Ngh Tea & Retworking	
Location: Bengaluru [Date : 09 th & 10 th June] Time : 10:30 AM to 5:30 PM		Supervision and the supervision of the supervision	
Anoty of Houring & Uthan Affairs (MohiuA) in partnership with 02 and the Building Material Achology Pronotion Cource (BMTPC) is hosting a series of pices of training/workshops on show Construction Technologies & Thermail Comfort for ABordabie Housing named RACHAA area, ABordable and Comfortabie Housing through National Action). The main focus of the stime new construction technologies that are available especially in India to create Climate-Smart ngs. The outcome of the training would be to make the constructors, masons, and field workers the new construction technologies & best construction practices. NUSATE: material and the second second particle and the second	11.15 am - 01.00 pm [Better 1] 02:30 pm - 04:30 pm [Better 2]	LIP Cleman in dir Construction tethnology - Presist Composent Asienableh in State OETIC: Bard explanation of other LEP construction technologies (OETIC trade explanation of other LEP construction technologies (OETIC video) PrevarC wavets Construction Tystems - Jackiew, Mallaya Pradesh PrevarC wavets Construction Tystems - JD Volumerus - Pandis, Tackdanid Lippt Composition Tystems - De empineorid Steel Structural Systems - Agattala, Tapara Biosofic Construct Construction using Tunnel Fourseords - Rajdec Organia PVC Step in Place Fortuneok Systems - Lacknow, Utwa Pradesh Construction Technology Process: Site Environment Statistismin - Tuniportation Process, Jacanth, protective unstanded during construction, Commodiation, Compaction, and Transportation Column Dying and Itstachares - Types: Africtian construction and preservice messances. Proteining will: Soil using, Moras, and Tallag, Paesdow-sense Biodeco-sense Protection, Technology in construction and patientschementum aparentive messances. Types of Housing, Moras, and Tallag, Paesdow-sense Biodeco-sense From Biodeco-Sense Biodeco-sense From Biodeco-Sense Biodeco-se	Trainer – Ms Hamualatha Pithavadian J Partners

AGENDA - SECOND DAY					
DURATION	TOPIC	SPEAKER			
20:30 am - 12:30 pm (Batch 3) 02:00 pm - 04:30 pm (Batch 4)	Vecational Training III Communication in Communication Includingly - Present Component Assembled at Size GHTC: Biol explanation of other LHP construction technologies (GHTC: Biol explanation of other LHP construction technologies (GHTC: Sized explanation of other LHP construction technologies (GHTC: Sized explanation of other LHP construction technologies (GHTC: Sized Structural System - Jackow, Madina Paulach 2 Present Concerter Construction System - Jackow, Machanel System - Agattack, Trapan 3 Light Gouge Sized Structural System & Pre-explaneted Steel Structural System - Agattack, Trapan 4 Monolohic Concerte Construction using Transel Formsock - Explict, Grain 5 PVC: Stry in Place Formsock System - Lucknew, Utter Paulech Construction Technology Process: 1 Size Excernation and Stabilization - Excercision and Stabilization Process, Landrik, protective antiched duing construction, Consolidation, Comparision, and Transportation 2. Column laying and structure - Types, defects in construction and Filling, Rendorement 1. Missiany & Funder-Printering and Paulaning 5. Improving Efficiency in construction - Defects in reconstruction proventice press, adDitorion, and reduction and maring 5. Improving Efficiency in construction and reduction and construction.	Trainer – Ms Hamslatha – Prithavadian & Partners			
04:30 pm - 05:00 pm	Q&A and feedback	Climate Smart Buildings (CSB) Cell			
05:00 pm - 05:30 pm	Vote of Titatiks	602 / Olimate Smart Buildings (CSB) Cell			

Agenda for RACHNA #28



Rachna on Twitter



GHTC INDIA @GhtcIndia · Jun 14 Next was a vocational training for masons in Bengaluru on Innovative #ConstructionTechnologies & Best Construction Practices.

#HousingForAll #PMAYUrban #GHTCIndia #LHPs #ContructionTechnologies #TransformingLives #TransformingUrbanLandscape



Training #28 program proceedings on GHTC twitter handle

RACINA



Training on emerging construction technologies & thermal comfort in LHPs for practitioners



Date: 09-10 June 2022No of participants: 56Location:



About the Event

The Ministry of Housing and Urban Affairs, in conjunction with GIZ India held a one-day training session for professionals called Rachna -Training on emerging construction technologies & thermal comfort in LHPs for practitioners. The training was especially designed for the stakeholders from building and construction sectors. Government officials from different divisions of State and Central Government (Officials from Urban Local Bodies, Engineers/ Architects/Technograhis from Rajkot, Gujarat) attended the event. The prime motive of the training was to create awareness about thermal comfort and its necessity in the affordable housing sector.

Trainer profile



Trainer 01-Shri. Jitendra Vyas is a Structural Engineer with 16 years of experience and trained in Law Degree, M.B.A. (Information Technology) & P.G Diploma in Urban Planning and Development. He is a GRIHA

Certified Professional and Evaluator, IGBC AP, GEM CP, EDGE Expert and Auditor, ECBC Master Trainer and empanelled ECBC expert with BEE, Ministry of Power. He is also registered as Third-Party Assessor for ECBC with Greater Hyderabad Municipal Corporation. He has conducted various training programs on ECBC, Eco-Niwas Samhita and sustainability and energy simulation.





02-Shri Trainer Kumar **Biplab** is an Energy Engineer with more than 12 years of experience in project management, energy audits, retro-commissioning works, site execution, technical delivery, liaising, and

coordinating with clients, vendors & consultants. He has experience in working with advanced technologies, including but not limited to, combined heat & power, district heating & cooling, thermal energy storage, geothermal heating and cooling systems. He is a certified IBBI registered valuer, LEED Ap (O+M), BEE ECBC Master trainer, Edge Expert, PQP, IGBC AP. He has been a master trainer in about 48 training programs on ECBC.

Brief event proceedings

Welcome address

Shri S.S Rai, Dean – KIIT School of Architecture & Planning started off the event with a motivating welcome address that established the tone for the day, greeting all dignitaries and attendees present in the program. Further he added that he was very happy to see the RACHNA event coming to state of Odisha and providing a platform for knowledge exchange.



Shri S.S Rai, Dean – KIIT School of Architecture & Planning started giving the welcome address

Keynote Address

Shri L.P Patnayak, Chief Town Planner, Bhubaneswar Development Authority, Govt. of Odisha started off his address by briefly stressing upon the need of thermal comfort in buildings and highlighted that the very purpose of buildings is to provide comfort to human beings. He stressed that if we could advocate the newer housing technologies on the mass scale even to the private developers and builders, there is a good chance that we could achieve comfort in our residential spaces.



Shri L.P Patnayak, Chief Town Planner, Bhubaneswar Development Authority during his keynote

Special Address

Shri Swadhin Panigrahi, Sr Engineer - Odisha Urban Housing Mission (OUHM) in his special address, briefly highlighted how the building construction has evolved in the past 50-60 years that today we find ourselves totally dependent upon the electrical appliances like fans, coolers, and air conditioners to provide us comfort. But what if we put a little extra effort during the building design stage and see where passive measures can be adopted so that natural air circulation is sufficient inside the buildings. He urged the participants not to take natural energy for granted and take small steps towards preserving it as much as they could.



Shri Swadhin Panigrahi, Sr Engineer - Odisha Urban Housing Mission during his special address



Shri P.S Sahoo, Team Lead, SLTC - Odisha Urban Housing Mission (OUHM) gave a short presentation on the progress made by the Odisha state under PMAY (U) scheme. He stressed that right from its inception, the scheme has always been acting as the beneficiary led construction gateway. The State Government has accorded top-priority to 'AWAAS - Odisha Urban Housing Mission'. He signed off by saying, there is no point in providing houses where the residents do not feel comfortable staying in, and that is why the inclusion of thermal comfort plays a vital role.



Shri P.S Sahoo, Team Lead, SLTC (OUHM) talking about PMAY in Odisha

GIZ CSB introduction:

Ar. Divya Bansal Talwar, Representative - GIZ India & Climate Smart Buildings Project, gave a brief presentation on the 'Climate Smart Buildings' which also highlighted the key initiatives undertaken by GIZ in India, mostly focusing on the sustainability sector, clean energy & energy efficiency services. She also noted that the prime goal of hosting RACHNA Training programmes throughout 30 cities of the country is towards introducing thermal comfort in affordable housing and urged the participants to make the most use of the deliberations.



Ms. Divya Bansal Talwar from GIZ elaborating on Climate Smart Building goals

Technical sessions:

The event covered the following technical sessions:

Session 1: Thermal comfort in affordable housing & passive Designs

Session 2: Thermal comfort standards & materials effect on thermal comfort

Session 3: New age innovative technologies along with the 6 LHP construction technologies Session 4: Green building concept

Session 5: Eco Niwas Samhita 2021

Session 6: Eco Niwas Samhita – 2021 Compliance & Tool demonstration

Session 7: Eco Niwas Samhita 2018

Session 8: Low energy comfort systems, BEE Star Labelling for residential buildings and Indian & international best practices

Outcome & impact of the event

The two-day event evoked great response from 56 participants from various government departments, building industry stakeholders & professionals from academia. The glimpses of the training program were also covered in the local tv channel – Metro TV.

Feedback from participants

The participants found the sessions relevant and need of the hour. They understood the importance of thermal comfort in buildings and its impact on the occupants. Further they understood the role of building materials, passive design strategies in making a building comfortable and latest construction technologies available in the market.



Media coverage of the event on local TV

RACINA

Agenda

	: Bhubaneswar Date : 09-20 June 2022 , Thursday - Friday AGENDA	/ Time : 09:30 AM to 5:00 PM	Locatio	o: Bhubaneswar Date : 09-10 June 2022 , Thursday - friday Day - 2 AGENDA	Time : 09:30 AM to 5:00 Ph	
DURATION	TOPIC	PEAKS	DURATION	tone	UNAXIS	
9:30-30:00	Registration	CSBCall	10:06-11:00	Session S: Too-Ninces Sambits 2021	Shri, Shatruja et Swain	
0:00-10:15	Introduction & Agenda Briefing	CS8 Ce R		With group exercise	HVAC Muster Trainer	
10:15-20:25	Welcome Address Keynote Address Danne Address	180 180 180	11.00-11.05	Heat TA & NETWORKS	19 Shrii, Shatrujeet Surain	
10:45-11:00	Introduction to MoHUN's Yousing for Alf Programme, GE, and the Internal Programme - Climate Smart Buildings	GI		ajiini 2023 Complance bjEire demo on Tool cThermal comfort analysis	HVAC Master Trainer	
11.00-11:13	HIGH-TEA & NETWORK	10		d Recommendation to correct and future Affordable Housing projects		
11-15-18-00	Session 1: Thermal Confort	IConfort Succession Unicession		LUNCH BREAK	<u> </u>	
	ajbolices b)Thermal comfort is Affordable Housing c)Panier strategies & Building Physics	Include Reasing dating Physics	14:00-15:00	Section 7: ENS 2018 Brief With technical exercise (Calculating RETV etc.)	Shri, Mendra Vyae ECBC Marter Trainer	
	d/Case exempts e3/we exempts 7. Building Control Congristinger 9. Building Control Congristing 1. Building Control Congristing		15:30-26:25	Sealine B: a)Cove Energy Constant Systems and BEE Star Labelling b)Instan & International Best Practices	Shri, Shatrajeet Seain HWC Master Trainer	
13:00-14:00	LUNCHBREAK	to the second se	16(15-56)(0	J QAA and Feedback CSII Cell		
14:00-15:09	Session J: Thermal Comfort al Thermal Comfort standards	Shri, Shendra Vyus ECRC Macher Trainer	26(25-36)8	Vatu of Thanks	602/C58 C+8	
	cjalonac		16-30-17-00	Ho Tea & Networking	1	
	d)Effect of materials on thermal conduct			CLOSE		
15:33-36:00	Session 1: New age invocative technologies along with the \$189 construction technologies focusing on efficiency in construction, mainstramming & replication of technologies, and sustainable com- thermal comfort aspects	BMTPC				
16:00-36:45	Session A: Green Bubblings ajBrief Volareen Measures Chaligenous and how-embodied materials elBert Practices	CISCOR				
16:45 - 17:00	Q&A	CSECel				

Agenda for the RACHNA #29

Rachna on Twitter



Training #29 program proceedings on GHTC twitter handle









Date: 09–10 June 2022No of participants: 87Location:



About the event

The Rachna awareness drive in Architecture college is organised for students and faculty interested in understanding the basics of thermal comfort needs and its applicability in affordable housing. Post training, the students will be able to design keeping thermal comfort aspect in mind and be equipped with monitoring and evaluating the impact to ensure thermal comfort in upcoming affordable housing is ensured. The training targeted architecture students of B. Arch and faculty.

Trainer profile



Mr. Gopal Nurani Parasu has a working experience of more than 5 years. He has been involved in all the stages of a project i.e., development of design to its execution and has seen the application of design strategies from close quarters.

His zeal to excel inspired him to take up this master's course in Cardiff University so that he is able to keep up with the knowledge required in this field to maintain world standards. He is a LEED Accredited Professional & Bureau of Energy Efficiency empanelled ECBC Expert.

Brief event proceedings

Welcome address

Mr. Santosh Nair, Senior Director – Industry Academia Partnership Cell – Parul University started the training by warmly welcoming all the participants and faculty members from the college. He expressed his gratitude to MoHUA and GIZ for giving the university a chance to be a part of movement towards making affordable housing sustainable and thermally comfortable. He urged the participants to try to practice in



real world application the learnings gained from such awareness workshops.

Technical sessions:

The event covered the following technical sessions:

Session 1: Overview of thermal comfort indices and passive strategies with case studies



A full house at the awareness workshop

Session 2: A brief about ENS Part I & ENS Part II with the same recommendations for LHP

Session 3: Design challenge theme & requirements for the students



Students during the design exercise

Outcome & impact of the event

The event was attended by 87 students of the university. The design exercises were useful in setting the learning in real world problems which led to students exploring new and creative ways to design climate smart buildings and ensure compliance with the existing codes.



Students during the design exercise

Feedback from participants

The participants found the sessions thorough and much inspiring. They understood the importance of low cost thermally comfortable housing in India designed using passive strategies and really appreciated the interactive nature of the sessions and the quality of the content specifically designed for improving thermal comfort in affordable housing in India.



SPEAKER

09:30 AM to 5:30 Pf

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& Friday



Agenda



	AGENDA – Day 2				
DURATION	ТОРІС	SPEAKER			
09:30-10:30	Registration of Participants	Climate Smart Buildings (CSB) Cell - GiZ			
10:30-11:00	<u>Session 3:</u> Affordable Housing Design Challenge: a) Design Problem Introduction, b) Grouping	Mr. Gopal Nurani Parasu (Trainer) LEED Accredited Professional & Bureau of Energy Efficiency Empaneled ECBC Expert			
11:00 - 13:00	Session 3: (Contd.) Design Challenge Exercise	Mr. Gopal Nurani Parasu (Trainer) LEED Accredited Professional & Bureau of Energy Efficiency Empaneled ECBC Expert			
13:00-14:00	LU	NCH BREAK			
14:00-16:00	Session 3: (Contd.) Design Challenge Exercise	Climate Smart Buildings (CSB) Cell - GiZ			
16:00-16:15	т	EA BREAK			
16:15 - 17:15	<u>Session 4:</u> Design Challenge Judgement & Winner Announcement	Climate Smart Buildings (CSB) Cell - GiZ			
17:15 - 17:30	Vote of Thanks	Climate Smart Buildings (CSB) Cell - GiZ			
	End of Awarenes	s Workshop			

Agenda for RACHNA #30



Rachna on Twitter



GHTC INDIA @GhtcIndia

Another programme was held for architecture & civil engineering students, faculties & **#Technograhis** at Parul University, Vadodara, Gujarat, wherein they were briefed about **#ThermalComfort** & new age innovative technologies used in **#LightHouseProjects** with live design challenge.



6:58 PM · Jun 16, 2022 · Twitter Web App

Training #30 program proceedings on GHTC twitter handle





Training on emerging construction technologies & thermal comfort in Light House Projects for officers



Date: 14th June 2022No of participants: 46Location:

govt officials, academicians, and professionals about the latest innovative technologies being used at LHPs alongside thermal comfort, green building Concept, Eco Niwas Samhita tool and standards.



About the event

Ministry of Housing and Urban Affairs (MoHUA) in collaboration with Building Material and Technology Promotion Council (BMTPC), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) hosted a series of trainings on Innovative Construction Technologies & Thermal Comfort for Affordable Housing under the RACHNA (Resilient, Affordable and Comfortable Housing through National Action) initiative. The focus of these training programs is to increase awareness of

Trainer profile



Gaurav Shorey has a bachelor's degree in Architecture (B.Arch. School of Planning and Architecture, New Delhi) with a post-graduate diploma in advanced construction management (D.A.C.M – National Institute

for Construction Management and Research, Pune).

He has seventeen years of experience in sustainable habitats during which he has transitioned from the green buildings and energy efficiency sector to education & awareness-generation. His work now focuses on sustainability in the hyper-local context, and for the need to preserve traditional knowledge systems for sustainable development and climate-change mitigation. He also has twelve years of experience in academia during which he



has served as permanent and visiting faculty at Sushant School of Art & Architecture (Gurgaon), the School of Planning and Architecture (New Delhi), and at Leuphana University (Luneburg, Germany). He is ECBC master trainer certified by BEE, Govt of India, Trainer and Technical advisory committee member certified by Green Rating for Integrated Habitat Assessment (GRIHA).

Brief event proceedings

Welcome address

Mr. Vikash Ranjan, Project Head, Climate Smart Buildings started off the event with welcome address to all the senior officials, panellists and participants present and elaborated on RACHNA, the MoHUA's initiative, GHTC-India Challenge, GIZ and its role of sustainability in India.



Mr. S Vikash Ranjan from GIZ giving the welcome address

Keynote Address



Shri Rajeev Kumar Tiwari, Pr. Commissioner DDA during his special address

Shri Rajeev Kumar Tiwari, Pr. Commissioner DDA delivered special address, concentrating on the technological aspects of the innovative construction technologies coming up in the building sector in India. He also affirmed the necessity of incorporating and implementing thermal comfort standards in bylaws.

Technical sessions

The event covered the following technical sessions:

Session 1: Importance of Thermal Comfort

Session 2: Thermal Comfort models: Standards, Codes and Building Materials

Session 3: New age innovative technologies along with the 6 LHP construction technologies

Session 4: EcoNiwas Samhita (ENS) part 1 &2 and its compliances

Session 5: Low Energy Comfort Systems, Star Labelling and Best Practices

Outcome & impact of the event

The day-long event evoked great responses from over 46 participants from Delhi Development Authority, who were trained on 'Innovative Construction Technologies & Thermal Comfort for Affordable Housing'.

Feedback from participants

The participants found the sessions insightful. They understood the importance of thermal comfort in buildings and its impact on the occupants. Further they understood the role of building materials, passive design strategies in making a building comfortable and latest construction technologies available in the market.





Agenda

	Yanger (Brenn of Resident State State	bmloc giz
RACINA	'Innova Loc	tive Construc ation: Delhi	tion Technologies & Thermal Comfort for Date: 14 th June 2022, Tuesday Time: 10:0 AGENDA	Affordable Housing' 10 AM to 5:30 PM
	TIME	CECCION	TOPY	CREASTER
RESILIENT, AFFORDABLE AND COMPORTABLE HOUSING THROUGH NATIONAL ACTION	10:00 - 10:15		Welcome Address	Shri Vikath Ranjan. Project Head. GEZ
		Introductory	Keynote Address	TBA (Chief Guest from DDA)
Training #31: One-Day Training Programme on	10:15 - 10:30	Session	Introduction to MoHUA's Housing for All Programme. GEZ, and the Bilateral Programme - Climate Smart Buildings	GIZ
Location: Delhi Date : 14 th June 2022, Tuesday Time : 10:00 AM to 5:30 PM	10:30 - 10:45		HIGH TEA and NETWORKING	
ABOUT THE TRAINING PROGRAMME The Ministry of Housing & Urban Affairs (MoHUA) in partnership with GIZ and the Building Material and Technology Promotion Council (BMTPC) is hosting a series of trainings/workshops on New age Innovative Construction Technologies & Thermal Comfort for Affordable Housing named RACHNA	10:45 - 12:15	Session I	Thermal Candurt: a) Indices b) Thermal conduct in Affordable Rossing c) Passive strategies & Building Physics d) Case studies	Expert Trainer (Gaurav Shorey)
[Resilient, Affordable and Comfortable Housing through National Action). The prime focus of this awareness workshop is to make participants aware of the Climate-Smart Buildings programme and gain knowledge on thermal comfort and its necessity in the affordable housing sector. The programme will cover the thermal comfort banics, material influences, low-cost solutions & codes that are available in India to create Climate-Smart Buildings. The participants will also learn about of 1 lobs Means Desired', Construction Technologies and another the affordable housing material is 1 lobs. Means Desired', Construction Technologies and another for any transmission and semi-	12:15 - 13:00	Secolog - 2	Thermal Conduct models a) Thermal Conduct standards IJMAC 0.42HIAE b) Effect of materials on thermal conduct	Expert Trainer (Ganzar Shorey)
of these technologies in their upcoming or future projects.	13:00 - 14:00		LUNCH BREAK	·
Venue: Conference Hall, Dethi Development Authority	14:00 - 15:00	Section - 3	New age innovative technologies along with the 6 LBD construction technologies focusing on - efficiency in construction, maintereasing & replication of technologies, and sustainable run thermal confort aspects.	Expert Trainer (Saif Oddin)
ikas Sadan, INA. New Delhi v Parther Denth, Plane drog on email to a farther denormal	15:00 - 16:00	Semion - 4	EcoNoma Samhita Fart 1 & 2 and its compliance	Espert Trainer (Saif Uddio)
aknow gazesborill@gmmsl.com	16:00 - 16:15		HIGH TEA and NETWORKING	
ARGET STAKEHOLDERS	10:15 - 17:00	Session - S	a) Low Energy Conduct Systems and BEE Star Labeling b) Indian & International Best Practices	Expert Trainer (Gauray Shorey)
	17:00 - 17:15	Concluding	Question & Anniver Session	Climate Smart Buildings (CSR Cell
Officials & professionals & Stakeholders Technograhm Policy makers Govt. Departments Builders / Developers	17:15 - 17:30	Session	Vote of Thanks	CIZ

Agenda for RACHNA #31



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Rachna on Twitter



GHTC INDIA @GhtcIndia

Recently, senior government engineers & professionals in Ranchi, Hyderabad, Delhi & Bhubaneswar attended trainings designed to make them aware of innovative **#constructiontechnologies & #thermalcomfort** in affordable housing.



6:57 PM · Jun 16, 2022 · Twitter Web App

Training #31 program proceedings on GHTC twitter handle





Training on emerging construction technologies & thermal comfort in LHPs for practitioners



Date: 15-16 June 2022No of participants: 64Location:



About the Event

Ministry of Housing and Urban Affairs (MoHUA) in collaboration between its subsidiary unit Building Material and Technology Promotion Council (BMTPC), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), is hosting a series of trainings on Innovative Construction Technologies & Thermal Comfort for Affordable Housing under the banner name RACHNA (Resilient, Affordable and Comfortable Housing through National Action). The focus of this training is thermal comfort and its necessity in the affordable housing sector. The training covers the thermal comfort basics, material influences, low-cost solutions & codes that are available in India to create Climate-Smart Buildings.

Trainer profile



Trainer 01- Shri. Jitendra Vyas Shri. Jitendra Vyas is a Structural Engineer with 16 years of experience and trained in Law, M.B.A. (Information Technology) & holds a P.G Diploma in Urban Planning and Development.

He is also a GRIHA Certified Professional and Evaluator, IGBC AP, GEM CP, EDGE Expert and Auditor, ECBC Master Trainer and empanelled ECBC expert with BEE, Ministry of Power. He is also registered as Third-Party Assessor for ECBC with Greater Hyderabad Municipal Corporation. He has conducted various training programs on sustainability, ECBC, Eco-Niwas Samhita and energy simulations.





Trainer 02- Shri Kumar Biplab is an Energy Engineer with more than 12 years of experience in project management, energy audits, retro-commissioning works, site execution, technical delivery, liaising, and

coordinating with clients, vendors & consultants. He has experience in working with advanced technologies, including but not limited to, combined heat & power, district heating & cooling, thermal energy storage, geothermal heating and cooling systems. He is a certified IBBI registered valuer, LEED Ap (O+M), BEE ECBC Master trainer, Edge Expert, PQP, IGBC AP. He has been a master trainer in about 48 training programs on ECBC.

Brief event proceedings

Welcome address

Ar. Abhishek Sharma, Co-Chair – IIA – Patna Chapter started off the event with an energetic welcome address that established the tone for the day, greeting all dignitaries and attendees present in the program. He also mentioned that the housing designs have drastically changed with time and with rise in temperature and global warming, inclusion of thermal comfort features are the need of the hour now.

Keynote Address



Ar. Abhishek Sharma, Co-Chair- IIA- Bihar Chapter giving the welcome address

Sri Sudip Kumar, Chairman-IGBC Patna Chapter & CREDAI Core Committee Member - Bihar started off his address by highlighting the need to follow the vernacular Indian construction practices and signalled that Indians have always been very conscious of the passive cooling inside houses and that is why there used to be a courtyard in almost every house built before.



Sri Sudip Kumar, Chairman-IGBC Patna chapter during his keynote address

Special Address

Shri Umesh Dhule, Team Lead – SLTC, PMAY (U), Bihar gave a brief of the progress made by the state of Bihar under the PMAY (U) scheme. He informed that plenty good work has been done through the BLC vertical of PMAY. The urban housing department has been involved in the construction of 2.5 lakh houses and the work in ongoing in various districts. He also urged the participants to create more awareness about the simple steps they can take to add thermal comfort in their dwellings.



Shri Umesh Dhule, Team Lead SLTC during his special address

GIZ CSB introduction:

Shri Chawan Vijay Kumar, from GIZ India Climate Smart Buildings Project, gave a brief presentation on the Climate Smart Buildings



project and highlighted the key initiatives undertaken by GIZ in India, mostly focusing on the sustainability sector, clean energy & energy efficiency services.

Technical sessions:

The event covered the following technical sessions:

Session 1: Thermal comfort in affordable housing & passive designs



Mr. Vijay from GIZ explaining about the CSB initiative.

Session 2: Thermal comfort standards & materials effect on thermal comfort



Mr Jitendra Vyas interacting with the participants

Session 3: New age innovative technologies along with the 6 LHP construction technologies

Session 4: Green building concept

Session 5: Eco Niwas Samhita 2021

Session 6: Eco Niwas Samhita – 2021 compliance & Tool demonstration

Session 7: Eco Niwas Samhita 2018

Session 8: Low energy comfort systems, BEE Star Labelling for residential buildings and Indian & international best practices

Outcome & impact of the event

The two-day event evoked great response from 64 participants from various government departments, building industry stakeholders & professionals from academia.



Participants asking questions during the Q&A session

Feedback from participants

The participants found the sessions relevant and need of the hour. They understood the importance of thermal comfort in buildings and its impact on the occupants. Further they understood the role of building materials, passive design strategies in making a building comfortable and latest construction technologies available in the market.



Agenda

	ed Velvet Hotel Patma, Bihar Date: 15 th -16 th June 20 AGENDA	fort for Affordable Housing 22 Time: 09:30 AM to 5:00 PM	Location: R	ve Construction Technologies & Thermal Com ed Velvet Hotel Patna, Bihar Date: 15* -16* June 202 Day -2 AGENDA	fort for Affordable Hou: 2 Time: 09:30 AM to 5:00	
OURATION	TOPIC	IPEALL	DURATION	TODAC	STRATE.	
	Pagettation	CREAR	10.00.11.00	Lawrence & Loss Minute Computing 2021	Out Sabel Sabe	
10:00-30:15	Introduction & Agenda Briefing	CSB Call	199000	With group exercise	BEBC Maider Trainer	
10:15-10:25	Welcome Address	Stvi Abhohek Sharma, Co-Chair - 14 Bihar	11:30-11:41	HIGH TEA & NETWORKIN	12	
1925-1935 1935-1945	Reports Address There Address	Chapter Seri Sodip Konne, CREDH: Core Committee memore: VID - Saelar Constructions Seri Union, Blade, Team Land - SLTC, PMAI Urlian, Blade	1645-1940	Termine fil alför5 2021 Compliance Hyllare denne an Foot (Thermanic confect analysis Affaresenationalises for consist and future Affareshin Machine Machine	Shei, Altendro Vyos BCBC Macher Trainer	
10:45-11:00	Introduction to MoHUA's 'Housing for All' Programme, GIZ, and the Bilateral Programme - Climate Smart Buildings	Stri. Orawan Vijoy Komar, 30				
11409-11-15	INCENTEA & ANTAICREE		1800-16:00	UNION BARA		
11.15-13:00	Semilon 3: Thermal Confort	Shri Jitendra Vyaz	14.00-15-30	Section 7: EMS 2018 Brief With technical exercion (Calculating BETV etc.)	BCBC Matter Trainer	
	allmönes billharmal annhari in Afhordable Houseng Cifeastive strategies & Building Physics d(Care Houles eUluie essentia	COIC Manar Trainer	35.00-46.35	Sension II: «(Xow Energy Comfort Systems and BEE Star Labelling hjimilan & international Bart Practices	Bect Alexandre Vyes BCBC Macher Trainer	
	Passive Architecturel Design Strategie Building Construction material Building Construction material Building		26:25:36:90	Q&A and Feedback	CIRCH	
13-09-18-00	LUNCH BREAK		36.15-36.30	Vote of Thanks	GIU/CIA CAR	
14:00-15:00	Sension 2: Thermal Comfort	Shri Atundra Vyez	19:30-17:00	5 No Tea & Retracting		
	a(Thermal Confort standards 5)8MAC c)ACRIMI d)[fteet of materials on thermal comfort	BORC Matter Trainer		CLOSE		
15-39-16-09	Securities 3: New age innovative technologies along with the 6 DIP rootrastion hadronizes forwards on efficiency in construction, mainstreaming & replication of technologies, and sustainable cum thermal condext aspects	Ar Okry Srivertens, CB Cell				
16:00-36:45	Seminn A: Green Buildings allbind byGreen Maaareer cibiologeneus and here embodied inaterials cibiologeneus and here embodied inaterials	Ar Glory Streamon, CSB Cell				
16:45 - 17:00	Q&A	CSB Gell				

Agenda for RACHNA #32





Training on thermal comfort for officers



Date: 15 June 2022No of participants: 30Location:



About the event

The Rachna for officers is organised for professionals interested in understanding the basics of thermal comfort needs and its applicability in affordable housing. Post training, the professionals will be able to design polices on thermal comfort and be equipped with monitoring and evaluating the impact to ensure thermal comfort in upcoming affordable housing is ensured. The training targeted senior officials having degree in engineering or architecture and serving in (a) Urban Local Bodies (b) State government and (c) Central government departments engaged in the development of affordable housing under various government

schemes, officials dealing with implementation of codes and policy related to thermal comfort, energy efficiency and affordable housing

Trainer profile



Prof. Rajan Rawal is an architect by training and is a senior advisor at Centre for Advanced Research in Building Science and Energy (CARBSE), and a CRDF Professor at CEPT University. He was Executive Director of

CARBSE between 2006 and 2021. He worked with Vastu Shilpa Foundation for Studies and Research in Environmental Design before joining Faculty of Design, CEPT University, Ahmedabad. He taught design and construction courses as part of the undergraduate program. He now teaches energy efficient built environment, energy policy, energy modelling and simulations at postgraduate level.


Brief event proceedings

Welcome address

The training started with the welcome address given by Dr. Rajan Rawal, Senior Advisor, CARBSE, CEPT University who gave and an overview of the trainings and explained that the current training is designed specifically for govt. officers who will be instrumental in developing new policies and complement implementation of policies through advanced knowledge of passive building design for thermal comfort in affordable housing.



Dr. Rawal explaining the importance of thermal comfort

GIZ CSB introduction

This was followed by the introduction of Climate Smart buildings delivered by Mr. S Vikash Ranjan from GIZ team. The introduction session gave an overview of PMAY(U) and the GIZ-CSB initiative, the project objectives and the team experts involved. He highlighted that GIZ on behalf of The Federal Ministry of Economic Cooperation and Development (BMZ), Germany, and in cooperation with the Ministry of Housing and Urban Affairs, Government of India aim to foster sustainability in built environment to use sustainable materials for Thermal Comfort and in turn improve the environment and climate conditions.

Technical sessions

The event covered the following technical sessions:

Session 1: Overview of innovative construction

technologies implemented in Light House Projects (LHPs)

Session 2: Importance of thermal comfort

Session 3: Affordable housing passive design strategies

Session 4: Building materials and methods of construction for affordable housing

Session 5: Building codes, affordable housing and thermal comfort

Session 6: Application of thermal comfort in affordable housing- Case Studies

Outcome & impact of the event

The event was attended by 23 govt. officials and 7 practicing professionals and faculties. The participants represented departments like Directorate for Municipal Administration (Urban Development and Housing department), Ranchi Municipal JREDA, Corporation, BIT Mesra, SPA Bhopal, SPPCL University, Jhakhand Police Housing Corporation etc. The participants learnt the importance and ways of constructing energy efficient and comfortable buildings and expressed interest in attending more trainings on thermal comfort and innovative constructions.



A glimpse of the participants from the session

Feedback from participants

The participants found the sessions thorough and much inspiring as they understood the importance of low cost thermally comfortable housing in India designed using passive strategies and really appreciated the interactive nature of the sessions





Agenda for RACHNA #33

Rachna on twitter



GHTC INDIA @GhtcIndia · Jun 16

Recently, senior government engineers & professionals in Ranchi, Hyderabad, Delhi & Bhubaneswar attended trainings designed to make them aware of innovative #constructiontechnologies & #thermalcomfort in affordable housing.



Training #33 program proceedings on GHTC twitter handle



Event pictures



Mr. Shailesh Agrawal from BMTPC explaining innovative technologies used at the LHPs



Dr. Rajan Rawal in the middle of a session.





Training on emerging construction technologies & thermal comfort in LHPs for practitioners



Date: 16- 17 June 2022No of participants: 55Location:



About the Event

Ministry of Housing and Urban Affairs (MoHUA) in collaboration with Building Material and Technology Promotion Council (BMTPC) and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), hosted this training on Innovative Construction

Technologies & Thermal Comfort for Affordable Housing under the banner of RACHNA (Resilient, Affordable and Comfortable Housing through National Action) at Simson Hotel, Chennai. The focus of this training is to familiarise practitioners with thermal comfort and its necessity in the affordable housing sector. The training covers the thermal comfort basics, material influences, low-cost solutions & codes that are available in India to create climate smart buildings.

Trainer profile



Trainer 01 – Architect Girija is an ardent advocate of sustainable living and energy efficiency. Her passion lies in leading the change and bringing awareness to green building and net zero concepts. She holds her

bachelor's degree from the School of Architecture and Planning and Post Graduate Research on Seismic Architecture from the University of Tokyo. With 20 years of international and local experience in Architectural Design, Project Management, Business Development, and Policy Implementation, she is currently the Consultant Architect for the TN Government and is in charge of Sustainable and Energy Efficiency code



Implementation in the State. She is a registered Architect with COA, a Fellow Member of IIA, and Well Accredited Professional.



Trainer 02-Crosby Paul is responsible for the green building certification rating system for all in-house design & build construction jobs for L&TConstruction, and making sure green requirements being incorporated in all levels of

workflow starting from tender to operating level. Some of the major projects. Projects include - Indira Gandhi International Airport – Terminal 1 certified as LEED pre-certified PLATINUM • Hyderabad International Airport – certified as LEED Pre-certified GOLD • NXTRA data centre certified as LEED SILVER • SCB Cuttack Hospital certified as IGBC Green Campus Precertified GOLD.

He has expertise in all facets of sustainability in building sector such as Building physics & Energy Simulation and is presently leading a team of 5 members for Daylight & Glare Simulation. He has been trained in GaBi software by M/s Think Step for undertaking in-house LCA analysis for all LEED projects. He has detailed working knowledge on cradle to grave approach for life cycle analysis. He is associated with life cycle assessment reporting of Hyderabad & Delhi International airports. In addition, he is involved in several in-house research projects & initiatives involving measurement approaches for thermal comfort in residential spaces, innovative HVAC systems, and construction & site audits for energy optimization. He is also an Energy Conservation Building Code Master Trainer and associated with knowledge dissemination for government & private sector personnel in adopting the code.

Brief event proceedings

Welcome & Keynote address

The session began with a keynote address & introduction to the cluster cell activities by Mr. Anand, Team Manager, Climate Smart Buildings Cell, South cluster. In the session, Mr. Anand emphasized the significance of this awareness

session and the need to guide the construction happening under PMAY-U, especially the self-build Beneficiary Led Construction (BLC) towards thermal comfort and sustainability by use of passive building design.

Keynote Address

The keynote address was followed by the first technical session by Mr. Balaji, LHP Chennai Site In-Charge, Building Materials & Technology Promotion Council (BMTPC). He educated the participants on the new innovative construction technologies being used across the 6 LHPs.



Mr. Balaji, LHP Chennai Site In-Charge, BMTPC during his session

Technical sessions

The event covered the following technical sessions:

Day 1:

Session 1: New age innovative technologies along with 6 LHP construction technologies

Session 2: Thermal Comfort:

- a) Indices
- b) Thermal comfort in affordable housing
- c) Passive strategies & building physics

Session 3: Thermal Comfort models:

- a) Thermal comfort standards
 - i.) IMAC & ii.) ASHRAE
 - b) Effect of materials on thermal comfort

Session 4: Green Building Ratings:

- a) Brief
- b) LHP Chennai green measures

RACINA



Mr. Crosby explaining the thermal comfort in affordable housing

Day 2:

Session 1: Eco-Niwas Samhita (ENS) Part I and its compliances

Session 2: LHP Chennai

- a) Compliance with ENS Part I
- b) Thermal comfort analysis
- c) Recommendations



Ms. Girija explaining ENS part I

Session 3: ENS Part II and its compliances

Session 4:

a) Low energy comfort systems and BEE Star labelling

b) Indian & international Best Practices

Session 5:

- a) Demonstration housing project analysis-Puducherry
- b) ARHC Sriperumbudur

Outcome & impact of the event

The two-day event evoked great response from the participants from various government departments, building industry stakeholders & professionals from academia. The training covered the thermal comfort basics, materials influences, low-cost solutions & codes that are available especially in India to create Climate-Smart Buildings. The training made the participants understand the need for thermal comfort & encouraged them to include no cost or low-cost strategies in their future projects. The training was well attended by officials and practitioners from Tamil Nadu Housing Board (TNHB) and Tamil Nadu Urban Habitat Development Board (TNUHDB).

Feedback from participants

The participants found the sessions very relevant. They understood the importance of thermal comfort in buildings and its impact on the occupants. Further they understood the role of building materials, passive design strategies in making a building comfortable and latest construction technologies available in the market.



Participants and the trainers together at the end of the training





Agenda for RACHNA #34

Rachna on Twitter



Training #34 program proceedings on GHTC twitter handle

RACINA



Training on thermal comfort for practitioners



Date: 17-18 June 2022No of participants: 15Location:



About the event

The Rachna for practitioners is organised for professionals interested in understanding the basics of thermal comfort needs and its applicability in affordable housing. Post training, the participants will be equipped with tools and know-how to design and evaluate affordable housing that provides enhanced thermal comfort.

The training targeted senior officials having degree in engineering or architecture and

serving in (a) Urban Local Bodies (b) State government and (c) Central government departments engaged in the development of affordable housing under various government scheme and practicing architects, civil engineers and urban planners.

Trainer profile



Dr. Rajan Rawal is a senior advisor at the Centre for Advanced Research in Building Science and Energy (CARBSE) and a CRDF Professor at CEPT University. He teaches energy-efficient built environments, energy

policy, energy modelling, and simulations at the postgraduate level. His work emphasizes on 'the energy performance of buildings and cities and 'architectural science education. He is a member of various technical core committees of the Bureau of Energy Efficiency. Dr. Rawal represents India at International Energy Agency EBC Annex. 69, Mission Innovation Challenge 7, and Global Building Performance Network (GBPN). Dr. Rajan Rawal has been honoured with Fellow status by ASHRAE in 2020, the first Indian architect to receive such an honour.



He was recognized as ASHRAE Distinguished Lecturer in 2021.

Brief event proceedings

Welcome address

The training started with the welcome address given by Dr. Rajan Rawal, Senior Advisor, CARBSE, CEPT university. Mr. Rajan highlighted that the current Rachna training is designed specifically for practicing architects, engineers who post training will be equipped with tools and know-how to design and evaluate affordable housing using advanced knowledge of passive building design for thermal comfort in affordable housing.

GIZ CSB introduction

This was followed by the introduction of Climate Smart buildings delivered by Mr. Abdullah Siddiqui from GIZ team. The introduction session gave an overview of PMAY(U) and the GIZ-CSB project, its objectives and the team experts involved. He highlighted that GIZ on behalf of The Federal Ministry of Economic Cooperation and Development (BMZ), Germany, and in cooperation with the Ministry of Housing and Urban Affairs, Government of India aim to foster sustainability in built environment to use sustainable materials for thermal comfort and in turn improve the environment and climate conditions.

Technical sessions

The event covered the following technical sessions:

Session 1: Importance of thermal comfort

Session 2: Building physics and its relationship with thermal comfort

Session 3: Fundamentals of thermal comfort

Session 4: Affordable housing passive design strategies

Session 5: Building materials and methods of construction for affordable housing

Session 6: Building codes, affordable housing and thermal comfort

Session 7: Application of thermal comfort in affordable housing- Case Studies

Session 8: Thermal comfort study methods

Session 9: Low energy cooling technologies and comfort



Session by BMTPC explaining the innovative technologies being used at LHPs

Outcome & impact of the event

The event was attended by 15 participants from engineering, architecture, and urban planning background and faculties from various institutions across India. A healthy participation and enthusiasm led to discussion on real life situations related to costs of materials, timeline of projects and highlighted projects that are already using sustainable materials that have been ensuring thermally comfortable living environments for the occupants.

Feedback from participants

The participants found the sessions thorough and much inspiring. They understood the importance of low cost thermally comfortable housing in India designed using passive strategies and really appreciated the interactive nature of the sessions and the quality of the content specifically designed for improving thermal comfort in affordable housing in India.





Agenda for RACHNA #35

Compendium of Trainings & Workshops

RACINA



Pictures from the training program





Training on emerging construction technologies & thermal comfort in Light House Projects for officers



Date: 17th June 2022No of participants: 49Location:

Academicians and Professionals aware about the latest construction technologies being used at LHPs, also about thermal comfort, green building concept, Eco-Niwas Samhita tool and standard.



About the event

Ministry of Housing and Urban Affairs (MoHUA) in collaboration between its subsidiary unit Building Material and Technology Promotion Council (BMTPC), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), organised a training on innovative construction technologies & thermal comfort for affordable housing under the banner name RACHNA (Resilient, Affordable and Comfortable Housing through National Action). The prime focus of this training is to make the Govt Officials,

Trainer profile



Trainer 01-Gaurav Shorey has a bachelor's degree in Architecture (B.Arch. School of Planning and Architecture, New Delhi) with a postgraduate diploma in advanced construction management (D.A.C.M – National Institute

for Construction Management and Research, Pune).

He has seventeen years of experience in sustainable habitats during which he has transitioned from the green buildings and energy efficiency sector to education & awareness-generation. His work now focuses on sustainability in the hyper-local context, and for the need to preserve traditional knowledge systems for sustainable development and climate-change mitigation. He also has twelve years of experience in academics during which he



has served as permanent and visiting faculty at Sushant School of Art & Architecture (Gurgaon), the School of Planning and Architecture (New Delhi), and at Leuphana University (Luneburg, Germany). He is a ECBC master trainer certified by BEE, Govt of India, Trainer and Technical advisory committee member certified by Green Rating for integrated Habitat Assessment (GRIHA).



Trainer 02-Mr Saif Uddin is an Energy Engineer by qualification and Building Policy Expert by profession having more than 8 years of experience in the domain of Energy Conservation Building Code, Eco-Niwas

Samhita implementation with government of Uttar Pradesh, Himachal Pradesh, Rajasthan & Bihar. Building Energy Simulation for ECBC, ASHRAE 90.1 and general energy optimization is his key expertise. He is a certified IGBC Associate professional, and GRIHA certified professional.

He has been also involved in the development of ENS Tool and ECBC App developed by Bureau of Energy Efficiency, Ministry of Power for Commercial & Residential Buildings.

Brief event proceedings

Welcome address



Mr. S Vikash Ranjan giving the welcome address

Shri Vikash Ranjan, Project Head, GIZ in his address welcomed all the senior officials, panellists and participants present and emphasized and stressed on the need of integrating thermal comfort in affordable housing segment. Post his address, all the dignitaries were facilitated by handing over plantlets.



Dr. Shailesh Kr. Agrawal during his keynote address

Keynote Address

Shri Shailesh Kr. Agrawal, Executive Director, BMTPC delivered the Keynote Address. In his special address he concentrated on the technological aspects of the innovative construction technologies coming up in the building sector in India.

Technical sessions

The event covered the following technical sessions:

Session 1: New age innovative technologies along with the 6 LHP construction technologies

Session 2: Thermal comfort in Affordable Housing & Passive Designs



Dr. Shailesh Agrawal explaining the 6 LHP technologies



Session 3: Thermal Comfort models: Standards, Codes and Building Materials



Mr. Gaurav explaining the importance of thermal comfort

Session 4: Eco-Niwas Samhita (ENS) part I&II and its compliances



Mr. Saif elaborating on ENS part I and II

Session 5: Low Energy Comfort Systems, Star Labelling and Best Practices



Mr. Saif explaining the ENS tool

Outcome & impact of the event

The outcome of the training is to make the senior govt. officials and practitioners understand the concept of the technology, it's need, green building concepts & urge them to adopt include in their practices and upcoming projects. The event evoked great response from 49 participants. The participants include senior officials, architects, planner and engineers from govt. departments. Also, practitioners who are senior resources in their organizations found the sessions very useful and catering to the requirement for future construction.

Feedback from participants

The participants found the event informative and interesting in terms of learnings and its approaches towards practical implementations. They also added & emphasized to organize more such events and small training sessions.



	Yatan G	NAME NAME NAME AND A CONTRACT OF A SAME AND A CONTRACT A SAME AND A CONTRACT A SAME A SAME AND A CONTRACT A SAME AND A CO	binipc giz		
	Innovative Construction Technologies & Thermal Comfort for Affordable Housing Location: Delhi Date : 17 th June 2022, Friday Time : 10:00 AM - 4:30 PM AGENDA				
	DURATION	TOPIC	SPEANER		
	10:00 - 10:30	Registration	or controls		
	10:30 - 10:40	Lamp Lighting	By Dignitaries		
RESILIENT, AFFORDABLE AND COMFORTABLE HOUSING THROUGH NATIONAL ACTION	10:40 - 10:50	Walcome Address	Shri Vikash Ranjan, Project Head, GIZ		
	10:50 - 11:00	Falicitation of Dignituries	Shri Vikash Ranjan, Project Head, 612		
Training #36: One-Day Training Programme on	11:00 - 11:15	Keynote Address	Chief Guest Shri Kuldip Narayan (IAS), IS & MD HFA.		
	11:15 - 11:30	HIGH TEA & NETV	VORKING		
Innovative Construction Technologies & Thermal Comfort for Affordable Housing' Location: Delhi Date : 17 th June 2022, Friday Time : 10:00 AM - 04:30 PM ABOUTT THE TRAINING PROGRAMME:	11:30 - 12:00	New age innovative technologies along with the 6 LHP construction technologies focusing on - efficiency in construction, mainstreaming & replication of technologies.	Shri Shaileoh Kr. Agrawal, ED. BMTPC		
The Ministry of Housing & Urban Affairs (MoHUA) in partnership with GIZ and the Building Material and Technology Promotion Council (BMTPC) is hosting a series of trainings/workshops on Innovative	12:00 - 12:30	Introduction: Thermal Comfort for Affordable Housing	SMH Adil, TL, CSB Cell, Lucknow		
Construction Technologies & Thermal Comfort for Affordable Housing named RACHNA (Resultent, Affordable and Comfortable Housing through National Action). The prime focus of this training programme is to make participants gain knowledge on thermal comfort and its necessity in the affordable housing sector. The programme covers material influences, low-cost solutions & codes that are available in India to create Chimate-Smart Buildings. The participants will also get familiar with a low memory comfort nuture und clobal bact tractions. The actionum of the programme would be to develop	12:30 - 13:15	Session 1: Thermal Comfort a) Need and Impact b) Thermal comfort in Affordable Housing c) Passive strategies & Building Physics d) Case Studies	Expert Trainer (Gaurav Shorey)		
the capacities of participating policymakers and implementers for mainstreaming thermal comfort in	13:15 - 14:15	LUNCH BRE	AK		
housing policies and incorporating thermal comfort provisions in Byelaws. Venue: Juniper Hall: Habitat World at	14:15 - 14:45	Session 2: Thermal Comfort models a) Thermal Comfort standards 1. INAC 2. ASHRAE b) Effect of materials on thermal comfort	Expert Trainer (Gaurav Shorey)		
India Habitat Centre, Lodhi Road. New Delhi - 110003	14:45 - 15:30	Session 3: Eco Niwas Samhita EcoNiwas Samhita Part 1 $\&$ 2, Overview and its role in Thermal Comfort and Energy Efficiency in affordable housing	Expert Trainer (Saif Uddin)		
TARGET STAKEHOLDERS	15:30 - 16:00	Session 4: Star Labelling a) Low Energy Comfort Systems and BEE Star Labelling b) Indian & International Best Practices	Expert Trainer (Saif Uddin)		
	16:00 - 16:15	HIGH TEA & NETV	VORKING		
	16:15 - 16:30	Vote of thanks	Shri Vikash Ranjan. Project Head, GIZ		
Senior Govt. Built-environment Officials & professionals & Stakeholders Policy makers Govt. Departments					

Agenda for RACHNA #36

Rachna on Twitter



Training #36 program proceedings on GHTC twitter handle





Training on thermal comfort for officers



Date: 20No of participants: 15Location:

: 20th June 2022 : 15



About the event

The Rachna for officers is organised for professionals interested in understanding the basics of thermal comfort needs and its applicability in affordable housing. Post training, the professionals will be able to design polices on thermal comfort and be equipped with monitoring and evaluating the impact to ensure thermal comfort in upcoming affordable housing is ensured. The training targeted senior officials having degree in engineering or architecture and serving in (a) Urban Local Bodies (b) State government and (c) Central government departments engaged in the development of affordable housing under various government schemes, officials dealing with implementation of codes and policy related to thermal comfort, energy efficiency and affordable housing

Trainer profile



Dr. Yash Kumar Shukla is the Principal Researcher and Centre Head at the Centre for Advanced Research in Building Science and Energy (CARBSE). He has led several ground-breaking research projects including low-energy

cooling and ventilation systems in Indian residences, evaluation of innovative cooling technologies, and benchmarking of Indian buildings. He is also associated with the Master of Technology in Building Energy Performance (MBEP) program at the Faculty of Technology, CEPT University.



Brief event proceedings

Welcome address

The training started with the welcome address given by Dr. Yash Shukla from CEPT university. He highlighted the different modules under Rachna initiative and that the current training is designed specifically for govt. officers who will be instrumental in developing new policies and complement implementation of policies through advanced knowledge of passive building design for thermal comfort in affordable housing.



Dr. Yash going over the different Rachna training modules

GIZ CSB introduction

This was followed by the introduction of Climate Smart buildings delivered by Mr. S Vikash Ranjan from GIZ team, The introduction session gave an overview of PMAY(U) and the GIZ-CSB initiative, the project objectives and the team experts involved.



Mr. Vikash from GIZ explaining the CSB program

He highlighted that GIZ on behalf of The Federal Ministry of Economic Cooperation and Development (BMZ), Germany, and in cooperation with the Ministry of Housing and Urban Affairs, Government of India aim to foster sustainability in built environment to use sustainable materials for thermal comfort and in turn improve the environment and climate conditions.

Technical sessions

The event covered the following technical sessions:

Session 1: Importance of thermal comfort

Session 2: affordable housing passive design strategies

Session 3: Building materials and methods of construction for affordable housing

Session 4: Building codes, affordable housing and thermal comfort

Session 5: Application of thermal comfort in affordable housing- Case studies

Session 6: Overview of innovative construction technologies implemented in Light House Projects (LHPs)

Outcome & impact of the event

The event was attended by 15 government officials. These officials represented organisations such as Energy Management Centre Kerala, PMAY, Public work department, ULBs etc. The training program saw a healthy discussion amongst each other, the trainer and discussed real life situations related to costs of materials, timeline of projects and highlighted projects that are already using sustainable materials that have been ensuring thermally comfortable living environments for the occupants.

Feedback from participants

The participants found the sessions thorough and much inspiring. They understood the importance of low cost thermally comfortable housing in India designed using passive strategies and really appreciated the interactive nature of the sessions and the quality of the content specifically designed for improving thermal comfort in affordable housing in India.





Agenda for the RACHNA #37

RACINA



Pictures from the training program





Training on emerging construction technologies & thermal comfort in Light House Projects for officers



Date : **22nd J** No of participants : **47** Location :

: 22nd June 2022 : 47 .



About the event

The Ministry of Housing and Urban Affairs, in conjunction with GiZ India held a one-day training session for professionals called Rachna, which was attended by government officials from different divisions of State and Central Government (Officials from Urban Development & Urban Housing Department, Roads & Building Department, Gandhinagar Urban Development Authority, Ahmedabad Municipal Corporation, Ahmedabad Urban Development Authority, Climate Change Department, etc.), Architects, etc. The prime motive of the training is to create awareness about the thermal comfort and its necessity in the affordable housing sector.

Trainer profile



Shri. Rajendra Pandya is a Certified ECBC Master Trainer by Bureau of Energy Efficiency, GOI, New Delhi and ISO – 50001 Lead Auditor. He has served as a Head of Department of the Energy Conservation Cell at Gujarat

Energy Development Agency – a Government of Gujarat Organization under the Climate Change Department. He is currently working as a visiting faculty at CEPT University and Parul Institute of Technology, Waghodia, Vadodara.

Brief event proceedings

Welcome address

The training Program was formally started by Mr. Winamra Negi, Engineer Consultant Climate Smart Buildings Cell, GIZ, by warmly welcoming all the participants and introducing RACHNA, the initiative by MoHUA and the objectives of the training program.





Keynote Address by Shri. Shwetal Shah, Technical Advisor, Climate Change Department – Govt. of Gujarat

Subsequently, he invited Shri. Shwetal Shah, Technical Advisor, Climate Change Department - Govt. of Gujarat to deliver the Keynote Address to the training program attendees. Shri. Shwetal Shah expressed his appreciation of the fact that MoHUA and BMTPC in association with GiZ are taking a lead in educating and imparting knowledge on key concepts like thermal comfort in buildings to building sector stakeholders, especially the state stakeholder departments officials and creating a movement towards making affordable housing sustainable and thermally comfortable. He urged the participants from the State Govt. departments to try to practice the concepts learnt in the training program in their upcoming housing projects.

GIZ CSB introduction

This was followed by the introduction of Climate Smart buildings delivered by Mr. Abdulla Siddiqui from GIZ team, The introduction session gave an overview of PMAY(U) and the GIZ-CSB initiative, the project objectives and the team experts involved. He highlighted that GIZ on behalf of The Federal Ministry of Economic Cooperation and Development (BMZ), Germany, and in cooperation with the



Mr. Swetal Shah explaining construction methodology

Ministry of Housing and Urban Affairs, Government of India aim to foster sustainability in built environment to use sustainable materials for Thermal comfort and in turn improve the environment and climate conditions.

Technical sessions

The event covered the following technical sessions:

Session 1: Thermal comfort:

- Indices
- Thermal comfort in affordable housing
- Passive strategies and building physics
- Case studies.

Session 2: Thermal comfort models:

- Thermal comfort standards i) IMAC and ii) ASHRAE
- Effects of materials on thermal comfort

Session 3: New age innovative technologies along with the 6 LHP construction technologies.

Session 4: Eco-Niwas Samhita I&II and its compliance



Session 5:

- Low energy comfort system and BEE Star Labelling
- Indian and international best practices.

Outcome & impact of the event

The event was attended by 47 government officials from energy and architectural domain. These officials represented organisations such as Gujarat Urban Development Authority, Urban Development & Urban Housing Department, Capital Project Subdivision 1 - R & B Dept., Gujarat High Court Subdivision 1 - R & B



Dept., Modarch Architects, Roads & Building Department, Affordable Housing Mission, I-Con Architects & Urban Planners, Bitcol India Pvt Ltd, Global Building Performance network, LTO & M etc.



Master trainer during technical session 3

The training program saw a healthy discussion amongst each other, the trainer and discussed real life situations related to costs of materials, timeline of projects and highlighted projects that are already using sustainable materials that have been ensuring thermally comfortable living environments for the occupants.

Feedback from participants

The participants found the sessions thorough and much inspiring. They understood the importance of low cost thermally comfortable housing in India designed using passive strategies and really appreciated the interactive nature of the sessions and the quality of the content specifically designed for improving thermal comfort in affordable housing in India.



Networking moments during the training program

Shri. Shwetal Shah – Technical Advisor, Climate Change Department – Govt. of Gujarat delivered the vote of thanks at the end of Training Program. He applauded the initiative by Ministry of Housing and Urban Affairs (MoHUA) – GoI to bring the concept of thermal comfort in the affordable housing sector, thus providing an opportunity to less privileged to live a comfortable and dignified life. Further he applauded the CSB Cell team members for their active efforts in the overall coordination and arrangement of this event. He also congratulated the participants for showing keen interest on the subject and their participation towards making the event a success.



	Innovati	ve Construction Technologies & The n: Seminar Hall, Ahmedabad Management Aro Time : 01:30 AM 1 AGEN	rmal Comfort for Affordable Housing station Date : 22 nd June 2022 , Wednesday is 500 PM IDA			
	EURATION I	TOPIC	CICARDS			
	9:30-30:30	Registration	6/2 - Climate Smart Buildings (CSB) Cell			
	10:39-10:45	Welcome Address	Gi2 - Climate Smart Buildings (CSR) Cell			
ORDABLE AND COMFORTABLE HOUSING THROUGH NATI raining #38: One-Day Training Programme on	ONAL ACTION	Keynote Address	Shri, Shweital Shah Tacholcal Advizer – Dimate Otange Department Govt of Gujanat			
onstruction Technologies & Thermal Comfort for Affor Seminar Hat, Alexaddiad Mangement Association Date (22 ^{ed} June 2022, W Time (09:30 AM to 5:50 PM	dable Housing' 10.45-11.00	Netroduction to MoHUA's Housing for All Programme, GC, and the Balaraval Programme - Climate Smart Buildings (CBI)	Gi2 - Climate Smart Buildings (CSB) Cell			
ETRAINING:	11-00-21:15	HIGH-TEA & NETWORKING				
ng & Urban Affairs (MOHUA) in partnership with GIZ and Build n Council (IMTPC) is hosting series of training/workshop ogles & Thermal Comfort for Affordable Housing named RA ortable Housing through National Action. The prime focus of	ng Material and i on innovative CNNA (Resilient, this training is	Session 3: Thermal Conduct: al Indicas, 0) Thermal confloct in Altordable Housing () Passive strategies & Building Physics. 4) Case studies	Mr. Rajendra Pandya BEE Certified ICDC Matter Trainer			
its necessity in the affordable housing sector. The training cov rial influences, low-cost solutions & codes that are available in ngs. The outcome of the training would be to make the stak	ers the thermal 11.45.52.00 India to create eholders in the	Session 2: Thermal Conflort models: a) Thermal Confort standards LBMAC & KASHBAE b) Effect of materials on thermal confort	Mr. Rajendra Pandya REE Cartified ECBC Master Trainer			
ir understand the need for thermal comfort & urge them to in coming projects.	clude no cost or 12-36-13-86	Session 3: New age innovative technologies along with the 6 LHP construction technologies	Mr. Blendra Vyas GRIHA Trainer & Evaluator, EDGE Expert & Auditor and BEE Certified ECBE Macter Trainer			
	13/30-54/15		ILOI BREAK			
Ahmedabad Association, Dr. Vikram	14:15-15:00	Session 4: EcoNtress Sambula Part 1.6.2 and its compliances	Mr. Stends a Vyac GRINA Trainer & Evaluator, EDGE Expert & Auditor and BEE Certifical ECBC Master Trainer			
ujarat - 380009	15-00-15-00	Sension Sraft Low Energy Constant Systems and BEE Star Labelling & b) Indian & International Best Practices	Mr. Standra Vyan GRMA Trainer & Evaluator, EDGE Expert & Auditor and BEE Caroffed ECBC Master Trainer			
R in raket pic caballifysic com	15-80-36-00	Q&A and levellack	62 - Oimate Smart Buildings (CSB) Cell			
OLDERS	16:00-16:05	Vete of Thanks	GQ - Climate Smart Buildings (CSB) Cell			
n n n	*** 16.05-17-00		HIGH TEA			
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Agenda for the RACHNA #38

Rachna on Twitter



Training # 38 program proceedings on GHTC twitter handle





Training on emerging construction technologies & thermal comfort in LHPs for practitioners



Date: 22No of participants: 24Location:

: 22- 23 June 2022 : 24



About the Event

The Rachna for practitioners is organised for professionals interested in understanding the basics of thermal comfort needs and its applicability in affordable housing. Post training, the participants will be equipped with tools and know-how to design and evaluate affordable housing that provides enhanced thermal comfort.

The training targeted senior officials having

degree in engineering or architecture and serving in (a) Urban Local Bodies (b) State government and (c) Central government departments engaged in the development of affordable housing under various government scheme and practicing architects, civil engineers and urban planners.

Trainer profile



Prof. Rajan Rawal is an architect by training and is a senior advisor at Centre for Advanced Research in Building Science and Energy (CARBSE), and a CRDF Professor at CEPT University. He was Executive Director of

CARBSE between 2006 and 2021. He worked with Vastu Shilpa Foundation for Studies and Research in Environmental Design before joining Faculty of Design, CEPT University, Ahmedabad. He taught design and construction courses as part of the undergraduate program. He now teaches energy efficient built environment, energy policy, energy modelling and simulations at postgraduate level.



Brief event proceedings

Welcome address

The training started with the welcome address given by Dr. Rajan Rawal, Senior Advisor, CARBSE, CEPT university. and an overview of training. Dr. Rajan started off the event with an inspiring address that established the tone for the day, greeting all attendees and giving them a glimpse of the upcoming sessions and giving an overview of the current training which is designed specifically for practitioners and academicians who will be instrumental in implementation of policies at ground level through application of passive building design for thermal comfort in affordable housing.

GIZ CSB introduction

The introduction session given by Ms. Divya Bansal Talwar provided an overview of PMAY(U) and the GIZ-CSB initiative, the project objectives and the team experts involved. It further elaborated on the project objectives and the roles of the relevant stakeholders.

Technical sessions

The event covered the following technical sessions

Day 1-

Session 1: Overview of the workshop, introduction of the project and trainers

Session 2: Importance of thermal Comfort

Session 3: Affordable housing passive design Strategies

Session 4: Building materials and methods of construction for affordable housing

Session 5: Building codes, affordable housing and thermal comfort

Session 6: Application of thermal comfort in affordable housing- Case studies

Session 7: Day 1 Concluding remarks

Day 2-

Session 8: Day 1 recap

Session 9: Building codes, affordable housing

and thermal comfort

Session 10: Application of thermal Comfort in Affordable Housing- A Suite of Case Studies

Session 11: Thermal Comfort study methods

Session 12: Low energy cooling technologies and comfort

Session 13: Discussions on quiz-questionnaires

Session 14: Feedback from participants and concluding remarks

Outcome & impact of the event

The event was attended by Architects, Engineers and building energy experts from construction domain and represented organisations such as Saint Gobain, Glazing Society of India, and multiple architectural firms such as arkDes studio, Sharan Architects etc. The attendees also included academicians from St. Peter's College of Engineering



Dr. Rajan setting the context of the training program

Feedback from participants

The training program was interactive and brought up discussions between the participants and the trainers on thermal properties of materials and surface finishes. The questions from participants involved around codes and compliance as well as understanding the difference between traditional construction practices and conventions systems.



Target Stake	olders				15h00 - 15h45	Session 5: Affordable Housing Passive Design Strategies	Dr. Rajan Rawal
					15h45-16h00	Questions and Answers	
					16h00- 16h15	Health Break	
		ATA)			16h15 – 17h15	Session 6: Building Materials and Methods of Construction for Affordable Housing	Dr. Rajan Rawal
					17h15 – 17h25	Questions and Answers	
Senior Govt. Off	icials Built-environment professionals Buil	lding sector	Technograhis		17h25 - 17h30	Session 7: Day 1 Concluding Remarks	Dr. Rajan Rawal
& Policy make	ers & Govt. Departments sta	ikeholders		4	Þ		
'RACHNA for Pra	ctitioners' training program will deliver in-depth knowl	edge on thermal comfor	t, its nuances, and its		Day 2- June 23	2022 (Thursday)	
relationship with techniques, policy	 building physics. Moreover, it will familiarize parti y documents, building codes, international practices, an 	icipants with design str id other aspects relevant	ategies, construction to thermal comfort in		10h00 - 10h15	Session 8: Day 1 Recap	Dr. Rajan Rawal
affordable housin the statistics and i	g through a suite of case studies. Additionally, it will dist indicators involved as well as affordable cooling technol	cuss the evaluation proce opies and their applicabil	ss of thermal comfort, ity in various climates.		10h15 - 11h15	Session 9: Building Codes, Affordable Housing and Thermal Comfort	Dr. Rajan Rawal
	the statistics and indicators involved as well as anordadie cooling technologies and their applicability in various climates.				11h15 - 11h30	Questions and Answers	
Session plan i	s as rollows:				11h30 – 11h45	Health Break	
10h00 - 10h05	Welcome address and Introduction to PMAY(U)		Dr. Rajan Rawal		11h45 – 12h45	Session 10: Application of Thermal Comfort in Affordable Housing- A Suite of Case Studies	Dr. Rajan Rawal
10h05 - 10h10	Introduction to Climate Smart Buildings programme (I	GEN-CSB)	Mr. Abdullah Nisar Siddiqui			Session 10A (Technical): Overview of Innovative construction technologies implemented in Light House Projects (LHPs)	
10h10 - 10h15	Session 1: Overview of the workshop, introduction of t	the project and	Dr. Rajan Rawal		12h45 - 13h00	Questions and Answers	
	introduction of the trainers				13h00 - 14h00	Lunch Break	
10h15 - 11h15 (60 min)	Session 2: Importance of Thermal Comfort		Dr. Rajan Rawal		14h00 – 15h00	Session 11: Thermal Comfort Study Methods	Dr. Rajan Rawal
11h15 - 11h30	Questions and Answers				15h00 - 15h15	Questions and Answers	
11h30 - 11h45	Health Break		••••••		15h15 – 16h15	Session 12: Low Energy Cooling Technologies and Comfort	Dr. Rajan Rawal
11h45 – 12h45	Session 3: Building Physics and its relationship with Th	ermal comfort	Dr. Rajan Rawal		16h15 – 16h30	Questions and Answers	
12h45 - 13h00	Questions and Answers				16h30 – 17h00	Overview of Innovative construction technologies implemented in Light House	Dr. Rajan Rawal
13h00 - 14h00	Lunch Break					Projects (LHPs)*	
14h00 - 14h45	Session 4: Fundamentals of Thermal Comfort		Dr. Rajan Rawal		17h00 – 17h15	Session 13: Discussions on quiz-questionnaires and feedback from participant	Dr. Rajan Rawal
14h45 - 15h00	Questions and Answers				17h15 - 17h30	Session 14: Concluding Remarks	Dr. Rajan Rawal
-				-			
				ИС			

Agenda for the RACHNA #39





Pictures from the training program





Training on emerging construction technologies & thermal comfort in LHPs for practitioners



Date: 23No of participants: 50Location:

: 23 - 24 June 2022 : 50



About the Event

In order to introduce new construction technologies, Ministry of Housing and Urban Affairs (MoHUA) has initiated the Global Housing Technology Challenge - India (GHTC-India) with an intent of recognizing a plethora of new-age construction technologies from across the globe for housing construction sector which can deliver ready to live-in homes in minimal time and cost with high-quality of construction in a sustainable manner. The training was intended for senior officials with engineering or architecture backgrounds who work in (a) Urban local bodies (b) State governments (c) and Central Government who are involved in the development of affordable housing under various government programmes. These officials also deal with the implementation of codes and policies related to thermal comfort, energy efficiency, and affordable housing.

Trainer profile



Trainer 01-Shri Saibal Saha has done post-graduation in Urban Environment Management & Law from the National Law University, Delhi. He holds above 28 years of industry experience. He is a BEE Certified Energy Auditor

and ECBC Master Trainer, GRIHA certified professional and is working as Third-Party Assessor for ECBC in Telangana and Andhra Pradesh. He is working on Building-Energy Efficiency, Green Building Certification, Energy –audits, and Environmental Management Plan for large construction (Buildings) projects. He



has provided training on the implementation of the 'Energy Conservation Building Code of India' to different state government officials of the country, including more than 50 training and awareness programs on ECBC.



Trainer 02-Miss. Ragini Goswami is an Architect and a certified Green Building Professional with more than 9 years of work experience in providing specialized services to obtain green certifications under LEED, IGBC, GRIHA,

EDGE and ECBC Compliance for the Buildings. She has earned credentials from IGBC AP and GRIHA CP and BEE as Certified ECBC Master Trainer. She has conducted more than 15 training programs in Chhattisgarh, Meghalaya, Manipur, Meghalaya, Mizoram, Nagaland on ECBC 2017 code (Commercial building) and Eco-Niwas Samhita (ENS) code (Residential buildings) as a Master trainer.

Brief event proceedings

Welcome address

Shri Richand Ahmed, Mission Director, PMAY HFA (U), Assam started the event with an inspiring address that established the tone for the day, greeting all dignitaries and attendees, sharing a brief of the session.



Shri Richard Ahmed, MD, PMAY HFA, Assam during his welcome address

The Welcome address was backed up by an energetic special Speech by Shri. Sanjay Mahanta, Chief Engineer – GMDA, where he stressed the need of mass housing considering the increase of population in the country & enlightened the participants on the government measures adopted on the same.

GIZ CSB introduction

Shri Rajesh Debbarma, Team Manager – CSB Cell, East Cluster, Agartala spoke in detail about the various initiatives of GIZ in India in the sustainability sector, clean energy & energy efficiency services. He also shared the objective of introducing this project as to ameliorate climate resilience and thermal comfort in buildings constructed under Pradhan Mantri Aawas Yojana (Urban).

Further, he updated that the Light House Projects is happening across six states of the country with different technologies with the sole intention of providing ready to live-in homes with minimal time and cost along with highquality of construction in a sustainable manner.



Shri Rajesh Debbarma, Engineer, CSB Cell East Cluster – Agartala, explaining to the participants the Light House Projects

Technical sessions

The event covered the following technical sessions:

Session 1: Session 1: Thermal comfort: a) Indices, b) Thermal comfort in affordable housing, c) Passive strategies and building physics, d) Case studies.

Session 2: Thermal comfort models: a) Thermal comfort standards i.) IMAC and ii) ASHRAE

Session 3: New age innovative technologies along with the 6 LHP construction technologies.



Session 4: Green buildings: a) Brief b) Green measures c) indigenous and low embodied materials d) Best practices

Session 5: Eco-Niwas Samhita I&II and its compliance

Session 6: a) ENS 2021 Compliance, b) Live demo on tool, c) Thermal comfort analysis, d) Recommendations to current and future Affordable housing projects

Session 7: ENS 2018 brief with technical exercise (calculating RETV etc.)

Session 8: a) Low energy comfort system and BEE Star Labelling, b) Indian and international best practices

Outcome & impact of the event

The event was attended by various officials from different government departments of Assam including the academic sector such as Adition Pvt Ltd, Town & Country Planning organisation, Municipal Corporation, Royal Global University, JJ Design Engineering, Guwahati College of Architecture & Planning, Council of Architecture Assam. The overall Programme was planned in such a way that it had a very balanced mixture of technical presentations, practical learning, as well as equal opportunity and exposure for networking.



Participants having an interactive session with the ECBC Master Trainers

Entire training session was bifurcated in three aspects - Theoretical, Compliance & design along with practical knowledge transfer. The training session featured a constructive exchange of ideas between participants, the instructor, and

real-world scenarios involving material pricing, project timelines, and projects that have already been employing sustainable materials to provide their inhabitants with suitable living spaces.

Feedback from participants

The participants found the sessions thorough and much inspiring. They understood the importance of low cost thermally comfortable housing in India designed using passive strategies and really appreciated the interactive nature of the sessions and the quality of the content specifically designed for improving thermal comfort in affordable housing in India. The two days long event evoked great response from 50 professionals.



Felicitation to the dignitaries & trainers

The event was an amalgamation of theoretical, design & compliance knowhow along with practical facets. Post the technical sessions, the participants were given a multiple choicebased questionnaire covering all aspects related to innovation construction technology and thermal comfort. The attendees participated wholeheartedly and with utmost enthusiasm.

Shri Rajesh Debbarma, Team Manager – CSB Cell, East Cluster, Agartala delivered the precious vote of thanks. He applauded MoHUA team members along with the volunteers involved for their active efforts in the overall coordination and arrangement of this event.





Agenda for the RACHNA #40

Rachna on Twitter



Training #40 program proceedings on GHTC twitter handle

RACINA



Vocational training for construction workers



Date: 23-24 June 2022No of participants: 76Location:



About the event

The Rachna vocational training is organised for contractors and masons interested in understanding the basics of thermal comfort needs and its applicability in affordable housing. The training is to educate masons, and contractors on the new construction technologies and building materials that are prevalently used in affordable housing construction. The training targeted contractors, masons, insulation applicators and other field workers. The training covers the technical aspect and practical application of the technology, also includes system and materials that are being used. The prime focus of this training is to make the construction field workers aware about the latest technology i.e., Pre-Fabricated Sandwich Panel System is being used at LHP, Indore and Insulating Concrete Formwork Technology (ICF) is being used at Demonstration Housing Project, Bhopal.

Trainer profile



Mr. Kashinath Kinge is the Project Head of KPR Projectcon Pvt. Ltd. He is B.E. Civil with diverse experience of 23 years in managing Mass Housing projects, highrise buildings, Industrial Buildings using Aluform

shuttering, Tunnel formwork, and its allied services like roads, sewage from its tendering, planning, and zero cost to handing over of the project.



Brief event proceedings

Welcome address

Mr. Shelendra Chanderiya started off the event with an inspiring address that established the tone for the day, greeting all guests and attendees and giving them a glimpse of the session. While welcoming the guests, he also added few words about the dignitaries and trainers present at the training program.



Mr. Shelendra fom CSB cell explaining the Rachna initiative

GIZ Introduction

CSB Cell started the session and began with introduction of Ministry of Housing and Urban Affairs (MoHUA), Mission – Housing for All followed by an overview of PMAY(U) and Global Housing Technology Challenge. Further, officers from CSB cells informed about GIZ and its working areas, about Climate Smart Building program, the program objectives and the team experts involved. It further elaborated on the interpretation of the project objectives and the roles of the relevant stakeholders.

Technical sessions

The event covered the following technical sessions:

Session 1: Overview of thermal comfort and LHP technologies

Session 2: Construction materials and technology

Session 3: Detailed presentation on

Demonstration Housing Project, Bhopal (Insulating Concrete Formwork Technology)



Technical Session on Insulating Concrete Formwork Technology being used at Demonstration Housing Project, Bhopal delivered by Mr. Vivek Tyagi

Outcome & impact of the event

The two-day vocational training event aimed at the capacity development and skill enhancement of construction workers, masons, labourers, and site officials. With the help of the info graphic presentation, participants understood the aspects of the site preparations, excavation work with the help of the machines, provision of necessary things like office, labour hutment etc. The event was attended by 70 participants, and they appreciated the program content very much. The training would make the contractors, masons, and field workers expertise in the current technologies & best construction practices.

Feedback from participants

The participants found the sessions thorough and much inspiring. They were enlightened by the new technologies being used in India. They showed interest in attending more such practical and hands on training sessions focusing on the new construction technologies.



Location: PMA	Innovati Y, Bhanpia	re Construction Technologies for Affordable Housing , Bhopal Date: 23 st & 24 th June 2022 Time: 10:00AM to DAY 1: 23:06-2022	S:00PM	Location: PM	Irunovyti AY, Shanpur	ve Construction Technologies for Affordable Housing r, Rhopal Date: 23 st & 24 st June 2022 Time: 10:00AM to Daty 2: 24-06-2022	5:00PM	
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Agenda for the RACHNA #41

Rachna on Twitter



Training #41 program proceedings on GHTC twitter handle



Event photographs



RACINA



Vocational training for construction workers



Date: 30th June & 1st July 2022No of participants: 40Location:





About the event

The RACHNA is organised for professionals who are available on-site and interested in vocational trainings on thermal comfort specifications and practical learning on the construction site. Post training, the professionals will be able to demonstrate their hands-on knowledge in different construction site and improve their skill set by learning new techniques and specifications for enhancing thermal comfort for residential buildings. The training was attended

Trainer profile



Mr. Dipen Thakkar is currently engaged as а Senior Engineer at Katira Construction Ltd. He has been working as a Site Engineer, Project in-charge and Project Manager for various construction projects of Govt.

Department. Some of the key skills possessed by him are, Project Execution, Document Preparation, Building Material Testing, Site Management, Liaison & Coordination, Site Management, Budget Control and Preparation of Detailed Project Reports & Control Performance Reports. His experience in Construction Site Management covers the entire gamut of roles involved in civil construction viz., Project Planning, preparation of S.O.P and B.O.Q, Material Testing and Quality control, project monitoring and supervision, project execution and Management and skill Development of Engineers and Technicians at the site.


Brief event proceedings

Welcome address

The Training Program was formally started by Mr. Winamra Negi, Engineer Consultant -Climate Smart Buildings Cell, GIZ, by warmly welcoming all the participants and introducing RACHNA, the initiative by MoHUA and the objectives of the Training Program. The overall programme was planned to provide the participants a balanced mixture of technical presentation and practical learning on the construction site.



Participants during the registration session

GIZ CSB introduction

Continuing after the Welcome Address, Mr. Winamra Negi - Engineer Consultant, Climate Smart Buildings Cell, GIZ gave a brief



Mr. Winamra Negi - Engineer Consultant, GIZ Climate Smart Buildings Cell talking about GIZ and Rachna initiative

introduction of the training program to the participants. In line with the theme of the program, he apprised the participants about the flagship missions towards urban transition, by Ministry of Housing and Urban Affairs (MoHUA) – GoI, Pradhan Mantri Awas Yojana (Urban), Global Housing Technology Challenge-India (GHTC-India), Indo-German Energy Programme & Climate Smart Buildings Cell for West Cluster states at Rajkot, and their key activities.

Technical sessions

The event covered the following technical sessions:

Session – 1: Brief introduction of new age construction technology employed at 6 LHPs

- Monolithic Tunnel Formwork Technology LHP Rajkot
- Prefabricated Sandwich Panel System LHP
 Indore
- Precast Concrete Construction System Precast Components Assembled at site – LHP Chennai
- Precast Concrete Construction System 3D Volumetric – LHP Ranchi
- Light Gauge Steel Structural System & Pre

 engineered Steel Structural System LHP Agartala
- PVC Stay in Place Formwork System LHP Lucknow

Session – 2: Detailed technical presentation on construction technology of LHP Rajkot [Monolithic Concrete Construction using Tunnel Formwork]

- Construction process at LHP Rajkot:
- Site excavation and stabilization
- Column laying & structure
- Technology specific construction & other walling & roof components details
- Plastering & finishes



Members from CSB cell explaining the technology at Rajkot



Session – 3: Site visit for the participants showcasing on-site building construction through Tunnel Formwork

Outcome & impact of the event

40 participants from the AHP-Zundal attended the two-day seminar and found that it was beneficial for expanding their understanding of the new building technologies available in the market. Additionally, participants gained exposure by visiting the actual site where the demonstrations were held. This made it much easier for them to observe and comprehend the techniques.



Post-training group photograph with the trainers

Feedback from participants

The two days long event addressed topics on Innovative Construction Technologies being employed at Light House Projects and covered the construction process of LHP Rajkot as per the "Monolithic Concrete Construction using Tunnel-Formwork. The training was beneficial in educating about the latest construction technologies which are being used in the country, and to keep them up to date with



Participants during the site visit at AHP-Zundal

the latest construction trends. Mr. Winamra Negi, Engineer Consultant, Climate Smart Buildings Cell, GIZ delivered the vote of thanks and applauded the initiative by (MoHUA) – GoI to bring the concept of training the construction workers at the ground level about the latest construction technologies in the Affordable Housing sector, thus providing an opportunity to learn free of cost.





Agenda for RACHNA #42

Rachna on Twitter



Figure Training #42 program proceedings on GHTC twitter handle

RACINA



Date: 30 June - 1 July 2022No of participants: 60Location:

Agartala, Tripura

About the event

The RACHNA for field workers is organised for professionals who are available on-site and interested in vocational trainings on thermal comfort specifications and practical learning on the construction site. Post training, the professionals will be able to demonstrate their hands-on knowledge in different construction site and improve their skill set by learning new techniques and specifications for enhancing thermal comfort for residential buildings. The training was attended by various field professionals such as masons, contractors, painters and site supervisors.

Trainer profile



Shri Ramachandra Mallick is currently engaged with BMTPC as an Sr. Engineer at LHP Agartala. He is a Civil Engineer from Indus College of Engineering, Bhubaneswar. He has more than 10 years of experience in the construction

field. He possesses very good knowledge of hospital, residential & infrastructure projects. He has an in-depth understanding of AutoCAD, Concrete Engineering, Quality assurance & control.

Brief event proceedings

Welcome address

The Training Program was formally opened by Shri Rajesh Debbarma, Team Manager – CSB Cell, East Cluster, Agartala, by warmly welcoming all the participants and introducing RACHNA, a unique initiative by MoHUA and the objectives of the training program. Subsequently, he introduced Shri Ramachandra



Mallick, Sr. Engineer, BMTPC at LHP Agartala to the Programme attendees and requested him to briefly explain his role at the Light House Project – Agartala to the participants. Shri Ramachandra Mallick appreciated the initiative by MoHUA, BMTPC and GIZ of imparting training and dissemination of knowledge regarding innovative construction technologies to the construction workers through these types of vocational training programs.



Trainer Mr. Ramchandra Mallick engaging in a discussion with the participants

GIZ CSB introduction

This was followed by the introduction of Climate Smart buildings. The introduction session gave an overview of PMAY(U) and the GIZ-CSB initiative, the project objectives and the team experts involved. He highlighted that GIZ on behalf of The Federal Ministry of Economic Cooperation and Development (BMZ), Germany, and in cooperation with the Ministry of Housing and Urban Affairs, Government of India aim to foster sustainability in built environment to use sustainable materials for Thermal comfort and in turn improve the environment and climate conditions.



Shri Rahul Bose, Architect – CSB Cell, East Cluster, Agartala explaining the Rachna initiative

Technical sessions

The event covered the following technical sessions

Session 1: LHP and its construction Technology.

GHTC Brief on other LHP Construction Technologies:

- a) Light Gauge Steel Structural System & Pre-engineered Steel Structural System – Agartala
- b) Prefabricated Sandwich Panel System Indore
- c) Monolithic Concrete Construction using Tunnel Formwork – Rajkot
- d) Precast Concrete Construction System Precast Components Assembled at Site – Chennai
- e) Precast Concrete Construction System 3D Volumetric – Ranchi
- f) PVC Stay In Place Formwork System Lucknow

Session 2: Details on construction technology process:

- a) Site excavation and stabilisation
- b) Column laying and structures
- c) Technology specific construction and other walling and roof components
- d) Plastering and finishes
- e) Improving efficiency in construction

Session 3: Vocational Training: a) Practical Implementation (Showcasing On-Site building construction through LGSF)



A glimpse of the attendees at the training program



Outcome & impact of the event

The two days event was attended by 50 construction workers and the attendees found the training helpful as it enhanced their knowledge about new construction technologies in the market. In addition to that, they got the exposure of visiting the live site where the demonstrations are taken up. This helped them to see and understand the techniques in much better way. With this initiative, not only they gained theoretical knowledge about the new construction technologies but also saw the practical implementation of the technology. Following the sessions, several questions were asked by the trainers related to the trainings provided. The intent was to analyse the level of understanding and construction knowledge of the attendees.

Feedback from participants

was majorly focused training The on disseminating hands-on training to the professionals from the construction sector. It was understood from the feedback collected that the delivery of the content managed to drive home the knowledge intended to be imparted about the new technologies. The training was beneficial educating them about the latest construction technologies which are being used in the country, and to keep them up to date with the latest construction trends in the country.



SIte engineers explaining the surveying process at the construction site

Mr. Sayan Maitra, Team Member, CSB Cell, East Cluster Agartala delivered the vote of thanks at the end of the Vocational Training Programme. He applauded the initiative by MoHUA to bring the concept of training the construction workers at the field level about the latest construction technologies in the Affordable Housing sector, thereby providing an opportunity to learn and keeping up to date with the latest trends in the construction sector. He also congratulated the participants for showing their keen interest on the subject and their participation towards making the event a grand success.



	Yatar	Anten Santa Santa Anten	timpe giz
	Innovation	ve Construction Technologies & The Agartals Date : 30 th June - 1 th July 2022 , Thu AGEN	rmal Comfort for Affordable Housing nday & feiday Time : \$0.00 AM to 5:00 PM DA
	DURATION	TOPIC	SPEAR
	10:00-10:50	Registration	Olimate Smart Buildings (CSB) Cell
RESILIENT, AFFORDABLE AND COMFORTABLE HOUSING THROUGH NATIONAL ACTION	10:50-11:00	Welcome & Trainer's Introduction	Climate Smart Buildings (CSB) Cell
Training #43: 2-Day Training Programme on	11-00-12-15	HIGH TE	A & RETWORKING
"Innovative Construction Technologies & Thermal Comfort for Affordable Housing" tocation:LNP Agentals Date 1.00" Name - 1* July 2023, Therealey & Fildry Time = 10:00 AM to 5:00 PM ABOUT THE TRAINING: The Ministry of Housing & Urban Affairs (MOHUA) in partnership with GIZ and Building Material and Technology promotion Council (BMTPC) is hosting series of trainings/workshops on innovative Construction Technologies & Thermal Comfort for Affordable Housing named RACHNA (Resilient, Alfordable and Comfortable Housing through National Action. The prime focus of this training is thermal comfort and its necessity in the affordable Housing sector. The training covers the thermal		Session 1: UHP & H's Construction Technology, GHTC Brief on other UHP Construction Technologies: a) Light Gauge Steel Structural System - Agentala, B) Presart Components avenabled at Site - Chennol, c) Prestant Components avenabled at Site - Chennol, c) Prestant Concernent Sandhick Pared System - More O Presart Concerte Construction System -50 Volumetrix - Ranchi, e) Monolithic Concrete Construction using Transfer Formory, Taskat, n	Shri Ramachandra Malfick (Trainer) 17. tegener - Joh Agentik annoc
omfort basics, material influences, low-cost solubons & codes that are available in India to create limate-smart Buildings. The outcome of the training would be to make the stakeholders in the flordable housing sector understand the need for thermal confort & urge them to include no cost or we-cost strategies in upcoming projects.	1215-11:15	PVC Stay in Place Foremonk System -Lucknow Session 2: Detail on Construction Technology Process: a) Ste Docountion & Stabilization b) Column Layleg & Structure C) Technology specific construction & other walking & not components details d) Plantening & Finishes e) Improving efficiency in construction	Shri Ramachandra Malikk (Trainer) Sr. tapnar - uri apensi aurric
gartala, Tripura - 799102	13:15-14:00		TICH BREAK
r Further Details, Please drop on email to Rajesh Debbarma agartala_glt_csbceil@pwc.com	14:00-16:00	Session 3: Vocational Training a) Practical Implementation (Showcasing On Site Building Construction through (SSF)	Stei flamachaedra Mallick (Trainer) 3r. tugineer – 1987 Agartala 1847 -
RGETED STAKEHOLDERS	16:00-16:30	Q&A	Olimate Smart Buildings (CSB) Cell
TT I	16:90-16:15	Vote of Thanks	Climate Smart Buildings (CSB) Cell
Training Program tailored for Contractors, Massos; Plamber, Electrician, Insulation Applicators, and the construction field Workers	14.85-17:00	15015-712	A & NETWORKING
	-	CLOS	SE.

Agenda for the #RACHNA 43





Training on thermal comfort for practitioners



Date No of participants :12 Location :

: 1-2 July 2022



About the event

The Rachna for practitioners training is organised for professionals interested in understanding principles to enhance climate resilience and thermal comfort in buildings by adopting innovative passive measures, local sustainable and low embodied energy material coupled with best available technologies in construction of affordable housing. The training targeted practitioners and academicians from various universities.

Trainer profile



Prof. Rajan Rawal is an architect by training and is a senior advisor at Centre for Advanced Research in Building Science and Energy (CARBSE), and a CRDF Professor at CEPT University. He was Executive Director of

CARBSE between 2006 and 2021. He worked with Vastu Shilpa Foundation for Studies and Research in Environmental Design before joining Faculty of Design, CEPT University, Ahmedabad. He taught design and construction courses as part of the undergraduate program. teaches energy efficient built He now environment, energy policy, energy modelling and simulations at postgraduate level.

Brief event proceedings

Welcome address

The training started with the welcome address given by Dr. Rajan Rawal, Senior Advisor, CARBSE, CEPT university. and an overview of training. Dr. Rajan started off the event with an inspiring address that established the tone for the day, greeting all attendees and giving



them a glimpse of the upcoming sessions and giving an overview of the Rachna training which is designed specifically for practitioners and academicians who will be instrumental in implementation of policies at ground level through application of passive building design for thermal comfort in affordable housing.

GIZ CSB introduction

The introduction session gave an overview of PMAY(U) and the GIZ-CSB initiative, the project objectives and the team experts involved. It further elaborated on the project objectives and the roles of the relevant stakeholders.

Technical sessions

The event covered the following technical sessions

Day 1-

Session 1: Overview of the workshop, introduction of the project and trainers

Session 2: Importance of thermal comfort

Session 3: Affordable housing passive design strategies

Session 4: Building materials and methods of construction for affordable housing

Session 5: Building physics and its relationship with thermal Comfort

Session 6: Application of thermal comfort in affordable housing- Case Studies

Session 7: Day 1 Concluding Remarks

Day 2-

Session 8: Day 1 Recap

Session 9: Building Codes, Affordable Housing and Thermal Comfort

Session 10: Application of Thermal Comfort in affordable housing- A suite of case studies

Session 11: Thermal comfort study methods

Session 12: Low energy cooling technologies and comfort

Session 13: Discussions on quiz-questionnaires

Session 14: Feedback from participants and concluding remarks

Outcome & impact of the event

The event was attended by Architects, Engineers and Building energy experts from construction domain. The attendees also included academicians and Head of Departments from IIT (BHU) Varanasi, CEPT University, Institute of Engineering and Management- Kolkata, Jadavpur university, and Sister Nivedita University.



Prof. Rajan during a light moment with the attendees

Feedback from participants

The training program was interactive and brought up discussions between the participants and the trainers on thermal properties of materials and surface finishes. The questions from participants involved around codes and compliance as well as understanding the difference between traditional construction practices and conventions systems.





Agenda for the RACHNA #44



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Rachna on Twitter



Recently, trainings were organised in Ahmedabad, Bengaluru, Kolkata & Agartala for senior govt officials, architects & **#Technograhis**.



10:44 AM · Jul 7, 2022 · Twitter Web App

Training #44 program proceedings on GHTC twitter handle





Training on emerging construction technologies & thermal comfort in Light House Projects for officers



Date: 05No of participants: 30Location:

: 05th July 2022 : 30



About the event

Ministry of Housing and Urban Affairs (MoHUA) in collaboration with Building Material and Technology Promotion Council (BMTPC), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), and the Karnataka Housing Board organized this Training at the Karnataka Housing Board Office, Bengaluru. The theme of the one-day training was 'Innovative Construction Technologies & Thermal Comfort for Affordable Housing'. The event targeted senior Govt. officials, helping the participants understand the need for thermal comfort & tools for incorporating thermal comfort at policy level.

Trainer profile



Neha V Vyas is the Founder of Enverte Consultancy, a green-built environment design consultancy (started in 2021). She is an Architect and Green Building Consultant with more than 10 years of experience in Green Building

Certification, Green Building Design Solutions, Sustainable and Energy Efficient buildings. She has worked on over fifty Green Building final certification projects for LEED, IGBC, and GRIHA. She holds M. Arch in Sustainable Architecture.

She is a registered Architect with COA-India, BEE Certified ECBC Master Trainer, LEED AP (ID+C), IGBC AP, and GEM CP. She has taken more than 50 training sessions for ECBC & ENS Codes for various states and union territories as BEE Certified ECBC Master Trainer



Brief event proceedings

Welcome address

The session began with a welcome address & felicitation done by Mr. Anand, Team Manager, Climate Smart Buildings Cell, South Cluster. He gave a short note about the training and its importance to the participants.



Mr. Anand explains the new innovative construction technologies

Keynote Address:

Shri T. D. Nanjundappa, Chief Engineer, Karnataka Housing Board gave the keynote address.

Technical sessions:

The event covered the following technical sessions:

Session 1: New age innovative technologies

- a) 6 LHP construction technologies
- b) LHP Chennai features
- c) LHP Chennai video



Ms. Neha (ECBC Master Trainer) explains the Thermal Comfort indices

Session 2: Thermal Comfort:

- a) Indices
- b) Thermal comfort in affordable housing
- c) Passive strategies & uilding Physics

Session 3: Thermal Comfort models:

- a) Thermal Comfort standards
- i.) IMAC & ii.) ASHRAE
- b) Effect of materials on thermal comfort

Session 4: Eco-Niwas Samhita (ENS) part I and its compliances

Session 5: Eco-Niwas Samhita Part II and its compliances

Session 6: Eco-Niwas Samhita compliance Tool

Outcome & impact of the event

The day-long event was well attended by 30 officers and engineers from Karnataka Housing Board and evoked great responses from the participants. The training helped the Govt. officials understand the need for thermal comfort & the existing codes and compliance requirements and procedures prevailing in India pertaining to Thermal comfort in residential buildings.



Trainers taking feedback from the attendees

Feedback from participants

The participants found the sessions insightful. They understood the importance of thermal comfort in buildings and its impact on the occupants. Further they understood the role of building materials, passive design strategies in making a building comfortable and latest construction technologies available in the market. They gained in depth knowledge on the application of the codes and compliance parameters and how they can be met.



	Yatta	Allen States States Allen Alle	timine giz		
	Innovati Li	ve Construction Technologies & The scation: Bengaluru Date : 05 th July 202 AGENDA	rmal Comfort for Affordable Housing 2 Time : 10:30 AM to 03:30 PM - Day 1		
	DUBATION	TOPIC	SPEAKER		
KAYMENA	10.80 11.00	Registration			
RESILIENT, AFFORDABLE AND COMFORTABLE HOUSING THROUGH NATIONAL ACTION	11:00-11:05	Weizome Address	Mr. Anand Sachithanantham Team Manager, Cliviste Smart Buildings Cell		
Training #45: Training Programme on	11:05-11:15	Keynote Address	Shri T.D. Nanjundappa Chief Engineer, Kartataka Housing Board		
"Innovative Construction Technologies & Thermal Comfort for Affordable Housing" Location: Bengaluru Date: 5 th July 2022 Time: 10:30 AM to 03:30 PM	11:15-11:90	Session I: New age innexative technologies a) 6 UIP construction technologies b) UIP Chesnal - Features c) UIP Chesnal - Voloo	Mr. Anand Sachithanantham Team Manager, Climate Smart Buildings Cell		
ABOUT THE TRAINING	11:30-11:45	HIGH TEA & NETWORKING			
The windsty of nousing is orean Anelia (Monov) in partnership with GL and building Metership Technology promotion Council (BMTPC) is hosting series of training/workshops on innovative Construction Technologies & Thermal Comfort for Alfordable Housing named KACHNA (Resilient, Alfordable and Comfortable Housing through National Action). The prime focus of this training is		Session 2: Thermal Conduct: a) Indices, b) Thermal comfort in Affordable Housing c) Passive strategies & Building Physics	Mt. Noha Vyaz ECRC Master Transe cartified by Bureau of Energy Efficiency		
thermai comfort and its necessity in the attordable housing sector. The training covers the thermal comfort backs, material influences, low-cost solutions & codes that are available in india to create Climate-Smart Buildings. The outcome of the training would be to make the stakeholders in the atfordable housing sector understand the need for thermal comfort & urge them to include no cost attordable housing sector understand the need for thermal comfort & urge them to include no cost attordable housing sector understand the need for thermal comfort & urge them to include no cost attordable housing sector understand the need for thermal comfort & urge them to include no cost attordable housing sector understand the need for the sector sector at the sector sector sector at the sector	12:15-12:45	Session 3: Thermal Comfort models: a) Thermal Comfort standards L IMAC & II. ASHRAE b) Effect of materials on thermal conduct	Ms. Neha Vyas ECBC Master Trainer certified by Bureau of Energy Efficiency		
r iow-cost strategies in upcoming projects.	12:45-13:00	e Q&A			
OIN US AT:	13:00-14:00	LUNCH BREAK			
Carnataka Housing Board Office, Cauvery Bhavan, K G Road,	14:00-14:30	Service 4: EcoNiums Samhits Part 1 and its compliances	Ma. Neha Vyas ECBC Matter Trainer certified by Bureau of Energy Efficiency		
engaluru, Karnataka rer kuther betala, Hease drap ao emoli to Mr. Anond	14:30-15:00	Session S: EcoNinus Samhita Part 2 and its compliances	Mis. Netra Vyan ECBC Master Trainer Serbfied by Bureau of Dringy Efficiency		
Southhadambair of channel periodentility multicom	15:00-15:20	Session 6: Ecolisium Samhita Part - Compliance Teol	Ma. Nata Vyan BCBC Matter Transr cartified by Bureau of Energy Efficiency		
	15:20-15:25		Q&A		
Cost Officials & Built environment	15:25-15:30	Vote of Thanko	Mr. Anand Sachithanantham Team Manager, Cimute Smart Buildings Cell		
Policy makers geotestionate & Oost. Departments		aos	E		

: Agenda for the RACHNA #45



A glimpse of the training in session



Rachna on Twitter



GHTC INDIA @Ghtcindia - Jul 11 Replying to @GhtcIndia

In Bengaluru too, the event was held on a similar theme.

The training programme at Guwahati was organized by #LHPAgartala cell to make participants aware about importance of #thermalcomfort in #affordablehousing.

#HousingForAll #PMAYUrban #GHTCIndia #ConstructionTechnology



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Under #RACHNA, training programmes were recently held at Gorakhpur, Bengaluru & Guwahati for senior Govt officials/stakeholders. The one in Gorakhpur was a comprehensive capacity-building programme on innovative construction technology, Thermal Comfort for Affordable Housing.



6:21 PM - Jul 11, 2022 - Twitter Web App

OHICINDIA OCHUMBIA BENGALURU RAC INA importance of HousingForAll Plant 12

Training #45 program proceedings on GHTC India twitter handle

In Bengaluru too, the event was held on a similar theme.

The training programme at Guwahati was organized by #LHPAgartela cell to make participants aware about #thermalcomfort in #attordablehousin

#PMAYUrban #GHTCIndia #ConstructionTechnology 0.02 PM - hat 11 (2022) Builting Maria Bara

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Date No of participants : 38 Location ÷



About the event

The Rachna for practitioners training is organised for professionals interested in understanding principles to enhance climate resilience and thermal comfort in buildings by adopting innovative passive measures, local sustainable and low embodied energy material coupled with best available technologies in construction of affordable housing. The training targeted practitioners and academicians from various universities.

Trainer profile



Trainer01-Smita Chandiwala is an architect with over 17 years of diverse global experience in providing sustainability solutions for the built environment. Her work has focused on the reduction of energy and associated

carbon emissions from buildings and cities, especially, incorporating and advancing climate change mitigation and adaptation strategies, including renewable energy technologies, in design, policies, and regulations for the built environment.

Prior to founding energe-se, Smita worked in the development sector leading the Buildings and Appliance energy efficiency programs at Shakti Sustainable Energy Foundation, New Delhi. She also served as the Regional Director India at Global Buildings Performance Network (GBPN), Paris. Smita has worked on a range of research and consultancy as a research fellow at the Oxford Institute of Sustainable Development, UK. These have included projects for the World Bank, Swedish International Development Cooperation Agency and EU Research Councils, UK Government's Technology Strategy Board.



She has taught postgraduate architecture students as an Associate lecturer at Oxford Brookes University, UK..



Trainer 02-Bhavya Pathak is an architect working as Research Associate at а the Center for Advanced Research in Building Science (CARBSE), and Energy CRDF, CEPT University, Ahmedabad. work Her

focuses on energy efficiency through building materials and thermal comfort in the built environment. She also works at the intersection of the environment and energy associated with residential buildings in India through the lens of climate change mitigation and adaptation. Bhavya holds a Master of Architecture degree from the City University of New York, New York, the U.S.A. focusing on energy and sustainability in buildings. Simultaneously, she also worked on the BRETHE project which aimed to understand modulation in indoor air quality through phytoremediation. Prior to that, has worked as an architect in India on multiple projects ranging from IGBC 'platinum' rated institutional buildings to an award-winning heritage project.

Brief event proceedings

Welcome address

The training started with the welcome address given by Palak Patel, Research Associate, CARBSE, CEPT university. This was followed by the overview of training program by Palak Patel, Research Associate, CARBSE, CEPT university, greeting all attendees and giving them a glimpse of the upcoming sessions of the training which is designed specifically for practitioners and academicians who will be instrumental in implementation of policies at ground level through application of passive building design for thermal comfort in affordable housing.

GIZ CSB introduction

The introduction session gave an overview of PMAY(U) and the GIZ-CSB initiative, the project objectives and the team experts involved. It further elaborated on the project objectives and the roles of the relevant stakeholders.

Technical sessions

The event covered the following technical sessions:

Day 1-

Session 1: Overview of the workshop, introduction of the project and trainers

Session 2: Importance of Thermal Comfort

Session 3: Affordable housing Passive Design strategies

Session 4: Building materials and methods of construction for affordable housing

Session 5: Building Physics and its relationship with thermal comfort

Session 6: Application of thermal comfort in affordable housing- case studies



Case studies of housing project with thermal comfort

Session 7: Day 1 Concluding remarks

Day 2-

Session 8: Day 1 Recap

Session 9: Building codes, affordable housing and Thermal Comfort



Fundamentals of thermal comfort



Session 10: Application of thermal comfort in affordable housing- A suite of case studies

Session 11: Thermal comfort study methods



Session 12: Low energy cooling technologies and comfort



Session 13: Discussions on quiz-questionnaires

Session 14: Feedback from Participants and Concluding Remarks



Outcome & impact of the event

The event was attended by Architects, Engineers and Building Energy experts from construction domain. The attendees included academicians and PhD scholars from IIT Roorkee & School of Planning and Architecture, New Delhi. Students and recent graduates form architecture department were present from Indira Gandhi Delhi Technical University for Women, School of planning and architecture.

Feedback from participants

The training program was interactive and brought up discussions between the participants and the trainers on tools available for understanding thermal comfort level during design. The most effective passive design strategies in warm and humid climate such as ventilation were discussed. Participants were also curious to understand the applicability of the code and concepts like WWR and WFR.

RACINA

Agenda



18H00 + 14H81	Section 4 (Technical): Building Mahertals and Methods of GanaziucSon for Affordable Housing	Shavya Fachak	
14H48 - 15A00	Questions and Answers		
18H00 + 18N13	Health Break	- Sal	
15400-13983	Session 5 (Productar). Building Codes, Affordable Housing and Thermal Conduct	ed Shavya Pathak	
13145 - 38500	Questions and Aryanes		
10-00 - 38A15	Health Break		
8915-1963	Session 6 (Technical): Application of Thermal Confort in Afterdable troosing: A Suite of Case Scatter	Ehavya Pathak	
17/15 - 175/5	Cheston and Aneers		
init-time	Sension 7: Day 1 Concluding Remarks	Ralak Patel	

Day 2- July 7 th , 2022 (Thursday)				
10+00-10+15	Service 8: Day 1 Reing	Palak Panal		
mais - nixes.	Service 8 (Technical) Building Custer, Affordable Insusing and Thermal Conduct	Smita Chandivala		
11915 - 11936	Questions and Answers			
11530-11585	Haulth Steak	-10		
that-their	Session III (Tachneally Application of Thermal Control in Affordable Housing- A butte of Case Scatter	Smita Chandivala		
15+30-35+00	Guestion and Answert, Discussions on gala-paralismusters	Second Second		
13-00-34400	Lunch Break			
14015 - 15400	Session 11 (Technical): (Technal Comfort Scuty Methods			
19900-19915	Questions and Accella			

21813 - 18413 Sersion 12 (Technical): Low Energy Cooling Technologies and Comfort Bharya Pethak 18133 - 18187 Questions and Answers Bharya Pethak 18133 - 18147 Session 12: Discussions on guid-questionnalities and feedback Inster participants Bharya Pethak 18143 - 18147 Session 12: Discussions on guid-questionnalities and feedback Palais Satel









Training on emerging construction technologies & thermal comfort in Light House Projects for officers



Date : No of participants : Location :

: 06 July 2022 : 24



About the Event

MoHUA in a collaboration with Building Material and Technology Promotion Council (BMTPC) & Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) organized a 1-day Training Programme named RACHNA (Resilient, Affordable and Comfortable Housing through National Action) in Guwahati, Assam. The theme of the 1-day training programme was 'Innovative Construction Technologies & Thermal Comfort for Affordable Housing'. The training was specifically curated to cater to govt. officials but covered a wide range of topics also suitable for practitioners and builders.

Trainer profile



Miss. Ragini Goswami is an Architect and a certified Green Building Professional with more than 9 years of work experience in providing specialized services to obtain green certifications under LEED, IGBC, GRIHA, EDGE

and ECBC Compliance for the Buildings. She has earned credentials from IGBC AP and GRIHA CP and BEE as Certified ECBC Master Trainer. She has conducted more than 15 training programs in Chhattisgarh, Meghalaya, Manipur, Meghalaya, Mizoram, Nagaland on ECBC 2017 code (Commercial building) and Eco-Niwas Samhita (ENS) code (Residential buildings) as a Master trainer.

Brief event proceedings

Welcome address

Shri Dwijen Das, State Project Engineer, PMAY (U) HFA Assam commenced the event with an inspiring address that established the tone for



the day, greeting all attendees, sharing a brief of the session. The program began around with 30 enthusiastic participants eagerly waiting in the auditorium. Shri Sayan Maitra, Team member – CSB Cell, East Cluster, Agartala was the moderator of the session. Post running through the in-house rules for the audience, the session was commenced by inviting the key dignitaries to light the lamp and start the proceedings.



Dignitaries inaugurating the session by lamp lighting

GIZ CSB introduction:

Shri Sayan Maitra, Team member – CSB Cell, East Cluster, Agartala spoke in detail about the various initiatives of GIZ in India in the sustainability sector, clean energy & energy efficiency services. He also shared the objective of introducing this project as to ameliorate climate resilience and thermal comfort in buildings constructed under Pradhan Mantri Aawas Yojana (Urban).

Further, he updated that the Light House Projects is happening across six states of the country with different technologies with the sole intention of providing ready to live-in homes with minimal time and cost along with highquality of construction in a sustainable manner.



Shri Sayan Maitra, Team member – CSB Cell, East Cluster, Agartala talking in detail about the various initiatives of GIZ

Technical sessions

The event covered the following technical sessions:

Session 1: Thermal Comfort: a) Indices, b) Thermal Comfort in Affordable Housing, c) Passive strategies and Building Physics, d) Case studies.

Session 2: Thermal Comfort models: a) Thermal Comfort Standards i.) IMAC and ii.) ASHRAE

Session 3: New age innovative technologies along with the 6 LHP construction technologies.

Session 4: Green Buildings: a) Brief b) Green measures c) indigenous and low embodied materials d) Best practices

Session 5: Eco-Niwas Samhita I&II and its compliance



Smt. Ragini Goswami introducing the participants with Thermal Comfort

Outcome & impact of the event

The event was attended by various officials from different government departments of Assam such as PWD (Building & NH), Guwahati Development Metropolitan Authority; Directorate of Housing & Urban Affairs, Building Material & Technology Promotion Council, Atman Architects, Guwahati Municipal Corporation, ISHRAE Assam Chapter. The overall Programme was planned in such a way that it had a very balanced mixture of technical presentations, practical learning, as well as equal opportunity and exposure for networking. Entire training session was bifurcated in three aspects - Theoretical, Compliance & design along with practical knowledge transfer. The training session featured a constructive exchange of



ideas between participants, the instructor, and real-world scenarios involving material pricing, project timelines, and projects that have already been employing sustainable materials to provide their inhabitants with suitable living spaces.



Participants having an interactive session with the ECBC Master Trainers

Feedback from participants

The participants found the sessions thorough and much inspiring. They understood the importance of low cost thermally comfortable housing in India designed using passive strategies and really appreciated the interactive nature of the sessions and the quality of the content specifically designed for improving thermal comfort in affordable housing in India. The session was followed by the interactive rounds of questions and answers for better understanding of the topics. The participants had a live interaction session with him along with the master trainer for their queries. Shri Sayan Maitra, Team Member – CSB Cell, East Cluster, Agartala delivered the vote of thanks. He applauded MoHUA team members along with the volunteers involved for their active efforts in the overall coordination and arrangement of this event.



Mr. Shayan from CSB cell giving the vote of thanks

He also requested the participants to apply Light Gauge Steel Frame technology that is being implemented at LHP Agartala to deliver ready to live-in homes in minimal time and cost with high-quality of construction in a sustainable manner.



	Yahr	Contraction of the second seco	bmiec giz		
	Locatio	ve Construction Technologies & The n: Guwahati Date : 6 th July 2022 , Wed AGEN	rmal Comfort for Affordable Housing Inesday Time : 09:30 AM to 5:30 PM DA		
	DURATION	TOPIC	SPEAKER		
	9:30-10:00	Registration			
ESILIENT, AFFORDABLE AND COMFORTABLE HOUSING THROUGH NATIONAL ACTION	10:00-10:15	Welcome and Special Address	Shri Dudjen Das Date Poujet fognese - Plate (U) vita Aster		
Training #47: One-Day Training Programme on 'Innovative Construction Technologies & Thermal Comfort for Affordable Housing' Location: Guwahati Date : 6 th July 2022 ; Wednesday Time : 09:30 AM to 5:30 PM		Introduction to MoHUA's Housing for AA Programme, GIZ, and the Bästeral Programme – Climate Smart Buildings (CSB)	Gi2 Team		
ABOUT THE TRAINING: The Ministry of Housing & Urban Affairs (MoHUA) in partnership with GIZ and Building Material and Technology promotion Council (BMTPC) is hosting series of trainings/workshops on Innovative Construction Technologies & Thermal Comfort for Affordable Housing named RACHNA (Resilient, Affordable and Comfortable Housing through National Action. The prime focus of this training is thermal comfort and its necessity in the affordable housing sector. The training covers the thermal		HOM-TEA & METWORKING			
		Session 1: Thermal Constort: a) Indices. b) Thermal constort in Attordable Housing c) Passive strategies & Bailding Physics. d) Case studies	Soot, Ragini Goossemi ECRC Matter Trainer cart/Red by Barnas of Energy (Ricincy		
more backs, matching internet whereas to be a set of the training would be to make the stakeholders in the lordable housing sector understand the need for thermal comfort & unge them to include no cost or w-cost strategies in upcoming projects.	12:15-13:00	Session 2: Thermal Comfort models: a) Thermal Consfort standards i. IMAC & E. ASBRAE b) Effect of materials on thermal comfort	Steri (Dr.) Avljit Ghosh ECR: Matter Trainer cardied by Burnes of Energy Efficiency		
IN US AT:	13-00-14:00	UNKHIMCAK			
e Lily Hotel p. to Directorate of Agriculture Office	14:00-15:00	Session 1: New age innovative technologies along with the 6 LHP construction technologies	002 Team		
Wahab - 781022 Further Details, Please drop on email to Raiesh Orbhorma	15:00-16:00	Session 4: Ecolitivas Sambita Part 1 & 2 and its compliances	Shri (Dr.) Anijit Ghosh FCRC Marter Transe' certified by Burnas of Energy Efficiency		
_agartala_giz_esbeell@pwe.com		HIGH-TEA & NETWORKING			
	16:15-17:00	Session 5: a) Low Every Comfort Systems and BEE Star Labelling & b) Indian & International Best Practices	Sent, Ragini Goowami DDC Mache Transe certified by baseau of trange tificiency		
	17:00-17:15	Q&A and feedback	Climate Smart Buildings (CSB) East Cluster Cell		
Senior Govi. Built-environment Builtenvironment Builtenvironment Builtenvironment Builtenvironments Builtenvironments Builtenvironments	17:15-17:30	Vote of Thanks	CS8 East Churter Cell		

Agenda for the RACHNA #47

Rachna on Twitter



Training #47 program proceedings on GHTC twitter handle

RACINA



Date: 7-8 July 2022No of participants: 42Location:



About the event

The RACHNA for field workers is organised for professionals who are majorly available onsite and interested in vocational trainings on thermal comfort specifications and practical learning on the construction site. Post training, the professionals will be able to demonstrate their hands-on knowledge in different construction site and improve their skill set by learning new techniques and specifications for enhancing thermal comfort for residential buildings. The training was attended by various field professionals such as masons, contractors, painters and site supervisors.

Trainer profile



Mr. Ankit Suvagiya is currently engaged as a Municipal Engineer – Project Execution at West Zone Package-5 Rajkot on behalf of Rajkot Municipal Corporation. He has been working as a Site Engineer,

Project in-charge and Project Manager for various construction projects of PAMY Awas in Rajkot city & also have 7 years of experience in heavy RCC structure in Marin Construction in Mundra, AKBTPL, West port and many project of Adani Group, with more than 12 years of experience in this Field.

Some of the key skills possessed by him are, Project Execution, Document Preparation, Building Material Testing, Site Management, Liaison & Coordination, Site Management, Budget Control and Preparation of Detailed Project Reports & Control Performance Reports. His experience in Construction Site Management covers the entire gamut of roles involved in Civil Construction viz., Project Planning, preparation



of B.O.M and B.O.Q, Material Testing and Quality control, project monitoring and supervision, project execution and Management and Development of Engineers and Technicians at the site.

Brief event proceedings

Welcome address

The Training Program was formally started by Mr. Winamra Negi, Engineer Consultant -Climate Smart Buildings Cell, GIZ, by warmly welcoming all the participants and introducing RACHNA, the initiative by MoHUA and the objectives of the Training Program. He expressed that the overall programme was planned to provide the participants a balanced mixture of technical presentation and practical learnings on the construction site.



A glimpse from Session 1 of 2 of Training Program at AHP Vavdi - Rajkot

The main intent was Capacity Building & Dissemination of knowledge on Innovative Construction Technologies used in LHPs for Affordable Housing. This was followed by a a brief introduction of the Training Program to the participants.

GIZ CSB introduction

In line with the theme of the Training Program, Mr. Winamra apprised the participants about the flagship missions towards urban transition, by Ministry of Housing and Urban Affairs (MoHUA) – GoI, Pradhan Mantri Awas Yojana (Urban), Global Housing Technology Challenge-India (GHTC-India), Indo-German Energy Programme & Climate Smart Buildings Cell at West Cluster states, and their key activities.



CSB cell informing about GIZ and its objectives under the CSB program

Technical sessions

The event covered the following technical sessions:

Session-1: Brief introduction of new age construction technologies employed at 6 LHPs

- Monolithic Tunnel Formwork Technology LHP Rajkot
- Prefabricated Sandwich Panel System LHP Indore
- Precast Concrete Construction System Precast Components Assembled at site – LHP Chennai
- Precast Concrete Construction System 3D Volumetric – LHP Ranchi
- Light Gauge Steel Structural System & Pre

 engineered Steel Structural System LHP Agartala
- PVC Stay in Place Formwork System LHP Lucknow

Session – 2: Detailed Technical Presentation on construction technology of LHP Rajkot [Monolithic Concrete Construction using Tunnel Formwork]

- Construction process at LHP Rajkot:
- Site excavation and stabilization
- Column laying & structure
- Technology specific construction & other walling & roof components details
- Plastering & finishes



Session–3: Vocational Training – Practical implementation (Showcasing On-site Building Construction)

Outcome & impact of the event

42 construction employees attended the two-day seminar found it to be beneficial for expanding their understanding of new building technology available on the market. Additionally, participants gained exposure by visiting the actual site where the demonstration projects are built. This made it much easier for them to observe and comprehend the techniques. Through this programme, participants were able to learn about new building technologies on a theoretical level while also seeing how the technology was used in live sites. Following the sessions, the trainers had a number of inquiries about the trainings offered. The goal was to evaluate the attendees' level of understanding and construction knowledge.



A glimpses from the warmup session by GIZ CSB cell

Feedback from participants

The training was majorly focused on dissimilating hands-on training to the professionals from the construction sector. The two days long event addressed topics on Innovative Construction Technologies being deployed at Light House Projects and Construction Process of LHP Rajkot as per the "Monolithic Concrete Construction using Tunnel-Formwork. The training was successful in educating the participants about the latest construction technologies which are being used in the country, and to keep them up to date with



Participants and CSB Cell members took the participants for site visit of the AHP Vavdi - Rajkot

the latest construction trends in the country. Mr. Winamra Negi, Engineer Consultant, Climate Smart Buildings Cell, GIZ delivered the vote of thanks and applauded the initiative by (MoHUA) – GoI to bring the concept of training of the construction workers at the ground level about the latest construction technologies in the affordable housing sector.





Agenda for the RACHNA #48

Rachna on Twitter



Training #48 program proceedings on GHTC twitter handle





Training on emerging construction technologies & thermal comfort in Light House Projects for officers



Date: 05No of participants: 38Location:

: 05th July 2022 : 38



About the Event

Ministry of Housing and Urban Affairs (MoHUA) in a collaboration between its technical arm Building Material and Technology Promotion Council (BMTPC), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) organized a Training - cum - Workshop named RACHNA (Resilient, Programme Affordable and Comfortable Housing through National Action) at Gorakhpur Development Authority, Gorakhpur, Uttar Pradesh. The theme of the one-day training was Innovative

Construction Technologies & Thermal Comfort for Affordable Housing.

Trainer profile



Trainer 01-Mr. Abu Talha Farooqui is an Assistant Professor and the Assistant Dean for Internships and Industry interface at the Jindal School of Art & Architecture, Jindal Global University, Sonipat. He has practised and

taught architecture and design for 10 years and have headed design studios, theory & research courses, and sustainability related courses in his teaching career. He is also a BEE-Certified Master-Trainer of ECBC Energy Conservation Building Code of India and have trained professors and government officials across India for the implementation of ECBC.



Training 02-Mr Saif Uddin is an Energy Engineer by Qualification and Building Policy Expert by Profession having more than 8 years' experience in the domain of Energy Conservation Building Code, Eco-Niwas



Samhita implementation with Government of Uttar Pradesh, Himachal Pradesh, Rajasthan & Bihar. Building Energy Simulation for ECBC, ASHRAE 90.1 and general energy optimization is his key expertise. He is a certified IGBC Associate professional, and GRIHA certified professional.

Brief event proceedings

Welcome address

Mr. Amrish Kumar Chaturvedi, Consultant Engineer and Team Manager, Climate Smart Buildings Cell, North Cluster, GIZ delivered the welcome address for all the participants to not only understand and learn the technical aspects of the new innovative technologies but simultaneously also acquire and strictly follow the safety norms while incorporating these new technologies in their current and future projects.



Mr. Amrish Kumar Chaturvedi, Consultant Engineer and Team Manager during the welcome address

Technical sessions

The event covered the following technical sessions:

Session 1: Importance of Thermal Comfort

Session 2: Thermal comfort models: Standards, Codes and Building Materials Session 3: New age innovative technologies along with the 6 LHP construction technologies



Mr. Amrish Chaturvedi explaining the LHP technologies

Session 4: Eco-Niwas Samhita (ENS) part I &II and its compliances

Session 5: Low energy comfort systems, Star Labelling and Best practices

Outcome & impact of the event

The day-long event evoked great responses from over 38 participants from Gorakhpur Development Authority, Gorakhpur, Uttar Pradesh who were trained on 'Innovative Construction Technologies & Thermal Comfort for Affordable Housing'. As a requirement for future buildings in the state, climate smart strategies for constructing new dwellings was understood and appreciated by the officials present, and they further requested further support in future projects.

Feedback from participants

The participants found the sessions insightful. They understood the importance of thermal comfort in buildings and its impact on the occupants. Further they understood the role of building materials, passive design strategies in making a building comfortable and latest construction technologies available in the market.



	Innovati	ve Construc m: Gorakhpu	tion Technologies & Thermal Comfort for a rr Date: 05 th July 2022, Tuesday Time: 10	Affordable Housing'
	TIME	SESSION	TORE	CREAVER
RESILIENT, AFFORDABLE AND COMFORTABLE HOUSING THROUGH NATIONAL ACTION	11716	36338014	Williams Eddense	GIZ CIZ
	10:00 - 10:15	Introductory Section	Presidente a Billione	chiefdoud ditt
Training #49: One, Day Training Programme on			Adjusted Adultation	CORE OPEN - OCA
e Construction Technologies & Thermal Comfort for Affordable Housing	10:15 - 10:30		GIZ, and the Bilateral Programme - Climate-Smart Buildings	Climate-Smart Buildings (CSB) Cell
ton-Goraldown: Data : 059 Inlo 2022 Tuanday Tima - 10:00 AM to 5:30 PM	10:30 - 10:45		HIGH TEA and NETWORKING	
TRAINING PROGRAMME Housing & Urban Affairs (MoHUA) in partnership with GIZ and the Building Material Promotion Council (BMTPC) is bosting a series of trainings/workshops on new age	10:45 - 12:15	Section-1	Thermal Conduct: a) Indices b) Thermal conduct in Affordable Housing c) Parame strategies & Duilding Physics d) Care studies	Mr. Abu Talha (Expert Trainer)
wattive Construction Technologies & Thermal Connort for Affordable Housing manned RACLINA dilent. Affordable and Comfortable Housing through National Action). The prime focus of this sing Programme is to make participants aware of the Climate-Smart Buildings programme and knowledge on thermal confort and its necessity in the affordable housing sector. The parame will cover the thermal confort basics, material influences, low-cost solutions & codes	12:15 - 13:00	Secolon - 2	Thermal Confort models: a) Thermal Confort standards b IMAC ii. ASHRAE b) Effect of sustenials on thermal confort	Mr. Abu Talha (Expert Trainer)
n India to create Climate-Smart Buildings. The participants will also learn about sject's construction technologies and aspects of mainstreaming and replication of	13:00 - 14:00		LUNCH BREAK	
i in their upcoming or future projects.	14:00 - 15:00	Section - 3	New age innovative technologies along with the 6 LEP construction technologies focusing on - efficiency in construction, mainstreaming if replication of technologies, and suitainable com thermal confort aspects.	Mr. Saif Uddin (Expert Trainer)
Pradesh	15:00 - 16:00	Session - 4	Eco Novas Samhita Part 1 & 2 and its compliance	Mr. Abs Talha (Expert Trainer)
is. Presse drop an ereal to	16:00 - 16:15		HIGH TEA and NETWORKING	
HOLDERS	16:15 - 17:00	Settion - S	a) Low Energy Comfort Systems and BEE Star Labeling b) Indian & International Best Practices	Mr. Saif Uddin (Expert Trainer)
<u>nn</u>	1000000		Qualitize & Longer Section	Climate-Smart Buildings
TT #	17:00 - 17:15	Concluding	Concernence of Concernence	(CSB) Cell

Agenda for the RACHNA #49

Rachna in media



Under **#RACHNA**, training programmes were recently held at Gorakhpur, Bengaluru & Guwahati for senior Govt officials/stakeholders. The one in Gorakhpur was a comprehensive capacity-building programme on innovative construction technology, Thermal Comfort for Affordable Housing.



: Training #49 program proceedings on GHTC twitter handle



क्लाइमेट स्मार्ट बिल्डिंगः गर्मी में कराएगी ठंडक का अहसास

SPECIAL

वलाइमेट स्मार्ट बिल्डिंग के लिए अफसरों और इंजीनियरों को दे रहे टेलिंग

orakhpur@inext.co.in

GORAKHPUR (6 July): मॉर्डनाइजेशन के दौर में गवर्नमेंट ने क्लाइमेट स्मार्ट बिल्डिंग (ग्रीन बिल्डिंग) पर जोर दिया है, पानी, कर्जा और भौतिक संसाधनों को बचाने के लिए अब क्लाइमेट स्मार्ट बिल्डिंग बनेंगी, टायल के तौर पर शहीद पथ (लखनऊ) को अवध विहार योजना में क्लाइमेट स्मार्ट बिल्डिंग बनाने का काम शुरू भी हो गया है. इसके तहत



लखनऊ में बन रही क्लाइमेट स्मार्ट बिल्डिंग.

क्लाइमेट स्मार्ट बिल्डिंग के फायदे

 गर्मी में ठंडी रहेगी और सर्दी में गर्म. टेम्प्रेचर नामंल रहने से लोग बीमार कम घडेगे

 बिजली का उपयोग कम होगा. 🥺 आने वाले समय में नामेल मकान से किफायती पड़ेगा. 🛚 बिजली बिल कम अइएगा, जिससे बचत होगी. 📀 पर्यावरण को फायदा पहंचेगा

📕 🗮 बर्मल कंफर्ट के लिए लखनऊ में 1040 मकान क्लाइमेट स्मार्ट बिल्डिंग प्रोजेक्ट के तहत बनाए जा रहे हैं. जैसे-जैसे ये टेक्नोलॉजी अपडेट होगी वैसे ही इस तरह के मकान ज्यादा से उद्यादा देखने को मिलेंगे, इनोवेटिव कंस्टक्शन के लिए लगातार वर्कशॉप ऑर्गनाइज की जा रही हैं.

अमरीश कुमार चतुर्वेदी, टीम मैनेजर, क्लाइमेट स्मार्ट बिल्डिंग्स सेल जीआईजेड

1040 क्लाइमेट स्मार्ट मकान बनेंगे. सर्दी में गर्म, इसको बनाने के लिए लखनऊ में इस प्रोजेक्ट को 'पीवीसी ग्रे- रन-प्लेम फॉमंवकं सिम्टम' नाम दिया गया है, भारत सरकार के आवासन और शहरी कार्य मंत्रालय और जोआईवेड के सहयोग से नार्थ क्लस्टर के उत्तर प्रदेश, उत्तराखंड, हाउस प्रोजेक्ट दिल्ली, लहाख, जेएंडके और हिमाचल प्रदेश में क्लाइमेट स्मार्ट बिल्डिंग के लिए अफसरों और इंजीनियरों को ट्रेनिंग देने का काम शुरू हो गया है, कुल 75 टेनिंग सेशन में से 49वीं टेनिंग गोरखपुर में हुई.

क्या होती है क्लाइमेट स्मार्ट बिल्डिंग

यह एक ऐसी बिल्डिंग होती है जो भौसम के हिसाब से एडजस्ट हो सके, यह गर्मी में ठंडी रहती है और कर सके.

ग्लोबल हाडसिंग टेक्नोलॉजी चैलॅस को तकनीक का इस्तेमाल करके बनाया जा रहा है.

धर्मल कंफर्ट के लिए लाइट

नई तकनीको से आवास बनाने के लिए भारत और जर्मनी की सरकार ने इंडो-जर्मनी एनजी प्रोग्राम के तहत हाथ मिलाया है. इस प्रोग्राम के अंतर्गत इंडिया के नाथ क्लस्टर में क्लाइमेट म्मार्ट बिल्डिंग्स क्लस्टर सेल्स बनाए जा रहे हैं. इनको लाइट हाउस प्रोजेक्ट के नाम से भी जाना जाता है. इस प्रोजेक्ट का मकसद है बिल्डिंग में धर्मल कंफर्ट को लाना, ताकि बिल्डिंग मौसम के अनसार टेम्प्रेचर एडजस्ट



GORAKHPUR (5 July): भारत सरकार के आवासन और शहरी कार्य मंत्रालय की ओर से इनोवेटिव कंस्टक्शन टेक्नोलॉजी और थर्मल कंफर्ट पर मंगलवार को एक वर्कशॉप ऑर्गनाइज की गई, जीडीए के कॉन्फ्रेंस हॉल में ऑर्गनाइज इस वर्कशॉप में को 'रचना' नाम दिया गया है. इसमें चीफ गेस्ट के तौर पर जीडीए वीसी प्रेम रंजन सिंह, पूर्व एक्सईएन मुकेश अग्रवाल और किशन सिंह रहे.

कैसी होती है क्लाइमेट स्मार्ट बिल्डिंग

इस वर्कशाप को आयोजित करने का मकसद है क्लाइमेट स्मार्ट बिल्डिंग का निर्माण कैसे हो और इसको बनाने में किन-किन चीजों को इस्तेमाल करना

चाहिए, इसके बारे में जानकारी दी गई. क्लाइमेट स्मार्ट बिल्डिंग एक ऐसी तरह की बिल्डिंग होती है, जिसको मौसम से कोई फर्क नहीं पडता. यह ठंड के मौसम में गर्म रहती है और गर्मी के मौसम में ठंडी, इसमें आए ट्रेनर्स अब तल्हा और सैफुदुदीन ने सभी पार्टिसिपेंटस को इंडिया में अवेलेबल मैटेरियल्स और सस्ते सॉल्यशन से क्लाइमेट स्मार्ट बिल्डिंग बनाने का तरीका सिखाया. इसके साथ ही बिल्डिंग को बनाने के लिए नई टेक्नोलाजी और प्रोजेक्टस के बारे में बताया गया. घर को क्लाइमेट स्मार्ट बनाने के लिए मैटेरियल को किस अमाउंट में रखना चाहिए और और साथ ही इसके कुछ उदाहरण भी प्रस्तुत किए गए.





Training on thermal comfort for practitioners



Date: 8-9 JNo of participants: 52Location:

: 8-9 July 2022 : 52



About the event

The Rachna for practitioners training program is organised for professionals to deliver indepth knowledge to professionals on thermal comfort, its relationship with building physics and best available technologies in construction of affordable housing. The training targeted architects, engineers, professionals from ISHRAE and professionals from various state & municipal implementing agencies.

Trainer profile



Prof. Rajan Rawal is an architect by training and is a senior advisor at Centre for Advanced Research in Building Science and Energy (CARBSE), and a CRDF Professor at CEPT University. He was Executive Director of

CARBSE between 2006 and 2021. He worked with Vastu Shilpa Foundation for Studies and Research in Environmental Design before joining Faculty of Design, CEPT University, Ahmedabad. He taught design and construction courses as part of the undergraduate program. He now teaches energy efficient built environment, energy policy, energy modelling and simulations at postgraduate level.

230



Brief event proceedings

Welcome address

Dr. Rajan Rawal, Senior Advisor, CARBSE, CEPT university. started the training with the welcome address greeting all dignitaries and attendees and giving them an overview of Rachna and a glimpse of the session ahead.



Dr. Rajan during his welcome address for Rachna training program

GIZ CSB introduction

Mr. S Vikash Ranjan, Project Head, Climate Smart Buildings (CSB) Programme under GIZ, gave an overview of PMAY(U) and the GIZ-CSB initiative, the project objectives and the team experts involved. He introduced the audience to the work done by GIZ in India. He further elaborated on the other project initiatives with MoHUA under the CSB project such as the Thermal comfort Standard and Action plan, replicable designs catalogue amongst other initiatives. He also urged the participants to register for the Technograhi's program to gain further knowledge on LHPs and innovative technologies and get regular updates of upcoming events.



Mr. Vikash from GIZ elaborating on the initiative of GIZ's Climate Smart Buildings program

Technical sessions

The event covered the following technical sessions:

Day 1-

Session 1: Overview of the workshop, introduction of the project and trainers

Session 2: Importance of Thermal Comfort

Session 3: Affordable housing passive design strategies

Session 4: Building materials and methods of construction for affordable housing

Session 5: Building codes, affordable housing and thermal comfort

Session 6: Application of thermal comfort in affordable housing- Case studies

Session 7: Day 1 Concluding remarks



A light moment during the training session

Day 2-

Session 8: Day 1 Recap

Session 9: Building codes, affordable housing and thermal Comfort

Session 10: Application of thermal comfort in affordable housing- A suite of case studies

Session 11: Thermal comfort study methods

Session 12: Low energy cooling technologies and comfort

Session 13: Discussions on quiz-questionnaires

Session 14: Feedback from participants and concluding remarks





Participants applying the learnings during the quiz session

Outcome & impact of the event

The event was attended by Architects, Engineers and Building energy experts from the construction domain. The attendees also included academicians and Planning students from NITTE school of Architecture and environmental science students from Visvesvaraya Institute of Advanced Technology and Dr. Bhanuben Nanavati College of Architecture for Women. The event also saw participation of Project engineers, Junior Assistants. Assistant Engineers and Civil Engineers from various government departments such as Karnataka Slum Development Board, PMAY(U) State Level Technical Cell (SLTC), City Level Technical Cell (CLTC), Rajiv Gandhi Housing Corporation Limited (RGHCL), District Urban Development Cell (DUDC). Many participants were professionals who are members of Indian Society of Heating, Refrigerating and Air Conditioning Engineers (ISHRAE). The participants represented covered almost all the stakeholders from the building industry, from professionals to govt. officers responsible for Affordable Housing implementation. The discussions were

very enriching and reflected the learnings from the session and experience form the field in the designing and implementation of housing for economically weaker sections.

Feedback from participants

The sessions concluded with the speaker providing information regarding various other training sessions that are going to be conducted in both online and in-person formats in other cities of the country. The training program was well received by the participants. The questions from participants involved queries about ENS code and compliance as well as understanding the applicability of ENS with other green rating systems such as GRIHA & IGBC etc. Discussions revolved around understanding the difference conditioned and naturally between Air ventilated buildings and their suitability for Bangalore. It was understood that the attendees would require more such trainings to be held on regular basis for skilling up the senior management alongside their implementors on field.



Participants being briefed about the e-modules and gamification of training program





Agenda for the event

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Rachna on Twitter



50 & counting!

The 50th training under **#RACHNA** programme was recently organised in Bengaluru for professionals and Govt officials on the theme of innovative construction technology & **#thermalcomfort** in **#affordablehousing**.



7:48 PM · Jul 13, 2022 · Twitter Web App

Training program proceedings on GHTC twitter handle





Date: 11h July 2022No of participants: 19Location:



About the Event

The Rachna for officers was organised for professionals interested in understanding the basics of thermal comfort, its needs and its applicability in affordable housing. Post training, the professionals were able to understand polices on thermal comfort and were equipped with tools for monitoring and evaluating the impact of thermal comfort in upcoming affordable housing. The training targeted Government officials and professionals having degree in engineering or architecture and serving in (a) Urban Local Bodies (b) State government and (c) Central government departments engaged in the development of affordable housing under various government schemes, officials and academicians dealing with implementation and application of codes and policy related to thermal comfort and energy efficiency in affordable housing.

Trainer profile



Trainer 01–Prof. Rajan Rawal is an architect by training and is a senior advisor at Centre for Advanced Research in Building Science and Energy (CARBSE), and a CRDF Professor at CEPT University. He was Executive Director of

CARBSE between 2006 and 2021. He worked with Vastu Shilpa Foundation for Studies and Research in Environmental Design before joining Faculty of Design, CEPT University, Ahmedabad. He taught design and construction courses as part of the undergraduate program. He now teaches energy efficient built environment, energy policy, energy modelling and simulations at postgraduate level.




Trainer 02 –Dr. Yash Kumar Shukla is the Principal Researcher and Centre Head at the Centre for Advanced Research in Building Science and Energy (CARBSE). He has led several ground-breaking research projects including

low-energy cooling and ventilation systems in Indian residences, evaluation of innovative cooling technologies, and benchmarking of Indian buildings. He is also associated with the Master of Technology in Building Energy Performance (MBEP) program at the Faculty of Technology, CEPT University. He possesses several professional certifications including Certified Measurements and Verification Professional (CMVP), Home energy rating system (HERS), GRIHA trainer, and ECBC Master Trainer. He is an active member of ISHRAE, ASHRAE, and IBPSA.



Trainer 03 -Bhavya Pathak is an architect working as Research Associate at а the Center for Advanced Research in Building Science (CARBSE), and Energy CRDF, CEPT University, Ahmedabad. Her work

focuses on energy efficiency through building materials and thermal comfort in the built environment. She also works at the intersection of the environment and energy associated with residential buildings in India through the lens of climate change mitigation and adaptation. Bhavya holds a Master of Architecture degree from the City University of New York, New York, U.S.A. focusing on energy and sustainability in buildings. Prior to that, she has worked as an architect in India on multiple projects ranging from IGBC 'platinum' rated institutional buildings to an award-winning heritage project.

Brief event proceedings

Welcome address

The training started with the welcome address given by Ms Palak Patel. This was followed by

an overview of the training program by Dr. Rajan Rawal. He highlighted that the current Rachna training is designed specifically for govt. officers who will be instrumental in developing new policies and complement implementation of policies through advanced knowledge of passive building design for thermal comfort in affordable housing.

GIZ CSB introduction:

This was followed by the introduction of Climate Smart buildings Program delivered by Prof. Rajan Rawal. The introduction session gave an overview of PMAY(U) and the GIZ-CSB initiative, the project objectives and the team experts involved. He highlighted that GIZ on behalf of The Federal Ministry of Economic Cooperation and Development (BMZ), Germany, and in cooperation with the Ministry of Housing and Urban Affairs, Government of India aims to foster sustainability in built environment to use sustainable materials for Thermal comfort and in turn improve the environment and climate conditions.

Technical sessions:

The event covered the following technical sessions:

Session 1: Importance of Thermal Comfort



Session on importance of Thermal Comfort



Session 2: Affordable Housing Passive Design Strategies



Session 3: Building Materials and Methods of Construction for Affordable Housing

Session 4: Building Codes, Affordable Housing and Thermal Comfort



Session 5: Application of Thermal Comfort in Affordable Housing- Case Studies

Session 6: Overview of Innovative construction technologies implemented in Light House Projects (LHPs)

Outcome & impact of the event

The event was attended by 19 participants. These predominantly represented architects, practitioners and academicians from universities such as Amity University Noida, CEPT University and SRM University. The participants also represented researchers and managers from building material manufacturing industry such as Lumin Coatings, Kansai Nerolac Paints, Pidilite industries, Duromax Hitech Coatings etc. The training program saw a healthy discussion amongst participants and the trainers discussing real life situations related to costs of materials, choosing right material/ design, timeline of projects.

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Feedback and discussion session

Feedback from participants

The participants found the sessions thorough and inspiring. They understood the importance of using passive strategies for designing low cost thermally comfortable housing in India which was well explained with the help of case studies, photographs and examples. The participants appreciated the interactive nature of the sessions and the quality of the content. The participants, being practicing architects and representatives from the construction and building material industry were keen to understand and learn more about new age strategies such as cool roofs: the concept and implementation.



Feedback session

The sessions concluded with the speaker providing the information regarding the various other training sessions that are going to be conducted in both online and in-person formats in other cities of the country.



Dr Relen Rene

Dr Rajan Kawali

Dr Rajan Raval

Bhavya Pathak

Shavya Pathali

Ehros Pathali

Dr Yash Shuki

Agenda



Agenda of RACHNA #51

Pictures from the event



Technical session in progress





Training on thermal comfort for officers

RACHNA for Officers

(Resilient, Affordable and Comfortable Housing through National Action)

One-Day Online/Virtual Training Programme on "Thermal Comfort through a Multi-Layered understanding in Affordable Housing"



Date: 13 July 2022No of participants: 60Location:



About the Event

The Rachna for officers was organised for professionals interested in understanding the basics of thermal comfort, its needs and its applicability in affordable housing. Post training, the professionals were able to understand polices on thermal comfort and were equipped with tools for monitoring and evaluating the impact of thermal comfort in upcoming affordable housing. The training targeted Government officials and professionals having degree in engineering or architecture and serving in (a) Urban Local Bodies (b) State government and (c) Central government departments engaged in the development of affordable housing under various government schemes, officials and academicians dealing with implementation and application of codes and policy related to thermal comfort and energy efficiency in affordable housing.

Trainer profile



Trainer 01 –Dr. Vishal Garg is a Building Science professor and specializes in building energy efficiency through building performance simulations and automation and controls. His current focus is on Smart Energy

Homes. He is developing and field testing a Smart Home Management System (SHEMS) to understand its impact on energy savings and demand reduction. This work also includes psychological evaluations and sociological approaches to understanding people's energy behaviour. He is also involved in policymaking and market research of smart energy homes and is incubating a start-up to facilitate lab to market.





Trainer 02 – Ashok B Lall is an architect practicing in Delhi since 1981. He graduated from the University of Cambridge U.K. in Architecture Fine Arts and obtained the Architectural Association Diploma in 1970. His practice specializes

in environmentally and socially sustainable design. He has researched and written about sustainability extensively. He has also been involved with architectural education since 1984. He was Dean of Studies at TVB School of Habitat Studies, New Delhi and at present he is the Design and Technology Chair at KRVIA, Mumbai.



Trainer 03 – Dr. Aviruch Bhatia is presently working with TERI SAS as Assistant Professor. He has nine years of research/industry experience. He received his M.Tech. in energy engineering from Malaviya National Institute of

Technology, Jaipur. His areas of interest include building physics, calibrated building energy simulation, and fault detection and diagnostics in HVAC systems. He is an Indian Green Building Council Accredited Professional and GRIHA Trainer. Till date, he has published 7 journal publications, 9 conference publications.



Trainer 04 – Dr. Shivraj Dhaka has over 15 years of rich experience in industry and academia. He has been involved in research, especially on Building, Energy and Environment since 2008 and has published

over 20 research articles in the top-ranking journals and referred international conferences. He was awarded DAAD Fellowship, Germany in 2012 for research on Thermal Comfort at 'Karlsruhe Institute of Technology (KIT), Germany'. ASHRAE awarded scholarships for his contribution to the society.

Brief event proceedings

Welcome address

Prof. Rajkiran V Bilolikar, Director, Centre for Energy Studies – ASCI, Hyderabad formally initiated the program with his inaugural address by welcoming the dignitaries and participants. As part of his inaugural address, he shared his views on the importance of thermal comfort in affordable housing and discussed the programme agenda that has set the tone for the event.

GIZ CSB introduction:

The introduction session by Mr. S Vikash Ranjan, Programme Head (CSB) from GIZ gave an overview of PMAY(U) and the GIZ-CSB initiative, the project objectives and the team experts involved. It further elaborated on our interpretation of the project objectives and the roles of the relevant stakeholder



Shri S Vikash Ranjan, Program Head, GIZ-CSB Project introducing the project

Technical sessions:

Session 1: Building Physics and Thermal Comfort





Session 2: Affordable Housing Passive Design Strategies

Session 3: Building Codes, Affordable Housing and Thermal Comfort

Session 4: Building Materials and Methods of Construction for Affordable Housing and Case Studies

Outcome & impact of the event

The event was attended by 60 participants, mostly practising professionals and including some govt. officers and students. The participants understood the concepts well and this motivated them to ask relevant questions related to material choice and passive design strategies to reduce indoor temperatures while drawing from their own experience and practice.





Questions regarding material choice and passive design strategies being addressed by experts

Feedback from participants

With regards to training, participants shared that training was very helpful and the content and exercises used in training helped them understand the topic and its significance. The feedback from participants regarding trainers were very positive, with most of them appreciating the trainers' approach in demonstrating examples.



	AGENDA		
Duration	Торіс	Speaker	
10:30 – 10:40 AM	Welcome Address	Prof. Rajkiran V Bilolikar, Centre for Energy Studies, ASCI	
10:40 – 10:50 AM	Introduction to Climate Smart Buildings Programme (IGEN – CSB) and overview of Training programme	Mr. S Vikash Ranjan, Programme Head (CSB), GIZ	
10:50 – 12:15 PM	Building Physics and Thermal Comfort	Dr Vishal Garg	
12:15 – 12:20 PM	Break		
12:20 – 1:10 PM	Passive Design Strategies for Energy Efficient Buildings	Prof' Ashok B Lall	
1:10 – 1:40 PM	Lunch Break		
1:40 – 2:40 PM	Building Codes, Affordable Housing and Thermal Comfort	Dr <u>Aviruch</u> Bhatia	
2:40 – 2:45 PM	Breal	ĸ	
2:45 – 3:45 PM	Building Materials and Methods of Construction for Affordable Housing and Case Studies	Dr <u>Shivraj</u> Dhaka	
3:45 – 3:50 PM	Q&A/Q	uiz	
3:55 – 4:00 PM	Feedback and Conc	uding Remarks	

Agenda for RACHNA #52

Screenshots of Event









Awareness drive in architectural college



Date: 13th & 14th July 2022No of participants: 80Location:



About the Event

Ministry of Housing and Urban Affairs (MoHUA) in collaboration between its subsidiary unit Building Material and Technology Promotion Council (BMTPC), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), hosted a series of trainings on Innovative Construction Technologies & Thermal Comfort for Affordable Housing under the banner name RACHNA (Resilient, Affordable and Comfortable Housing through National Action). The prime focus of this training was to make the Academicians and students aware about the latest technology i.e., Precast Concrete Construction System – 3D Volumetric is being used at LHP Ranchi, also about Thermal Comfort, Green Building Concept, Eco Niwas Samhita tool and standard.

Trainer's profile



Shri. Gaurav Shorey has a bachelor's degree in Architecture (B.Arch. School of Planning and Architecture, New Delhi) with a postgraduate diploma in advanced construction management (D.A.C.M – National Institute

for Construction Management and Research, Pune).

He has seventeen years of experience in sustainable habitats during which he has transitioned from the green buildings and energy efficiency sector to education & awareness-generation. His work now focuses on sustainability in the hyper-local context, and for the need to preserve traditional knowledge systems for sustainable development and climate-change mitigation.



Brief event proceedings

Welcome address

Shri S.S Rai – Director - KIIT School of Arch. & Planning started off the event with an energetic welcome address that established the tone for the day, greeting all dignitaries and attendees present in the program.

Keynote Address

Shri J.K Das - Managing Director - Odisha Bridge & Construction Corporation Limited (OB&CC) started off his address by highlighting the need to follow the best practices from the roots of the the Tribal Housing Construction Techniques from the Odisha State.

Special Address

Shri S.K Patra - Chief Architect-Public Works Dept., Govt. of Odisha gave a brief of the progress made by the Odisha Govt. He also urged the students to learn about the simple steps they can take to add thermal comfort in their dwelling's designs.

GIZ CSB introduction:

CSB Cell has started session and began with introduction of "RACHNA" program, Ministry of Housing and Urban Affairs (MoHUA), Mission – Housing for All, overview of PMAY(U) and Global Housing Technology Challenge. Further delivered & informed about GIZ, their association with Indian Govt on different project and objective fulfilments. About Climate Smart Buildings program and CSB cell initiative, project objectives and the team experts involved. Further the team elaborated on the interpretation of the project objectives and the roles of the relevant stakeholders.

Technical sessions

Session 1: Thermal Comfort in Affordable Housing & Passive Designs, Standards

Session 2: Eco Niwas Samhita Part 1 & 2, Compliance & Tool Demonstration

Session 3: Affordable Housing Design Challenge

Session 4: Design Challenge Judgment and Certificate Distribution

Outcome & impact of the event

The two-day event evoked great response from 80 participants. After receiving training on "Innovative Construction Technologies & Thermal Comfort Measures for Affordable Housing," the participants took part in an architectural design challenge where they were tasked with coming up with affordable housing designs using innovative construction technologies and thermal comfort features

Feedback from participants

The Participants have appreciated the efforts put in by CSB Cell members and successful completion of the event. They have shared their experiences on the event, found it informative and interested in terms of learnings and its approaches towards practical implementations. They also added & emphasize to get organize such more events / small training sessions for the academicians. They have also shared their plans to consider this Technology and related materials as a part of their academic courses.



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Agenda for RACHNA #53

Rachna on Twitter



Training #53 program proceedings on GHTC twitter handle

RACINA



Photographs taken during the event RACHNA #53

RACINA



Training on emerging construction technologies & thermal comfort in LHPs for practitioners



Date: 14 - 15 July 2022No of participants: 51Location:



About the Event

In order to introduce new construction technologies, Ministry of Housing and Urban Affairs (MoHUA) had initiated the Global Housing Technology Challenge - India (GHTC-India) with an intent of recognizing a plethora of new-age construction technologies from across the globe for housing construction sector which can deliver ready to live-in homes in minimal time and cost with high-quality of construction in a sustainable manner. The RACHNA: Training on emerging construction technologies for thermal comfort was organised for the officers, practitioners, builders and professionals interested in learning the fundamentals of thermal comfort requirements and their needs in the affordable housing sector. The training was intended for senior officials with engineering or architecture backgrounds who work in urban local bodies, state and central governments, reputed universities and individual practitioners who are involved in the development of affordable housing under various government programmes. These officials also deal with the implementation of codes and policies related to thermal comfort, energy efficiency, and affordable housing.

Trainer profile



Trainer 01 – Shri Saibal Saha has done post-graduation in "Urban Environment Management & Law" from National Law University, Delhi. He has above 28 years of experience. He has earned the credentials

like BEE Certified Energy Auditor and ECBC Master Trainer, GRIHA certified professional and is working as Third-Party Assessor for



ECBC in Telangana and Andhra Pradesh. He is working in Building-Energy Efficiency, Green Building Certification, Energy –audits, and Environmental Management Plan for large construction (Buildings) projects. He has provided training on the implementation of the 'Energy Conservation Building Code of India' to different state government officials of the country, including more than 50 training and awareness programs on ECBC.



Trainer 02 – Ms. Ragini Goswami is an Architect and a certified Green Building Professional with more than 9 years of work experience in providing specialized services to obtain green certifications under LEED, IGBC, GRIHA,

EDGE and ECBC Compliance for the Buildings. She has earned credentials from IGBC AP and GRIHA CP and BEE as Certified ECBC Master Trainer. She has conducted more than 15 training programs in Chhattisgarh, Meghalaya, Manipur, Meghalaya, Mizoram, Nagaland on ECBC 2017 code (Commercial building) and Eco-Niwas Samhita (ENS) code (Residential buildings) as a Master trainer.

Brief event proceedings

Welcome address

The training started with the welcome address delivered by the CSB cell members of Tripura in the absence of Shri Tamal Majumder, Director, UDD Tripura. Shri Sayan Maitra, Team member – CSB Cell, East Cluster, Agartala was the moderator of the session.



Session by Shri Saibal Saha on Thermal Comfort

The current Rachna training was designed specifically for govt. officers who will be instrumental in developing new policies and complement implementation of policies through advanced knowledge of passive building design for thermal comfort in affordable housing.

GIZ CSB introduction:

Shri Rahul Bose, Architect – CSB Cell, East Cluster, Agartala spoke in detail about the various initiatives of GIZ in India in the sustainability sector, clean energy & energy efficiency services. He also shared the objective of introducing this project as to ameliorate climate resilience and thermal comfort in buildings constructed under Pradhan Mantri Aawas Yojana (Urban).

Further, he updated that the Light House Projects is happening across six states of the country with different technologies with the sole intention of providing ready to live-in homes with minimal time and cost along with highquality of construction in a sustainable manner.



Introductory session on initiatives of GIZ

Technical sessions:

Session 1: Session 1: Thermal Comfort: a) Indices, b) Thermal comfort in Affordable Housing, c) Passive strategies and building physics, d) Case Studies.

Session 2: Thermal Comfort Models: a) Thermal Comfort Standards i. IMAC and ii ASHRAE

Session 3: New Age innovative technologies along with the 6 LHP construction technologies.

Session 4: Green Buildings: a) Brief b) Green measures c) indigenous and low embodied materials d) Best Practices



Session 5: Eco-Niwas Samhita 1&2 and its compliance

Session 6: a) ENS 2021 Compliance, b) Live demo on Tool, c) Thermal Comfort Analysis, d) Recommendations to current and future Affordable Housing Projects

Session 7: ENS 2018 Brief with technical exercise (calculating RETV etc.)

Session 8: a) Low energy Comfort System and BEE star levelling, b) Indian and International best practices



Session by Shri Saibal Saha on Thermal Comfort

Outcome & impact of the event

The event was attended by various officials from different government departments of Tripura including institutions and individual practitioners such as Tripura State Electricity Corporation Ltd., PWD, Agartala Municipal Corporation, The Institute of Engineers, ICFAI University. The overall Programme was planned in such a way that it had a very balanced mixture of technical presentations, practical learning, as well as equal opportunity and exposure for networking. Entire training session was bifurcated in three aspects -Theoretical, Compliance & design along with practical knowledge transfer. The training session featured a constructive exchange of ideas between participants, the instructor, and real-world scenarios involving material pricing, project timelines, and projects that have already been employing sustainable materials to provide their inhabitants with suitable living spaces.

Feedback from participants

The participants found the sessions thorough and much inspiring. They understood the importance of low cost thermally comfortable housing in India designed using passive strategies and really appreciated the interactive nature of the sessions and the quality of the content specifically designed for improving thermal comfort in affordable housing in India. Shri Sayan Maitra, Team Member – CSB Cell, East Cluster, Agartala delivered the precious vote of thanks. He applauded MoHUA team members along with the volunteers involved for their active efforts in the overall coordination and arrangement of this event.



Ms. Ragini Goswami addressing queries of the participants

He was also encouraged the participants to adopt Light Gauge Steel Frame technology that is being implemented at LHP Agartala will deliver ready to live-in homes in minimal time and cost with high-quality of construction in a sustainable manner.



	Innovati Locatio	ve Construction Technologies & The n: Agertals Date : 14 th - 15 th July 2022 , Thu AGENDA	ermal Comfort for Affordable Housir rday & Friday Time : 00:30 AM to 5:30 PM - DAY 1
	DURATION	TOPIC	SPEAKER
	9:30-10:00	Registration	
SILIENT, AFFORDABLE AND COMFORTABLE HOUSING THROUGH NATIONAL ACTION	10:00-10:15	Welcome Address	G42 Team
Training #54: 2-Day Training Programme on	1015-1045	International Society (2)'s Meaning For All	Shid Ruhid Rova
novative Construction Technologies & Thermal Comfort for Affordable Housing' Location: Agentale Date: 51% - 15% http://doi.org/10.1001/001101010000000000000000000000		Programme, G/Z, and the Bilateral Programme - Climate Smart Buildings (CSB)	Architect, CSB Cell East Ouster
ABOUT THE TRAINING: The Ministry of Housing & Urban Affairs (MOHUA) in partnership with GIZ and Building Material and Technology promotion Council (BMTPC) is hosting series of trainings/workshops on Innovative Construction Technologies & Thermal Comfort for Affordable Housing named RACHNA (Resilient, Affordable and Comfortable Housing through National Action. The prime focus of this training is thermal comfort and its necessity in the affordable housing sector. The training covers the thermal comfort basics, material influences, low-cost solutions & codes that are available in India to create Climate-Smart Buildings. The outcome of the training would be to make the stakeholders in the		HEEH-TEA & NETWORKING	
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Agenda for RACHNA #54

Rachna on Twitter



Training #54 program proceedings on twitter handle





Training on emerging construction technologies & thermal comfort in Light House Projects for officers



Date : No of participants : Location :

: 28th July 2022 : 52



About the Event

The Rachna for officers was organised for professionals interested in understanding the basics of thermal comfort, its needs and its applicability in affordable housing. Post training, the professionals were able to understand polices on thermal comfort and were equipped with tools for monitoring and evaluating the impact of thermal comfort in upcoming affordable housing. The training targeted Senior officials having degree in engineering or architecture and serving in various State Government Stakeholder Departments, viz. Dept. of Local Govt. - Punjab, Greater Mohali Urban Development Authority, Dept of Housing and Urban Development, Haryana, Dept. of Town & Country Planning, Haryana, Municipal Corporation, Chandigarh, PWD- Building & Roads, Govt. of Haryana, etc., Architects and TECHNOGRAHIS.

Trainer profile



Trainer 01 – Smt. Mariyam Zakiah has a background of architecture and environmental design. She has over 10 years of working experience in projects dealing with sustainable development, building

energy efficiency and green buildings in Asia, Africa, and the UK. Her interest is expanding the realm of integrated passive design and has expertise in sustainable design assistance. Through her experience of collaborating with MEP Engineers at EDS coupled with her architecture background she has developed an integrated approach of the two disciplines on the overall environmental performance of buildings and their energy use. She was also involved in developing policy documents and content



for implementing Energy efficient buildings at the state and national level. Her previous experience includes conducting workshops on Insulation in high altitude villages of Sikkim, and participatory design exercise in various parts of India and Nepal.

Mariyam is a BEE Accredited Master Trainer and has conducted specialized training on Energy conservation building code (ECBC), ECBC- R (Eco-Niwas Samhita), climate adaptive design, green building certification standards and upskilling of the developer staff and construction laborers on aspects related to resilient green building construction for various projects.



Trainer 02 – Jitendra K. Vyas is a Structural Engineer Trained in Law Degree, M.B.A.(Information Technology) & P.G. Diploma in Urban Planning & Development. He has been qualified by examination as a

GRIHA Evaluator in 4 disciplines of the GRIHA Council (Teri & MNRE, G.O.I.). He is GRIHA CP & TRAINER, IGBC-AP, GEM CP, EDGE EXPERT & AUDITOR. He is also a T.P.A. on ECBC for Greater Hyderabad Municipal Corporation. He is a certified ECBC Master Trainer of the Bureau of Energy Efficiency (GoI) by examination. He is empanelled as ECBC EXPERT with B.E.E., India.

Brief event proceedings

Welcome address

All the participants were welcomed at the Faculty Hall of the Centre for Research in Rural and Industrial Development, Chandigarh. Shri. Jit Kumar Gupta – Technical Advisor, Chairman-Chandigarh IGBC Chapter, started the welcome address by giving a background to the attendees on the need for a Built Environment or Building for a Human Being, and how it relates to safety, shelter, and overall wellbeing for human beings. Further, for providing a better context of need for built environment. He compared a building to a living entity, as they provide us protection from natural environment viz, heat, cold, etc. And emphasized on the fact that 80 % of life of a human being is spent within the four walls of a building. Thus, he implored the attendees to understand and analyze buildings, in terms of how they determine the quality of life of a person.



Welcome address by Shri. Jit Kumar Gupta – Technical Advisor, Chairman - Chandigarh IGBC Chapter

GIZ CSB introduction:

The Training Program was formally started by Shri. Govinda Somani – Technical Expert, GIZ, by warmly welcoming all the participants and introducing RACHNA, the initiative by MoHUA and the objectives of the Training Program to the participants. In line with the theme of the Training Program, he also briefed the participants about the Climate Smart Buildings Program, which is an off-shoot of Indo-German Energy Programme (Joint Venture of Federal Republic of Germany [GiZ] and Govt. of India [MoHUA], and its objective with respect to Thermal Comfort of building occupants.



Briefing about GIZ and its initiatives by Shri. Govinda Somani – Technical Expert, GIZ



He further, apprised the participants about the flagship Light House Projects being built at 6 different locations in India, under Global Housing Technology Challenge-India (GHTC-India) & Pradhan Mantri Awas Yojana (Urban), & introduced the GiZ - Climate Smart Buildings Cell members and briefed the participants about the key activities being undertaken by Climate Smart Buildings Cell under the Climate Smart Building Program.

Technical sessions

Session 1: Session 1: Thermal Comfort: a) Indices, b) Thermal comfort in Affordable Housing, c) Passive strategies and building physics, d) Case Studies.

Session 2: Thermal Comfort Models: a) Thermal Comfort Standards i. IMAC and ii ASHRAE

Session 3: New Age innovative technologies along with the 6 LHP construction technologies.

Session 4: Eco-Niwas Samhita 1&2 and its compliance

Session 5: a) Low energy Comfort System and BEE star levelling, b) Indian and International best practices



Thermal Comfort being explained by Smt. Mariyam Zakiah

Outcome & impact of the event

The event was attended by 52 government officials and 3 practitioners from energy and architectural domain. These officials represented organisations like Dept. of Local Govt., Punjab, Dept of Housing and Urban Development, Haryana, Municipal Corporation, Chandigarh, PWD- Building & Roads, Govt. of Haryana, Haryana Police Housing Corporation, Panchkula, Greater Mohali Urban Development Authority, Dept. of Urban Planning etc. The training program saw a healthy discussion amongst each other, the trainer and discusses real life situations related to costs of materials, timeline of projects and highlighted projects that are already using sustainable materials that have been ensuring thermally comfortable living environments for the occupants.

Feedback from participants

The participants found the sessions thorough and much inspiring. They understood the importance of low cost thermally comfortable housing in India designed using passive strategies and really appreciated the interactive nature of the sessions and the quality of the content specifically designed for improving thermal comfort in affordable housing in India.



Questions being addressed by experts

Shri. Govinda Somani – Technical Expert, GiZ delivered the vote of thanks at the end of Training Program. He applauded the initiative by Ministry of Housing and Urban Affairs (MoHUA) – GoI to bring the concept of thermal comfort in the Affordable Housing sector, thus providing an opportunity to less privileged to live a comfortable and dignified life. Further he applauded the CSB Cell Team members for their active efforts in the overall coordination and arrangement of this event. He also congratulated the participants for showing keen interest on the subject and their participation towards making the event a success.



		Innovative Construction Technologies & Thermal Comfort for Affordable Housing Loading: Center for Research in flore and Industrial Development (1980), Claudigen Date 12P Ady 2022, Therefore [There: 09-09 AMI or Software] Advisory Date 12P Ady 2022, Therefore			
	DURATION	TOPIC	SPEAKER		
	9,30-10-30	Registration			
	10:50-11:00	Imangural Session: -			
SILIENT, AFFORDABLE AND COMFORTABLE HOUSING THROUGH NATIONAL ACTION		1. Walcome Address & Introduction to MoNUCs Hussing for AS Programme, GC, and the Bilateral Programme - Climate Smart Buildings (CSR)	GiZ / GiZ - Climate Smart Buildings (CSB) Cell		
Training #55: One-Day Training Programme on novative Construction Technologies & Thermal Comfort for Affordable Housing"		2. Keynote Address	Ar. Jit Rumar Gupta - Chairman: Chandigarh KBC Chapter; Chairman: Board of Examination & Architectural Education and Advisor: Journal of Indian Institute of Architects.		
Location (SBUD, Chandigerh.) Date: 28 th July 2022 , Thursday [Time : 09:30 AM to 5:00 PM.]		3. Inageral Address	Chandigeth Chief Goost: Sini, Sond Durth Yamma Former Additional Project Directors SUDA, Department of Constraints and the Network of Sub Additional Street		
Ministry of Housing & Urban Affairs (MoHUA) in partnership with GI2 and Building Material and ology promotion Council (BMTPC) is hosting series of trainings/workshops on innovative truction Technologies & Thermal Comfort for Affordable Housing named RACHNA (Resilient.		4. Yote of Thanks	Aloue core, and Corage manage oper, or purgan Moderator: Or. Managi Kamar Teola, Pacality CRISD (Forme HUDCO Chair Coordinator) Co. Moderator: Or. New Sam, Assistant Professor - CRISD		
able and Comfortable Housing through National Action. The prime focus of this training is al comfort and its necessity in the affordable housing sector. The training covers the thermal	11-00-11-15	19624 TO	A NETWORKING		
ics, material influences, low-cost solutions & codes that are available in India to create art Buildings. The outcome of the training would be to make the stakeholders in the ousing sector understand the need for thermal comfort & urge them to include no cost or tagies in upcoming projects.	11:05-11:45	Session 1: Thermal Confort: a) Indica , b) Thermal confort in Affordable Housing () Paulow strategies & Building Physics, d) Case studies	Mrs. Markyan Zakah M. Arch Sorta endels Environmental Design, Registered Architect - Council of Architecture and BEE Cartified ECBC Market Transm		
arch in Rural and	11:45-12:50	Session 2: Thermal Comfort models: a) Thermal Comfort standards. IMAC 6 a. ASHRAE b) Effect of materials on thermal comfort	Mr.s. Martysen Zalsah M.A.A.L. Sauta indeka Environmental Decign, Registerind Architect – Council of Architecture and BEE Cartiflet ECBC Machine Trainer		
Development (CARUD), TERRO A, Madhya Marg - Chandigarh	12:30-13:30	Section 3: New age invocative technologies along with the 6 LHP construction technologies	Mr. Jitandra Vyas Glitik Trainer & Evaluator, EDGE Expert & Auditor and BEE Cartified ECEC Manter Trainer		
r Details, Resserving the sensitive	13.30-14.15	0.09	NCH BREAK		
AKEHOLDERS	14:15-15:00	Session 4: EcoNilvas Sambita Part 1 & 2 and its compliances	Mr. Jitendra Vyaz Gilli A Trainer & Envinator, EDGE Expert & Andritor and BEE Contilled ECBC Mauser Trainer		
🛓 🛉 🏦 🎄	15/00-15:40	Session 5: a) Low Energy Contert Systems and BEE Stat Labeling & b) Indian & International Best Practices	Mr. Atlandra Vyas ORINA Trainer & Encluator, EDGE Expert & Auditor and BEE Cartificat ECRC Munice Trainer		
	15:40-16:00	Q&A and Feedback	GiZ - Climate Smart Buildings (CSR) Cell		
ar cove. Burd environment	10.00 10.00	Vote of Thusks	6/2 16/2, Cheville Count Building (COR) Call		
ials 6. professionals 8. Building Sector Technograhis	16/00-16:05	Evilte risks	are to are a construction of the second se		

Agenda for RACHNA #55

Rachna on Twitter



Training #55 program proceedings on twitter handle





Training on emerging construction technologies & thermal comfort in Light House Projects for officers



Date: 15th July 2022No of participants: 40Location:



About the Event

Ministry of Housing and Urban Affairs (MoHUA) in collaboration with Building Material and Technology Promotion Council (BMTPC) and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) organized this Training at Bhimaas Temple Tree Hotel, Chennai. The theme of the one-day training was 'Innovative Construction Technologies & Thermal Comfort for Affordable Housing'. The event targeted Senior Govt. officials, helping the participants understand the need for thermal comfort & tools for incorporating thermal comfort at policy level.

Trainer profile



Trainer 01 –Crosby Paul is responsible for the green building certification rating system for all in-house design & build construction jobs for L&T Construction. These were inclusive of green requirements being

incorporated in all levels of workflow starting from tender to operating level. Some of the major projects • Indira Gandhi International Airport - Terminal 1 certified as LEED precertified PLATINUM • Hyderabad International Airport - certified as LEED Pre-certified GOLD • NXTRA data center certified as LEED SILVER • SCB Cuttack Hospital certified as IGBC Green Campus Pre-certified GOLD. He has expertise in all facets of sustainability in building sector such as Building physics & Energy Simulation -Presently leading a team of 5 members Daylight & Glare Simulation - Extensively worked in the detailed design of airport buildings for optimum daylight & glare elimination. He has been trained in GaBi software by M/s Think



step for undertaking in-house LCA analysis for all LEED projects. Has detailed working knowledge on cradle to grave approach for life cycle analysis. He is associated with life cycle assessment reporting of Hyderabad & Delhi International airports. In addition, he is involved in several in-house research projects & initiatives involving measurement approaches for thermal comfort in residential spaces, innovative HVAC systems, and construction & site audits for energy optimization. He is also an Energy Conservation Building Code Master Trainer and associated with knowledge dissemination for government & private sector personnel in adopting the code.



Trainer 02 – Dinesh Kumar D is a Managing Director of M/s. Inspire Engineering Consultants. He is a green building and sustainability professional with 15+ years of experience in the construction Industry. He has completed

his bachelor's in mechanical engineering from Anna University, Chennai. Also completed Masters in Energy Engineering from College Engineering Guindy Anna University Chennai. Following credentials obtained from various governing Councils

- 1. IGBC AP certificate from Indian Green Building Council.
- 2. LEED AP BD+C from Green Business Certification Inc.(GBCI).
- 3. GRIHA CP from GRIHA Council
- 4. Pearl Qualified Professional (PQP) PBRS from Abu Dhabi Urban Planning Council UPC
- 5. BEE Certified Energy Auditor & ECBC Master Trainer - Bureau of Energy Efficiency
- 6. EGDE Expert from Green Business Certification Inc. (GBCI)
- 7. GEM CP from ASSOCHAM

His specialization includes training professionals & Students on ECBC and Green Building consultancy for IGBC, GRIHA, and LEED. He has worked with L&T Construction for 12 years and done several prestigious projects like TCS Kolkata, CTS MEPZ, CTS siruseri, JIPMER, IICC Delhi, etc., He has trained more than 500 participants on ECBC, Green Buildings, Energy Audit, and Energy simulation.

Brief event proceedings



Welcome address by Ms. Kalaiyarasi, Communication Consultant, Climate Smart Buildings Cell, South cluster

Welcome address

The session started with a welcome address & felicitation done by Ms. Kalaiyarasi, Communication Consultant, Climate Smart Buildings Cell, South cluster. She gave a short note about the training and its importance to the participants. She inaugurated the session with a warm welcome to the participants. She started with the welcome of Mr. B.N.S. Chalam, CPDE, Southern Railway.



Welcoming experts

Followed by Senior Government officials who were present and the ECBC Master trainers Mr. Crosby Paul & Mr. Dinesh Kumar.

Keynote Address:

Mr. Anand, Team Manager, Climate Smart Buildings Cell, South Cluster, gave the keynote address to all the participants.

RACHNA



Auspicious Lamp lighting ceremony



Keynote by Mr. Anand, Team Manager, Climate Smart Buildings Cell, South Cluster

Technical sessions:

Brief of all the sessions is discussed below:

Session 1: New age innovative technologies along with 6 LHP construction technologies

Session 2: Thermal Comfort:

- a) Indices
- b) Thermal comfort in Affordable Housing
- c) Passive strategies & Building Physics

Session 3: Thermal Comfort models:

- a) Thermal Comfort standards
 - i. IMAC & ii. ASHRAE
- b) Effect of materials on thermal comfort

Session 4: EcoNiwas Samhita (ENS) part 1 and its compliances

Session 5: EcoNiwas Samhita Part 2 and its compliances

Session 6: LHP Chennai & DHP:

- a) Compliance with ENS
- b) DHP Puducherry analysis- case study

Outcome & impact of the event

The day-long event was well attended by 40 officers and Practitioners and evoked great responses from the participants. The training saw participation from officials from Southern Railways, Tamil Nadu Housing Board (TNHB) and Tamil Nadu Generation and Distribution Corporation Ltd (TANGEDCO). The training covered thermal comfort basics, materials influences, low-cost solutions & codes that are available especially in India to create Climate-Smart Buildings. The training helped the Govt. officials understand the need for thermal comfort & the existing codes and compliance requirements and procedures prevailing in India pertaining to Thermal comfort in residential buildings.

Feedback from participants

The participants found the sessions helpful with the content being relevant and efficiently delivered through the Master Trainers. They understood the importance of thermal comfort in buildings and its impact on the occupants. Further they understood the role of building materials, passive design strategies in making a building comfortable and latest construction technologies available in the market. They gained in depth knowledge on the application of the codes and compliance parameters and how they can be met. The participants were pleased to have this training and felt that it will help them adopt thermal comfort in their upcoming projects. Majority of the participants understood the concepts well and could answer the quiz questionnaire provided to them in the end.



	Innovati	ve Construction Technologies & The Location: Chennal Date : 15 th July 2022 AGENDA	rmal Comfort for Affordable Hous Time : 10:00 AM to 05:30 PM - Day 1
	CAMATION	TOPIC	SPEAKER
	10:00-10:15	Registration	
	10:15-10:80	Welcome Address & Felicitation	Climate Smart Buildings (CSB) Cell
RESILENT, AFFORDABLE AND COMFORTABLE HOUSING THROUGH NATIONAL ACTION		Keynota Address	Climate Smart Buildings (CSB) Cell
Training #56: One-Day Training Programme on	10-30-30-45	GG2 and the Bilateral Programme - Climate Smart Buildings (CSB) & its activities	Climate Smart Buildings (CSR) Cell
Location: Chennal Date : 15 th July 2022 Time : 10:00 AM to 05:30 PM	10:45-11:15	Section 1: New age innovative technologies along with the 6 138P construction technologies	витанс
IOUT THE TRAINING ie Ministry of Housing & Urban Affairs (MoHUA) in partnership with GIZ and Building Material and chinology promotion Council (BMTPC) is hosting series of training/Jworkshops on innovative instruction Technologies & Thermal Comfort for Affordable Housing named RACHNA (Resilient, fordable and Comfortable Housing through National Action), The prime focus of this training is	12:15-11:10	BREAK TEA & NETWORRING	
	11:00-12:00	Session 2: Thermal Camfort: al Indices, b) Thermal comfort in Affordable Housing c) Paulies strategies & Building Physics, d) Case studies	No. Crosby Paul EEE Moner Trainer perifical sy Boreau of Energy Diffusion
itort and its necessity in the attortable housing sector. The training covers the thermal ics, material influences, low-cost solutions & codes that are available in India to create int Buildings. The outcome of the training would be to make the stakeholders in the iousing sector understand the need for thermal comfort & urge them to include no cost.	12-30-13-15	Session 3: Thermal Comfort models: a) Thermal Comfort standards L MAC & S. ASHRAE b) Effect of materials on thermal comfort	Mr. Crosby Paul ECIC Mactar Transr cartified by Burnau of Energy Efficiency
strategies in upcoming projects.	13:15-13:30	OBA	Climate Seiart Buildings (CSR) Cell
	13:30-14:15	15 UUNCH BREAK	
emple Tree Hotel,	34:15-25:25	Section 4: EcoNivers Samhita Part 1 and Its compliances	Mo. Direch Kumar ECRC Master Transis centred by Bureau of Every, Diffusion
aminadu	15:15-16:15	Session 5: EcoNiwas Samhita Part 2 and its compliances	Ms. Dinesh Kamar EDE Mane Traine artified by Barnas of Drangs Piloen
NTAR, Penne drug an email in Mr. Anand antum at therma, percharbilitanut cam	16:15-16.10	interes TEL	& NETWORKING
KEHOLDERS	16:30-17:00	Session 6: 1HP Channel & DHP a) Compliance with EcoNivas Sambita Part 1 & 2 b) DHP analysis Puducheny	Climate Smart Buildings (CSB) Cell
	17:00-17:15	QSA	Clinate Smart Buildings (CSB) Cell
100C	13.15 13.00	No. of the local	Provide and the Prophy of

Agenda for RACHNA #56

Rachna on Twitter



Training #56 event covered on GHTC India twitter handle





Training on thermal comfort for Practitioners



Date: 18th July 2022No of participants: 42Location:



About the Event

The Rachna for practitioners training program was organised to deliver in-depth knowledge on thermal comfort, its nuances, and its relationship with building physics. Moreover, it discussed design strategies, construction techniques, policy documents, building codes, international practices, and other aspects relevant to thermal comfort in affordable housing through a suite of case studies. Additionally, it was formulated to familiarize participants with the evaluation process of thermal comfort, the statistics, and indicators involved as well as affordable cooling technologies and their applicability in various climates. This training targeted professionals having degree in engineering or architecture and practicing architects, civil engineers and urban planners who were interested in understanding the basics of thermal comfort needs and its applicability in affordable housing. Post training, the professionals will be equipped with tools for monitoring and evaluating the impact of thermal comfort in upcoming affordable housing.

Trainer profile



Trainer 01 – Abu Talha Farooqi is an Assistant Professor and the Assistant Dean, Industry Interface at the Jindal School of Art & Architecture, OP Jindal Global University. He has practised and taught architecture

for a decade and has headed design studios, theory & research courses, as well as courses on sustainable and environmental design. He is a BEE-Certified Master-Trainer of the Energy Conservation Building Code of India, and has been training academics, practitioners, and government officials across India for building



energy efficient buildings. His research focusses on problematizing modern and anthropocentric ways of architectural thinking and pedagogy and finding empathetic and ecologically sensitive ways of including non-human and material agencies in architectural thinking and practice.



Trainer 02 – Mr Saif Uddin is an Energy Engineer by Qualification and Building Policy Expert by Profession having more than 8 years' experience in the domain of Energy Conservation Building Code, Eco-Niwas Samhita

implementation with Government of Uttar Pradesh, Himachal Pradesh, Rajasthan & Bihar. Building Energy Simulation for ECBC, ASHRAE 90.1 and general energy optimization is his key expertise. He is a certified IGBC Associate professional, and GRIHA certified professional. He has been also involved in the development of ENS Tool and ECBC App developed by Bureau of Energy Efficiency, Ministry of Power for Commercial & Residential Buildings.

Brief event proceedings

Welcome address

In the inaugural session, Ms. Upma invited Mr. S Vikash Ranjan, Project Head from GIZ to deliver the welcome address for all the participants. Mr. Vikash welcomed and appreciated the presence of all the participants and emphasized on understanding and learning the technical aspects of the new innovative technologies and the thermal comfort aspects in the affordable residential housing segment.



Inaugural session by Ms. Upma

GIZ CSB introduction:

This was followed by the introduction of Climate Smart buildings delivered by Mr. S Vikash Ranjan from GIZ team. The introduction session gave an overview of PMAY(U) and the GIZ-CSB project, its objectives and the team experts involved. He highlighted that GIZ on behalf of The Federal Ministry of Economic Cooperation and Development (BMZ), Germany, and in cooperation with the Ministry of Housing and Urban Affairs, Government of India aim to foster sustainability in built environment to use sustainable materials for Thermal comfort and in turn improve the environment and climate conditions. Also, in detail he described the initiatives taken by the Ministry of Housing and Urban Affairs and role of GIZ in accomplishing the objectives under the Indo-German Energy Programme.



Shri S Vikash Ranjan, Program Head, GIZ-CSB Project introducing the project

Technical sessions: Session 1: Thermal Comfort:



- a) Indices
- b) Thermal comfort in Affordable Housing
- c) Passive strategies & Building Physics
- d) Case studies



Session 2: Thermal Comfort models:

- a) Thermal Comfort standards (i. IMAC & ii. ASHRAE)
- b) Effect of materials on thermal comfort



Session 3: New age innovative technologies along with the 6 LHP construction technologies



Session 4: EcoNiwas Samhita Part 1 & 2 and its compliance



Session 5: Low Energy cooling Technologies and Comfort

- a) Low Energy Comfort Systems and BEE Star Labelling
- b) Indian & International Best Practices

Outcome & impact of the event

The event was attended by 42 participants from engineering, architecture, and urban planning background from various parts of the country. A healthy participation and enthusiasm led to discussion on real life situations related to costs and performance of various materials along with through thermal properties, timeline of projects and tools for measuring thermal comfort.

Feedback from participants

The participants found the sessions thorough and much inspiring. They understood the importance of low cost thermally comfortable housing in India and really appreciated the interactive nature of the sessions and the quality of the content specifically designed for improving thermal comfort in affordable housing in India. Majority of the participants claimed that more than 75% of the training content and topics covered were new and informative for them and they would be able to adopt these concepts in their practice/ profession.





	nline (Google	Meet) Date: 18 th July 2022, Monday Time:	11:00 AN to 4:00 I	
		AGENDA		
TIME	SESSION	TOPIC	SPEAKER	
11:00 - 11:15		Welcome Address	SMILAdil GEED	
	Introductory Section	Keynate Address		
11:15 - 11:30		Introduction to Medil/A's Housing for All Programme. GIZ and the Bilateral Programme - Climate Smart Buildings	Sh. Vikach Ranjan GIZ	
11:30 - 12:10 Senton 1		Thermal Confort: a) Italices b) Thermal comfort in Affordable Housing c) Pausive strategies & Building Physics d) Gase studies	Mr. Abo Talka (Expert Trainer)	
12:10 - 12:15		Question & Answer Section		
12:15 - 12:55 Session - 2	Thermal Confert models a) Thermal Confert standards i MAC ii ASYRAE b) Effect of materials on thermal confert	Mr. Abu Talha (Espert Trainer)		
12:55 - 13:00		Question & Answer Session		
13:00 - 14:00		LUNCH BREAK		
14:00 - 14:25	Session - 3	New age importing technologies along with the 6 LHP construction technologies focusing on - efficiency in construction, mainstreaming & replication of bechnologies, and automobie cum thermal confert aspects.	Moled. Zaid Khan GEED	
14:25 - 14:30		Question & Answer Session		
14:30 - 15:25	Senting - 4	EcoNiwas Somhtio Part 1 & 2 and its compliance	Mr. Abu Talka (Expert Trainer)	
15:25 - 15:30		Question & Anawer Section	(aproximity)	
15:30 - 15:45	Session - 5	a) Low Energy Comfort Systems and BEE Star Labelling b) Indian & International Best Practices	Nr. Sail Uddin (Expert Trainer)	
5:45 - 15:55	1	Question & Answer / Feedback Session	(espere county)	
15-55 - 16-00	Concluding Section	liste of Thomas	Sh. Vikash Ranjun	

Agenda for RACHNA #57

Photographs from the event



Mr. Saif Uddin from GEED giving the concluding address





Training on emerging construction technologies & thermal comfort in LHPs for practitioners



Date: 18th & 19th July 2022No of participants: 39Location:



About the Event

Ministry of Housing and Urban Affairs (MoHUA) in collaboration with its subsidiary unit Building Material and Technology Promotion Council (BMTPC), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), hosted a series of trainings on Innovative Construction Technologies & Thermal Comfort for Affordable Housing under the banner name RACHNA (Resilient, Affordable and Comfortable Housing through National Action). The prime focus of these trainings were to make the Govt Officials, Academicians and Professionals aware about the latest technology i.e., Prefabricated Sandwich Panel system is being used at LHP, Indore, also about Thermal Comfort, Green Building Concept, Eco Niwas Samhita tool and standard.

Trainer's profile



Shri. Rana Pratap Poddar BEE certified ECBC Master Trainer, Griha Representative -West Bengal, IGBC Member, ISHRAE Member Kolkata. He is performance driven professional with more than 15 years of

experience in Design of green buildings, Research & Development, Energy Audits, Energy Conservation Programmes and Project Consultancy. He is Currently heading the Green Building consultancy services and energy efficiency improvements projects at Agnikrida. He also Deft at designing and analyzing innovative low energy space conditioning strategies for buildings. Efficient at utilizing Building Simulation & Analysis tools for effectuating system optimization.



Brief event proceedings

Welcome address

Ms Disha Jain started off the event with an inspiring address that established the tone for the day, greeting all dignitaries and attendees and giving them a glimpse of the session. During welcoming of the dignitaries.

Keynote Address:

Dr. (Mrs) Swasti Sthapak, HOD – Architecture Department, NIT, Raipur in her address expressed her views towards Climate responsive architecture. She insisted on making sustainable affordable housing without using mechanical means. She also emphasized on how we should not directly replicate things from foreign countries rather see how contextually it is fitting in the geographical conditions. Adding to this, she expressed the role of an architect starts from micro to macro level. Lastly, she said, training on thermal comfort and speedy construction in construction sector with the use of modern innovative technologies is useful, as this is the need of an hour.

GIZ CSB introduction:

CSB Cell had started the session and began with introduction of "RACHNA" program, Ministry of Housing and Urban Affairs (MoHUA), Mission–Housing for All, overview of PMAY(U) and Global Housing Technology Challenge. Further delivered & informed about GIZ, their association with Indian Govt on different project and objective fulfilments. About Climate Smart Buildings program and CSB cell initiative, project objectives and the team experts involved. Further the team elaborated on interpretation of the project objectives and the roles of the relevant stakeholders

Technical sessions:

Session 1: Thermal Comfort in Affordable Housing & Passive Designs

Session 2: Thermal Comfort Standards & Materials Effect on Thermal Comfort

Session 3: New age innovative technologies along with the 6 LHP construction technologies

Session 4: Green Building Concept

Session 5: Eco Niwas Samhita 2021

Session 6: Eco Niwas Samhita – 2021 Compliance & Tool Demonstration

Session 7: Eco Niwas Samhita 2018

Session 8: Low Energy Comfort Systems, BEE Star Labelling for Residential Buildings and Indian & International Best Practices

Outcome & impact of the event

The two-day event evoked great response from 39 participants. The targeted participants for this training were Junior & middle level officers of the government departments operating in Raipur & CG state, also the Academicians, Professionals & Practitioners operating in Raipur and nearby cities, and they were trained on 'Innovative Construction Technologies & Thermal Comfort for Affordable Housing'.

Feedback from participants

The Participants had appreciated the efforts put in by CSB Cell members and successful completion of the event. Everyone has shared their experiences on the event, found it informative and interested in terms of practical learnings. Participants suggested and encouraged to have more sessions like this for private builders/ architects and other government departments.





Agenda for RACHNA #58

Rachna on Twitter



Training #58 program proceedings on GHTC twitter handle





Photographs taken during RACHNA #58





Training on thermal comfort for Practitioners



Date: 21st July 2022No of participants: 39Location:



About the Event

The Rachna for practitioners training program was organised to deliver in-depth knowledge on thermal comfort, its nuances, and its relationship with building physics. Moreover, it discussed design strategies, construction techniques, policy documents, building codes, international practices, and other aspects relevant to thermal comfort in affordable housing through a suite of

case studies. Additionally, it was formulated to familiarize participants with the evaluation

process of thermal comfort, the statistics, and indicators involved as well as affordable cooling technologies and their applicability in various climates. This training targeted professionals having degree in engineering or architecture and practicing architects, civil engineers and urban planners who are interested in understanding the basics of thermal comfort needs and its applicability in affordable housing. Post training, the professionals will be equipped with tools for monitoring and evaluating the impact of thermal comfort in upcoming affordable housing.

Trainer profile



Mr Anand Achari is an architect in India and teaching graduate and postgraduate courses in architecture for 18 years. The primary focus of his teaching is on environmental architecture and sustainability. He is the

principal at Vivekanand Education Society's College of Architecture, Mumbai, Maharashtra. He was the Head of the Department of Post Graduate course at Rizvi College of Architecture for 7 years.



Brief event proceedings

Welcome address

The one-day training programme was conducted over the Google Meet platform and was formally opened by Ms. Upma Tiwari, Consultant, Marketing and Communication, Global Evolutionary Energy Design, New Delhi. She warmly welcomed all the panellists and the participants. She further welcomed all the panellists and stated their elaborate background. Ms. Upma then introduced RACHNA, the initiative by MoHUA and shared the brief objectives of the training.



Opening session by Ms. Upma Tiwari, Consultant, Marketing and Communication, Global Evolutionary Energy Design, New Delhi

Initiating with the inaugural session, Ms. Upma invited Mr. SMHAdil, Head Global Evolutionary Energy Design, New Delhi to deliver the welcome address. Mr. Adil welcomed and applauded the presence of all the participants. He highlighted the purpose of the training and on stressed on recognising and learning the technical aspects of the new innovative technologies and the thermal comfort aspects in the affordable residential housing segment. Also, in detail he described the initiatives taken by the Ministry of Housing and Urban Affairs in partnership with GIZ in accomplishing the objectives under the Indo-German Energy Programme.





Welcome address by Mr. SMH Adil, Head Global Evolutionary Energy Design, New Delhi

GIZ CSB introduction:

Post the welcome note, Mr. Abdullah Nisar Siddiqui, Energy Advisor from GIZ delivered his special keynote address, in which he gave significant knowledge about the role of GIZ for past 60 years in India for sustainability. He further added on the initiatives taken by the Ministry of Housing and Urban Affairs and GIZ with respect to innovative construction technologies, its implementation and replication.



Special keynote by Mr. Abdullah Nisar Siddiqui, Energy Advisor, GIZ

Technical sessions:

- Session 1: Thermal Comfort:
- a) Indices
- b) Thermal comfort in Affordable Housing
- c) Passive strategies & Building Physics
- d) Case studies

Session 2: Thermal Comfort models:

- a) Thermal Comfort standards
 - i. IMAC & ii. ASHRAE
- b) Effect of materials on thermal comfort



Brief on Thermal comfort



Session 3: New age innovative technologies along with the 6 LHP construction technologies

Session 4: EcoNiwas Samhita Part 1 & 2 and its compliance

Session 5: Low Energy cooling Technologies and Comfort

- a) Low Energy Comfort Systems and BEE Star Labelling
- b) Indian & International Best Practices

Outcome & impact of the event



The event was attended by 39 participants from engineering, architecture, and urban planning background from various parts of the country. A majority of the participants were architects and the content very interesting and relevant. The discussions revolved around real life situations related to costs and performance of various materials along with thermal properties, timeline of projects and tools for measuring thermal comfort.

Feedback from participants

The participants found the sessions thorough and much inspiring. They understood the importance of low cost thermally comfortable housing in India and really appreciated the interactive nature of the sessions and the quality of the content specifically designed for improving thermal comfort in affordable housing in India. The participants found the training content and topics covered new and informative and they would be able to adopt these concepts in their practice/ profession.



Experts addressing the queries





Agenda for RACHNA #59

Photographs from the event



Mr. Anand Achari conducting the technical sessions





Training on emerging construction technologies & thermal comfort in LHPs for practitioners



Date No of participants Location

: 22nd & 23rd July 2022 : 41



About the Event

Ministry of Housing and Urban Affairs (MoHUA) in a collaboration with its subsidiary unit Building Material and Technology Promotion Council (BMTPC), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) organized a Training - cum - Workshop Programme named RACHNA (Resilient, Affordable and Comfortable Housing through National Action) on July 22nd & 23rd, 2022 at Uttar Pradesh Housing and Development Board, Lucknow, Uttar Pradesh. The theme of the twoday training was 'Innovative Construction Technologies & Thermal Comfort for Affordable Housing'.

Trainer profile



Mr. Abu Talha Farooqui is an Assistant Professor and the Assistant Dean for Internships and Industry interface at the Jindal School of Art & Architecture, Jindal Global University, Sonipat. He has practised and taught

architecture and design for 10 years and have headed design studios, theory & research courses, and sustainability related courses in his teaching career. He is also a BEE-Certified Master-Trainer of ECBC Energy Conservation Building Code of India and have trained professors and government officials across India for the implementation of ECBC. His research focusses on problematizing modern and anthropocentric ways of architectural thinking and pedagogy and finding empathetic and ecologically sensitive ways of including nonhuman and material agencies in architectural thinking and practice.


Brief event proceedings

Welcome address

Mr. Vikash Ranjan, Project Head, Climate Smart Buildings started off the event with welcome address to all the senior officials, panellists and participants present and elaborated on RACHNA, the MoHUA's initiative, GHTC-India Challenge, GIZ and its role of sustainability in India.



Shri S Vikash Ranjan, Program Head, GIZ-CSB Project introducing the project

Keynote Address:

Chief Guest Shri Shyam Charan Rai in his extremely elucidating words gave several illustrations connected with the subject of the training and emphasised on the need of Thermal Comfort in the residential housing segment.



Keynote address by Chief Guest Shri Shyam Charan Rai

Technical sessions:

Session 1: Importance of Thermal Comfort



Session 2 on Thermal comfort models presented by the expert

Session 2: Thermal Comfort models: Standards, Codes and Building Materials

Session 3: New age innovative technologies along with the 6 LHP construction technologies

Session 4: Green Buildings

Session 5: EcoNiwas Samhita (ENS) part 1 &2 and its compliances

Session 6: Low Energy Comfort Systems, Star Labelling and Best Practices



Session on Low Energy comfort systems



Session by Mr. Abu Talha Farooqui



Outcome & impact of the event

The Two day-long event evoked great responses from over 41 participants from Uttar Pradesh Housing and Development Board, Lucknow, Uttar Pradesh, building industry stakeholders, professionals from academia and they were trained on 'Innovative Construction Technologies & Thermal Comfort for Affordable Housing'.

Feedback from participants

The participants found the sessions insightful. They understood the importance of thermal comfort in buildings and its impact on the occupants. Further they understood the role of building materials, passive design strategies in making a building comfortable and latest construction technologies available in the market. The training programme were graced by the special address delivered by Shri Rajesh Mehtani, Director – Centre for Excellence and Training, UPHDB and a Vote of Thanks speech by Shri S Vikash Ranjan, Programme Head, CSB, GIZ. While Shri Rajesh Mehtani praised the successful execution of the event and encouraged all the participants to exercise the learnings of the training into their future projects and assignments.



Discussion with experts



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	Innovative (Location: I	Construction Lucknow D	Fechnologies & Thermal Comfort for A ate: 22 ⁴⁴ July 2022, Friday Time: 10:0	fordable Honsing' 10 AM to 5:30 PM
			AGENDA - Day 1	4
	TIME	2122101	TOPIC	SPEAKER
	9:30 - 10:00		Registration & Lamp Lighting Ceremony	
SILIENT, AFFORDABLE AND COMFORTABLE HOUSING THROUGH NATIONAL ACTION			Welcome Address	Shri Shailesh Agrawal ED - BMTPC
	10:00 - 10:30	Incogeral	Keynote Addrezz	Shri Shyam Charan Rai Chief Engineer - UPHDB
Construction Technologies & Thermal Comfort for Affordable Housing' a: Lucknow Date : 22 nd & 23 rd July 2022 Time : 10:00 AM to 5:30 PM	10:30 - 10:45	Session	Introducing GIZ and Climate Smart Buildings Cell (CSB) Introduction to MoHUA's Housing for AD Programme, GHTC India Challenge, and Light Mouse Projects	Shri S Vikash Ranjau Project Head - GIZ
THE TRAINING PROGRAMME:	10:45 - 11:00	E	HIGH TEA and NETWORKING	
(Houring & Uchan Affaire (MoHUA) in partnership with GI2 and the Building Material and romotion Council (BMTPC) is hosting a series of trainings/workshops on new age mitruction Technologies & Thermal Comfect for Affordable Housing maned RACINA celable and Confortable Housing through National Action). The prime focus of this amme is to make participants aware of the Climate-Smart Buildings programme and gain thermal comfort and its necessity in the affordable housing sector. The programme will	11:00 - 12:00	Session - 1	New age innovative technologies along with the 6 LRP construction technologies foculing on - efficiency is construction, mainstreaming & replication of technologies, and sustainable cum thermal comfort aspects.	Shri Shallesh Agrawal ED - BMTPC
al comfort basics, material influences, low-cost solutions & codes that are available in limate-Smart Buildings. The participants will also learn about six Light-House Project's bhologies and aspects of mainstreaming and replication of these technologies in their are projects.	12:00 - 13:30	Session-2	Thermal Comfort: a) Indices b) Thermal comfort in Affordable Hausing c) Pausive strategies & Building Physics d) Case studies e) Live Exercise c Fausive Architectural Design Strategies ii Building Construction Material No Cost Solutions	Mr. Abu Talha Farooqui (Expert Trainer)
radesh - 226016	13:30 - 14:30		LUNCH BREAK	
Tence drap as result to In Dubance granted by productions IEHOLDERS	14:30 - 15:45	Session - 3	Thermal Comfort models: a) Thermal Comfort standards b) 1. DAAC () 11. ASRME d) b) Effect of materials on thermal comfort	Mr. Abu Talha Farooqui (Expert Trainer)
	15:45 - 17:00	Session - 4	Green Buildings a) Brief b) Green Measures c) Indigenous and Jow-embodied materials d) Best Practices	Mr. Abu Talha Farooqui (Expert Trainer)
A professionals & Stakeholders Technograhis	17:00 - 17:15		HIGH TEA and NETWORKING	
	17:15 - 17:30	1 3	Question & Answer Session	

Agenda for RACHNA #60

Rachna on Twitter



In Lucknow, 2-day training was conducted on the same theme for Govt. officials & private stakeholders, making it the 60th programme under this initiative of @MoHUA India.

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10:27 AM - Aug 2, 2022 - Twitter Web App

Training program proceedings on GHTC Handle

RACINA



Training on Climate Smart Buildings for Officers



Date: 22nd July 2022No of participants: 48Location:



About the Event

Ministry of Housing and Urban Affairs (MoHUA) in collaboration with its subsidiary unit Building Material and Technology Promotion Council (BMTPC), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), hosted a series of trainings on Innovative Construction Technologies & Thermal Comfort for Affordable Housing under the banner name RACHNA (Resilient, Affordable and Comfortable Housing through National Action). The prime focus of this training was to make the Govt Officials, Academicians and Professionals aware about the latest technology i.e., Prefabricated Sandwich Panel system is being used at LHP, Indore, also about Thermal Comfort, Green Building Concept, Eco Niwas Samhita tool and standard.

Trainer's profile



Trainer 01 –Shri. Jitendra Vyas is a Structural Engineer with 16 years of experience and trained in Law Degree, Technology) & P.G Diploma in Urban Planning and Development. He is a GRIHA Certified Professional and

Evaluator, IGBC AP, GEM CP, EDGE Expert and Auditor and ECBC Master Trainer. and empanelled ECBC expert with BEE, Ministry of Power. He is also registered as Third-Party Assessor for ECBC with Greater Hyderabad Municipal Corporation. He has conducted various training programs on ECBC, Eco-Niwas Samhita and Sustainability and Energy simulation.





Trainer 02 –Shri. Yatin Choudhary, Fellow, Sustainable Habitat Division is an Architect and LEED© Accredited Professional, with 21 years of rich experience in diverse analytical abilities for energy efficient green

building design and optimization, including passive design features, state of art building and systems design and optimization of Energy Systems, like artificial lighting and HVAC systems; design of low energy options for Hybrid Buildings and High-performance Buildings. Designing for meeting various compliance requirement like ASHRAE 90.1, Energy Conservation Building Codes, BEE Star ratings etc. Worked extensively on GRIHA Development in initial stages and worked on several GRIHA rated building projects.

Brief event proceedings

Welcome address

Ms. Disha Jain started off the event with an inspiring address that established the tone for the day, greeting all dignitaries and attendees and giving them a glimpse of the session. During welcoming of the dignitaries, she also added few words about the dignitaries.

Keynote Address



Keynote address by Shri Satendra Singh (IAS)

Shri Satendra Singh (IAS), in his address expressed his joy and happiness by highlighting the key milestones achieved by the UADD and team. He enlightened about the ongoing Projects and their key features. He also added and encouraged attendees to participate in such events, take advantages and upgrade their knowledge on the technology. He was also keen to interact with audiences and to know about the expected take aways from the training sessions.

Special Address I

Shri. S. K. Meher, Additional Commissioner, MPHIDB shared his experience on housing and insisted to make wise use of resources in the construction industry. Also encouraged CSB Cell, to conduct such training programs for the departments working in this field.



Special address by Shri. S. K. Meher, Additional Commissioner

Special Address II

Shri G. S. Saluja, Superintendent Engineer, in his address highlighted the need of innovative technology. He addressed the audiences by giving a brief presentation on Demonstration Housing Technology, Bhopal where he explained the Insulated Concrete Formwork technology in detail and also encouraged everyone to use such innovative technologies which are result oriented.



Special address Shri G. S. Saluja, Superintendent Engineer



GIZ CSB introduction

Shri Gagandeep Sigh, from GIZ has begun with introduction of "RACHNA" program, Ministry of Housing and Urban Affairs (MoHUA), Mission-Housing for All, overview of PMAY(U) and Global Housing Technology Challenge. Further delivered & informed about GIZ, their association with Indian Govt on different project and objective fulfilments. About Climate Smart Building program and CSB cell initiative, project objectives and the team experts involved. Further the team elaborated on the interpretation of the project objectives and the roles of the relevant stakeholders. He addressed project need on thermal comfort & climate resilience achievement and further enhancement of it in building bye laws.



Shri Gagandeep Singh briefing about role of GIZ

Technical sessions:

Session 1: Thermal Comfort in Affordable Housing & Passive Designs

Session 2: Thermal Comfort models: Standards, Codes and Building Materials Session 3: New age innovative technologies along with the 6 LHP construction technologies Session 4: EcoNiwas Samhita (ENS) part 1 &2 and its compliances

Session 5: Low Energy Comfort Systems, Star Labelling and Best Practices

Outcome & impact of the event

The outcome of the training was to make the Senior Govt. Officials and Practitioners understand the concept of the technology, it's need, green building concepts & urge them to adopt include in their practices and upcoming projects. The event evoked great response from 41 participants. The participants include Senior Officials, Architects, Planner and Engineers from Govt. departments. Also, Professionals, Practitioners who are senior resources in their organizations.

Feedback from participants

They have shared their experiences on the event, found it informative and interested in terms of learnings and its approaches towards practical implementations. They also added & emphasize to get organize such more events / small training sessions. Shri G. S. Saluja (Superintendent Engineer, UADD) had appreciated efforts put in by CSB Cell members and successful completion of the event. He has shared his experiences on the event, found it informative and interested in terms of practical learnings.



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			AGENDA		
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= #61: One Dow T	raining Programme on	10/55-11/05	Taxoal Address	Special Guest	
NON TECHN	IOLOGIES & THERMAL COMFORT FOR	13:5%-13:30	Technical Address on imprementation of PMAP-Urban in Modive Pracest	Shin GS Salvas, Superintending Engineer & Rockel Officer, ISAAF Uttaen, Madhya Pratost	
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L low-cist solutio II also get familia anime actual be t thermal comfort	is & codes that see available in india to create Climate- wath is low energy conflict softers and global best of develop the consoltais of participanting noticipanilars in housing policies and incorporating thermal conflict	12-15-13-13	Introduction: Thermal Contort for Attroduction Proving Sociale 2: Thermal Conduct 2: Need and Inspire 10: Thermal control in Attroducte Housing 10: Proving Control of Attroducte Housing 10: Case Strategies - Statistics Physics 10: Case Statistics	SteriOson Oxwattary, ICBC Marter Trainer, TEB, Team Lead, CBE Cell, Indone	
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		1498-15:15	Sension 3: Con Water Sensible Estimate Samitta Fart 1.6.1, Overview and its index Thermal Confort and Every: Efficiency in affordable housing	Shri iliancha Vyna, BOBC Waanar Trainar	
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riya +91-9654419859		0.003.01010.010	to indian & international Rest Practices	ECBC Master Trainer	
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Agenda for RACHNA #61

Rachna on Twitter



Tweet of program #61 on GHTC twitter website







Awareness drive in architectural college



Date: 21st & 22nd July 2022No of participants: 84Location:



About the Event

Ministry of Housing and Urban Affairs (MoHUA) in collaboration with its subsidiary unit Building Material and Technology Promotion Council (BMTPC), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), hosted a series of trainings on Innovative Construction Technologies & Thermal Comfort for Affordable Housing under the banner name RACHNA (Resilient, Affordable and Comfortable Housing through National Action). The prime focus of these trainings was to make the Academicians and students aware about the latest technology i.e., Precast Concrete Construction System – 3D Volumetric system is being used at LHP, Ranchi, also about Thermal Comfort, Green Building Concept, Eco Niwas Samhita tool and standard.

Trainer's profile



Trainer 01 –Shri Siddharth Sharma is currently leading the Modular Buildings and Precast Products Division of Magicrete Building Solutions Pvt. Ltd. which company won the GHTC (Global Housing Technology Challenge) for

construction of the Lighthouse Project at Ranchi. He holds a B. Tech in Mechanical Engineering from IIT Kharagpur. Shri Siddharth has an immense experience in the field of Planning & Design, Innovative Construction and Walling Technologies, New Product Development. His presentation was filled with relevant case studies and live examples of the major factors affecting thermal comfort and the steps to follow to make our living spaces more comfortable.





Trainer 02 –Ar. Gaurav Shorey is currently supporting Bureau of Energy Efficiency (BEE), Government of India, in a countrywide capacity building drive for energy conservation as an ECBC Master Trainer. Being

a founding member of the GRIHA Rating system, for more than a decade, he is a zealous promoter for the cause of sustainability in the built environment in India, both at academic and industry levels. He is on the Technical Advisory Committee of GRIHA, SVA-GRIHA and GRIHA-LD. He is also a Visiting Faculty at School of Planning & Architecture (SPA), New Delhi

Brief event proceedings

Welcome address

Dr. Manjari Chakrabarti, Head - Dept. of Architecture and Planning, BIT Mesra started off the event with an inspiring welcome address that established the tone for the day, greeting all dignitaries and attendees present in the program.



Welcome adress by Dr. Manjari Chakrabarti, Head - Dept. of Architecture and Planning, BIT Mesra

Keynote Address:

Dr. Anand Kr. Sinha, Dean Student Affairs -BIT Mesra started off his address by lauding RACHNA for bringing out such collaborative event, helping enlighten the students and highlighting the need to follow the best practices from the roots of the Indian Construction System and signalled out the importance of affordable housing.



Keynote adress by Dr. Anand Kr. Sinha, Dean Student Affairs - BIT Mesra

He pointed out that many citizens in our country do not have enough purchasing power and cost of housing projects must be less.

Technical sessions

Session 1: Thermal Comfort in Affordable Housing & Passive Designs, Standards

Session 2: Eco Niwas Samhita Part 1 & 2, Compliance & Tool Demonstration

Session 3: Affordable Housing Design Challenge

Session 4: Design Challenge Judgment and Certificate Distribution

Outcome & impact of the event

The two-day event evoked great response from 84 participants from various semesters of the department of architecture, including research scholars and professors and they were first trained on "Innovative Construction Technologies & Thermal Comfort Measures for Affordable Housing" followed by an Architectural Design Challenge in which the participants were encouraged to come up with affordable housing designs using innovative construction technologies with thermal comfort features.

Feedback from participants

The Participants and Shri Rajan C. Sinha, Professor – BIT Mesra have appreciated the efforts put in by CSB Cell members and successful completion of the event. They have shared their experiences on the event, found it informative and interested in terms of learnings and its approaches towards practical implementations. They also added & emphasize to get organize such more events / small training sessions for the academicians.



Locat	ve Construction Technologies & Thermal Comf ton: NT Meura Ranchi Date : 25-22 July 2022 , Thu – Fri 1	ort for Affordable Housing fime : 09:30 AM to 5:30 PM (Innovati	ve Construction Technologies & Thermal don: BIT Mess, Ranchil, Date : 21-22 July 2022 , Thu	Comfort for Affordable Housing - Fil Time : 09:30 AM to 5:30 PM
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10:00-30:25 20:15-38:30	Introductions & Agenda Briefing Weskerme Address	CSB Cell Dr. Mangari Chalcabarti, Prof. & Head - Degis,		Affordable Housing Design Challenge al Design Problem Introduction bill Security	
20-20-20-0	Reynote Address	of Autorian Core and Planning, BT Mean Shei Anand Kamar Seria, Dean-Studient Altan, BT Meana	11-09-13-00	Sensine TripCount.) Design Challenge Exemine	Claces
10-45-11-00	HIGH TEA & NETWORKS	4	13-04-14:00	LUNCHEE	CAR
11:00-11:05 Services 1:: LHP & Its Construction Fectorality, GHD: Relef to other IB Construction Technologies & Basic of Thermal Constru- al Presait Construction System - 10/Volumetric -Banchi b) Presait Construction System - 10/Volumetric -Banchi	Shel Salaharti Sharma. Project Nead -1169 Bandui (SGC Magicreta U.P. & Faculty -	14:04-16:00	Secolar 3: (Corrol.) Design Challenge Exercise	CSBCall	
	b) Present Components assembled at Site Cherry	And an	16-04-16-15	TEA BREAK	
	c) Prefabricated Sandwich Panel System: Jodows d) Monalithic Concrete Construction using Turneri Sermanok - Rajkot. e) Light Gauge Sneel Structural System & Pre-engineered Steal		14:15-17:00	Section 4: Design Challenge Judgement & Winner Announcement	The lary
	Structural System -Agartala 1) PVC May in Place FormanickSystem -Sucknow		17:00-17:15	Q & A and Feedback	CSBCell
11:45-13-00	1345-1340 Session-2 (Control.): Ar. Ownersy Storery, a) bitreformition to XM installate Rescaling CCBC Market Transmer b) Collingers & Articutor Constorms e) Transform the road amountain in addressible learning: e) Transform and combust Indiana.	Ar Gauran Shorey, 12/13/12/23 C	Concluding Remarks	Dr. Latyabi Sarkar, Associate Prof Dept. o Architecture and Planning, 80 Metria	
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16:15:17:15	Samison 2 (Contri,): a) BEE Star Labelling, 6) DNS Compliance Tool, () Recommendation to design an AffendationSussing	Ar, Gauran Skonny, BCBC Master Trainer			

: Agenda for RACHNA #62

Rachna on Twitter



Training program #62 proceedings on GHTC twitter handle

Compendium of Trainings & Workshops







Photographs taken during the event #62

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Training on Climate Smart Buildings for Officers



Date: 22No of participants: 21Location:

: 22 July 2022 : 21



About the Event

The Ministry of Housing and Urban Affairs, in conjunction with GiZ India held a oneday training session for professionals called Rachna - trainings on Climate Smart Buildings, which was attended by government officials from different divisions of State and Central Government (Officials from Urban Local Bodies, Engineers/Architects/Technograhis from Agartala, Tripura). The prime motive of the training was to create awareness about the thermal comfort and its necessity in the affordable housing sector. The overall Programme was planned in such a way that it had a very balanced amalgamation of technical presentations, practical learning, as well as equal opportunity and exposure for networking. Entire training session was bifurcated in three aspect - Theoretical, Compliance & design along with practical knowledge transfer.

Trainer profile



Shri Saibal Saha has done post-graduation in "Urban Environment Management & Law" from National Law University, Delhi. He has above 28 years of experience. He has earned the credentials like BEE Certified Energy

Auditor and ECBC Master Trainer, GRIHA certified professional and is working as Third-Party Assessor for ECBC in Telangana and Andhra Pradesh. He is working in Building-Energy Efficiency, Green Building Certification, Energy–audits, and Environmental Management Plan for large construction (Buildings) projects. He has provided training on the implementation of the 'Energy Conservation Building Code of India' to different state government officials of



the country, including more than 50 training and awareness programs on ECBC.

Brief event proceedings

Welcome address

The training started with the welcome address delivered by the CSB cell members of Tripura in the absence of Shri Tamal Majumder, Director, UDD Tripura. Shri Sayan Maitra, Team member – CSB Cell, East Cluster, Agartala was the moderator of the session.



Welcome address by Shri Sayan Maitra, Team member – CSB Cell, East Cluster, Agartala

The current Rachna training was designed specifically for govt. officers who will be instrumental in developing new policies and complement implementation of policies through advanced knowledge of passive building design for thermal comfort in affordable housing.

GIZ CSB introduction:

Shri Rahul Bose, Architect – CSB Cell, East Cluster, Agartala spoke in detail about the various initiatives of GIZ in India in the sustainability sector, clean energy & energy efficiency services. He also shared the objective of introducing this project as to ameliorate climate resilience and thermal comfort in buildings constructed under Pradhan Mantri Aawas Yojana (Urban).



Introductory session by Shri Rahul Bose

Further, he updated that the Light House Projects is happening across six states of the country with different technologies with the sole intention of providing ready to live-in homes with minimal time and cost along with highquality of construction in a sustainable manner.

Technical sessions:

Session 1: Session 1: Thermal Comfort: a) Indices, b) Thermal comfort in Affordable Housing, c) Passive strategies and building physics, d) Case Studies.

Session 2: Thermal Comfort Models: a) Thermal Comfort Standards i. IMAC and ii ASHRAE

Session 3: New Age innovative technologies along with the 6 LHP construction technologies.

Session 4: Eco-Niwas Samhita 1&2 and its compliance

Session 5: a) Low energy Comfort System and BEE star levelling, b) Indian and International best practices



Shri Saibal Saha taking various sessions

Outcome & impact of the event

The event was attended by various officials from different government departments of Tripura including institutions and individual practitioners such as Public Works Department, of Science Department Technology and Environment Tripura, Tripura Urban Development Authority, Urban Development Department Tripura Housing Construction Board and Tripura State Electricity Corporation Ltd. The overall Programme was planned in such a way that it had a very balanced mixture



of technical presentations, practical learning, as well as equal opportunity and exposure for networking. Entire training session was bifurcated in three aspects - Theoretical, Compliance & design along with practical knowledge transfer.



Questions being addressed by the expert

The 1-day long event evoked great response from 21 Sr. Govt. Officials where they were trained on 'Innovative Construction Technologies & Thermal Comfort for Affordable Housing'. The training session featured a constructive exchange of ideas between participants, the instructor, and real-world scenarios involving material pricing, project timelines, and projects that have already been employing sustainable materials to provide their inhabitants with suitable living spaces.

Feedback from participants

The participants found the sessions thorough and much inspiring. They understood the importance of low cost thermally comfortable housing in India designed using passive strategies and really appreciated the interactive nature of the sessions and the quality of the content specifically designed for improving thermal comfort in affordable housing in India. Shri Sayan Maitra, Team Member – CSB Cell, East Cluster, Agartala delivered the precious vote of thanks. He applauded MoHUA team members along with the volunteers involved for their active efforts in the overall coordination and arrangement of this event.



Closing session

He also encouraged the participants to adopt Light Gauge Steel Frame technology that is being implemented at LHP Agartala which will deliver ready to live-in homes in minimal time and cost with high-quality of construction in a sustainable manner.



	Innovati	ve Construction Technologies & The tion: Agartala Date : 22 rd July 2022 ; F	rmal Comfort for Affordable Housing riday Time : 09:30 AM to 5:30 PM		
	DURATION	TONC	SPEAKER		
	9:10-10:00	Registration			
ESILIENT, AFFORDABLE AND COMFORTABLE HOUSING THROUGH NATIONAL ACTION	10:00-10:15	Welcome & Special Address	G62 Team		
Training #63: One-Day Training Programme on					
"Innovative Construction Technologies & Thermal Comfort for Affordable Housing" Location: Agartala Date : 22 nd July 2022 , Friday Time : 09:30 AM to 5:30 PM	10:15-10:30	Introduction to MolHUA's Housing for AB Programme, GIZ, and the Bilateral Programme – Climate Smart Buildings (CSB)	Shei Rahad Bose Architect Clift fant Cleater Cell		
BOUT THE TRAINING:		1904 TEA & NETWORXING			
he Ministry of Housing & Urban Affairs (MoHUA) in partnership with GIZ and Building Material and echnology promotion Council (BMTPC) is hosting series of training/workshops on innovative onstruction Technologies & Thermal Comfort for Affordable Housing named RACHNA (Resilient, flordable and Comfortable Housing through National Action. The prime focus of this training is nermal comfort and its necessity in the affordable housing sector. The training covers the thermal confort and its necessity in the affordable housing sector. The training covers the thermal confort and its necessity in the affordable housing sector.	1045-12:15	Session 1: Thermal Constart: (i) indices, b) Thermal constart in Affordable Housing () Passive strategies & Building Physics, (f) Case straties	Shri Sabal Saba Stat. Matter Trainer set/Bed by the most of Energy (Pficinety		
more backs, material impacts, severous sources a cools that are available in mole to create imate-Smart Buildings. The outcome of the training would be to make the stakeholders in the fordable housing sector understand the need for thermal comfort & unge them to include no cost or w-cost strategies in upcoming projects.	12:15-13:00	Session 2: Thermal Conduct models: a) Thermal Conduct standards i, IMAC & II. ASHRAE b) Effect of materials on thermal conduct	Shri Solbal Saha ECEC Matter Trainer surfiled by Baruau of Energy Efficiency		
IN US AT:	18:00-14:00	LU.	ICHEMEAN		
otel Sonar Torl ear Fire Brigade Chowmuhoni, Jay Nagar	14:00-15:00	Session 3: New age innovative technologies along with the 6 LHP construction technologies	Skrii Rahut Bose Archiwet Cih tan Clumer Gel		
artala, Iribura	15:00-16:00	Session 4: Ecolisius Satohita Part 1.6.2 and its compliances	Shri Salbal Saha DDC Marter Transc certified by Sursas of Energy Efficiency		
r Fwrther Details, Please drop an email to		NUSPERIO NUSPERIO	& NETWORKING		
Further Details, Please drop an email to Rajesh Debbarma agartala_giz_csbcell@pwc.com	1600-16-15	HIGH-TE/			
Further Details, Please drop an email to Rajesh Debbarma agartala_giz_csbcell@pwc.com RGETED STAKEHOLDERS	16:00-16:15 16:15-17:00	Heast-TEA Session S: 4) Low Energy Condort Systems and BEE Star Labelling & b) Indian & International Best Practices	Shel Salbal Saha ECEC Master Trainer certified by themas of Energy Efficiency		
Further Details, Please drop on email to Rajesh Debbarma agaitala_giz_csibcell@puvc.com RGETED STAKEHOLDERS	1640-1615 1615-1750 1799-1715	Heast-TE2 Session 5: al Low Energy Conduct Systems and BEE Star Labeling & Isi Indian & International Best Practices Q&A and Textbook	Shid Sabal Saha ECE Matter Transe cartilled by theme of therpy Efficiency Climate Smart Buildings (CS8) East Charter Cell		

Agenda for RACHNA #63

Rachna on Twitter



Training #63 program proceedings on GHTC twitter handle





Date: 01st & 02nd August 2022No of participants: 42Location:



About the Event

The two-day training program was organised for the budding Architects of School of Architecture Planning and Design, DIT University Dehradun interested in understanding the basics of thermal comfort needs and its applicability in affordable housing. Post training, the students will get the exposure climate smart building designs will be able to implement the techniques in their designs. The intent of the training was Capacity Building & knowledge transfer about the 'Innovative Construction Technologies used in LHPs & Thermal Comfort for Affordable Housing' with a design submission on thermally comfortable affordable housing. The event was attended by the 42 enthusiastic students from the department of Architecture along with their subject professors.

Trainer profile



Mr Saif Uddin is an Energy Engineer by Qualification and Building Policy Expert by Profession having more than 8 years' experience in the domain of Energy Conservation Building Code, Eco-Niwas Samhita

implementation with Government of Uttar Pradesh, Himachal Pradesh, Rajasthan & Bihar. Building Energy Simulation for ECBC, ASHRAE 90.1 and general energy optimization is his key expertise. He is a certified IGBC Associate professional, and GRIHA certified professional.

He has been also involved in the development of ENS Tool and ECBC App developed by Bureau of Energy Efficiency, Ministry of Power for Commercial & Residential Buildings.

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Brief event proceedings

Welcome address

Mr. Amrish delivered the welcome address for all the participants to not only understand and learn the technical aspects of the new innovative technologies but simultaneously also brief about thermal comfort in these new technologies in their current and future projects. Subsequently, he invited Dr. Anjali Krishan Sharma, Director, SoAP&D to deliver the welcome address to the participants.



Welcome adress by Dr. Anjali Krishan Sharma, Director, SoAP&D

Prof. Anjali Sharma advocated aligning conventional, vernacular, and future innovative technologies together to achieve the ecological coherence. She urged the participants to evaluate and embrace the workshop learnings to their future projects.

GIZ CSB introduction:

Mr. SMH Adil, Team Leader, CSB Cell was invited on the stage to deliver the keynote address. Mr. Adil alleviated and encouraged all the participants by portraying decompressing skills. He then gave details of the importance of thermal comfort and how to improve it in buildings. He also suggested some passive techniques to improve the thermal comfort and give overview on energy scenarios of India.



Keynote address by Mr. SMH Adil, Team Leader, CSB Cell

Technical sessions:

Session 1: Session 1: Thermal Comfort:

- a) Indices
- b) Thermal comfort in Affordable Housing
- c) Passive strategies and building physics

Session 1 (cont.): Thermal Comfort Models: Thermal Comfort Standards

- i. IMAC and ii ASHRAE
 - Effects of materials on Thermal Comfort
 - Case Studies and Best Practices



Session by Mr Saif Uddin

Session 2: Eco Niwas Samhita-1

Session 2 (Cont.): Eco Niwas Samhita-2

- ENS 2021 Compliance
- ENS Compliance Tool
- Recommendations to design Affordable Housing Projects
- Case Studies

Session 3: Affordable Housing Design Challenge

- Design Problem Introduction
- Grouping
- Design Challenge Exercise

Session 4: Design challenge judgement and winner announcement.



Outcome & impact of the event

The event was an amalgamation of theoretical, design & compliance along with practical facets. With the help of presentations and design challenge sessions students got the exposure of implementing thermal comfort standards in their designs. Technical application of the standards helped them to learn and get in-depth knowledge about Thermal Comfort Principles. The event was not only attended by the students but teachers were also took part very actively.



Students working on design problem

Feedback from participants

The participants found the sessions thorough and much inspiring. They understood the importance of affordable thermally comfortable housing in India. With the help of hands-on training and implementation exercise students understood the basic concept of Thermal Comfort. Evaluation of design challenge was successfully executed as all the groups performed well in the design challenge.

Prof. Jitendra Sirohi, HOD, SoAPD, DIT University, was then invited on stage to present vote of thanks to all the participants. He appreciated the efforts of CSB Cell to conduct a successful workshop at the campus and shared their willingness to host such workshops in future also. he also thanked all the attendees for their active participation in the workshop.



Vote of thanks by Prof. Jitendra Sirohi, HOD, SoAPD, DIT



	Yana G	Andre States of Fore for the states of the s	bmiec giz
	Innovative Location: Del	Construction Technologies & Thermal Comfo hradun Date : 1" August 2022 , Monday T AGENDA - Day 1	ort for Affordable Housing ime : 10:00 AM to 5:30 PM
	DURATION	TOPIC	SPEAKER
	10:00 - 10:30	Registration	
		Welcome Address	Prof. Anjali Krishan Sharma Director-SAP&D. DIT University
RESILIENT, AFFORDABLE AND COMFORTABLE HOUSING THROUGH NATIONAL ACTION	10:30 - 10:45	Introduction a) Keynote Address b) Introducing GIZ and Climate Senart Buildings Cell (CSB)	Mr. SMH Add Climate Smart Buildings (CSB) Cell
Training# 64: Two-Day Awareness Programme on	17 11/13/2010/00	CSE Cell Activities a) New age innovative technologies along with the 6 LHP construction technologies focuring on - efficiency in construction, maintereaming &	
Innovative Construction Technologies & Thermal Contort for Alfordable Rousing Location: Dehradum Date : 1 st & 2 nd August 2022 Time : 10:00 AM to 5:30 PM	10:45 - 11:00	replication of technologies, and nutrainable cum thermal comfort appects. b) DHPS & ARKG c) http://www.execution.com/or technologies/ c) http://www.execution.com/or technologies/ http://www.execution.com/or technologies/ http://wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww	Mr. Amritik Chatwryedi Climate Smart Building: (CSB) Cell
The Minister of Housing 5 Hohan Africe (Malifield in partnership with CI7 and Building Material and		Durrang platens	
Technology promotion Council (EMTPC) is bosting series of trainings/workshops on Innovative	11:00 - 11:15	TEA BREAK	
Construction Technologies & Thermal Comfort for Affordable Housing named RACHNA (Resilient, Affordable and Comfortable Housing through National Action. The prime focus of this awareness workshop is to make participants gain knowledge on thermal comfort and its necessity in the affordable housing sector. The workshop covers the thermal confort basics, material influence, low-cost solutions & codes that are available in India to create Climate Smart Buildings. The participants will also get opportunity to explore more through unraveling a small design problem. The outcome of the workshop would be to make the trabeholders understand the need for thermal comfort. Surge them to use their	11:15-12.00	Section 1: a) Introduction to Affordable Housing b) Challenges & future Concerns c) Need for thermal comfort in affordable housing d) Thermal Conduct i. Indices ii. Thermal comfort in Affordable Housing iii. Faermal control to Affordable Housing iii. Thermal control to Affordable Housing iii. Thermal control to Affordable Housing iii. Paerma and the Affordable Housing iii. Thermal control to Affordable H	SMH Add Climate Smart Building: [CSB] Cell
learnings in future assignments. Venue: Seminar Hall, Ground Floor, Vastu Block, School of Architecture, Planning	12:00 - 13:00	Service 1: (Contd.) Thermal Confort standards i. DMAC ii. ASHRAE b) Effect of building materials on thermal confort c) case studies and Best Practices	SVOI Adul Clinicade Sociart Bouldings (CSB) Cell
& Design, DIT University	13:00 - 14:00	LUNCH BREAK	2
Dehradun, Uttarakhand Per Jushe Gesal, Flores drug na small in Software periodity spatialises	14:00 - 15:00	Session 2: Eco Nives Samhita (2018) Part 1	Mr. Saif Uddin (Expert Trainer)
TARGET STAKEHOLDERS	15:00 - 16:00	Session 2:(Contd.) Eco Niwas Sambita (2021) Part 2	Nr. Saif Uddin (Espert Trainer)
- CO.C.	18:00 - 16:15	HIGH TEA & NETWOR	KING
Built-survironment professionals & Sector Govt. Departments Stateholders	16:15 - 17.15	Senses 2/(Covid.) a) BEE Star-Tabeling for Residential Buildings b) ENS Compliance tool (•) Recommendation for designing of an Affordable Housing project (for themal comfort): Case studies (LMP/ARHC/DHP)	Nr. Saif Uddin (Expert Trainer)

Agenda for RACHNA #64

Event Photographs



Photographs captured during the event #64





Training on thermal comfort for officers

RACHNA for Officers

(Resilient, Affordable and Comfortable Housing through National Action)

One-Day Online/Virtual Training Programme on "Thermal Comfort through a Multi-Layered understanding in Affordable Housing"



Date: 26 July 2022No of participants: 45Location:



About the Event

The Rachna for officers was organised for professionals interested in understanding the basics of thermal comfort, its needs and its applicability in affordable housing. Post training, the professionals were able to understand polices on thermal comfort and were equipped with tools for monitoring and evaluating the impact of thermal comfort in upcoming affordable housing. The training targeted Government officials and professionals having degree in engineering or architecture and serving in (a) Urban Local Bodies (b) State government and (c) Central government departments engaged in the development of affordable housing under various government schemes, officials and academicians dealing with implementation and application of codes and policy related to thermal comfort and energy efficiency in affordable housing.

Trainer profile



Trainer 01 – Ashok B Lall is an architect practicing in Delhi since 1981. He graduated from the University of Cambridge U.K. in Architecture Fine Arts and obtained the Architectural Association Diploma in 1970. His practice

specializes in environmentally and socially sustainable design. He has researched and written about sustainability extensively. He has also been involved with architectural education since 1984.

He was Dean of Studies at TVB School of Habitat Studies, New Delhi and at present he is the Design and Technology Chair at KRVIA, Mumbai.





Trainer 02 –Dr. Aviruch Bhatia is presently working with TERI SAS as Assistant Professor. He has nine years ofresearch/industry experience. He received his M.Tech. In energy engineering from Malaviya National

Institute of Technology, Jaipur. His areas of interest include building physics, calibrated building energy simulation, and fault detection and diagnostics in HVAC systems. He is a Indian Green Building Council Accredited Professional and GRIHA Trainer. Till date, he has published 7 journal publications, 9 conference publications.



Trainer 03 – Dr. Shivraj Dhaka has over 15 years of rich experience in industry and academia. He has been involved in research, especially on Building, Energy and Environment since 2008 and has published

over 20 research articles in the top-ranking journals and referred international conferences. He was awarded DAAD Fellowship, Germany in 2012 for research on Thermal Comfort at 'Karlsruhe Institute of Technology (KIT), Germany'. ASHRAE awarded scholarships for his contribution to the society.

Brief event proceedings

Welcome address

Prof. Rajkiran V Bilolikar, Director, Centre for Energy Studies – ASCI, Hyderabad formally initiated the program with his inaugural address by welcoming the dignitaries and participants. As part of his inaugural address, he shared his views on the importance of thermal comfort in affordable housing and discussed the programme agenda that had set the tone for the event.

GIZ CSB introduction:

The introduction session by Mr. Anurag Verma, from GIZ gave an overview of PMAY(U) and the GIZ-CSB initiative the project objectives and the team experts involved. It further elaborated on our interpretation of the project objectives and the roles of the relevant stakeholder

Technical sessions:

Brief of all the sessions is discussed below:

Session 1: Building Physics and Thermal Comfort

Session 2: Affordable Housing Passive Design Strategies

Session 3: Building Codes, Affordable Housing and Thermal Comfort

Session 4: Building Materials and Methods of Construction for Affordable Housing and Case Studies

Outcome & impact of the event

The event was attended by 45 participants including practising professionals, govt. officers and students from across the country. The participants understood the concepts well and this motivated them to ask relevant questions related to material choice and passive design strategies to reduce indoor temperatures while drawing from their own experience and practice.

Feedback from participants

With regards to training, participants shared that training was very helpful and the content and exercises used in training helped them understand the topic and its significance. The feedback from participants regarding trainers were very positive, with most of them appreciating the trainers' approach in demonstrating examples.



AGENDA				
Duration	Торіс	Speaker		
10:00 - 10:10 AM	Welcome Address ASCI Representativ			
10:10 – 10:20 AM	Introduction to Climate Smart Buildings Programme (IGEN – CSB) and overview of Training programme	GIZ Representative		
10:20 – 11:30 AM	Building Physics and Thermal Comfort	Dr. <u>Aviruch</u> Bhatia		
11:30 - 11:40 AM	Q&A/Quiz			
11:40 - 11:45 AM	Break			
11:45 – 1:00 PM	Passive Design Strategies for Energy Efficient Buildings	Prof' Ashok B Lall		
01:00 – 1:10 PM	Q&A/Quiz			
1:10 – 1:40 PM	Lunch Break			
1:40 – 2:50 PM	Building Codes, Affordable Housing and Thermal Comfort	Dr. <u>Aviruch</u> Bhatia		
2:50 – 3:00 PM	Q&A/Quiz			
3:00 – 3:05 PM	Break			
3:05 – 4:10 PM	Building Materials and Methods of Construction for Affordable Housing and Case Studies	Dr. <u>Shivraj</u> Dhaka		
4:10 – 4:20 PM	Q&A	/Quiz		
4:20 – 4:30 PM	Feedback and Concluding Remarks			

Agenda for RACHNA #65



Screenshots from the event



Screenshots from the event #65





Training on emerging construction technologies & thermal comfort in LHPs for practitioners



Date No of participants Location : 28th & 29th July 2022 : 56



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About the Event

Ministry of Housing and Urban Affairs (MoHUA) in a collaboration with its subsidiary unit Building Material and Technology Promotion Council (BMTPC), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) organized a Training - cum - Workshop Programme RACHNA named (Resilient, Affordable and Comfortable Housing through National Action) on July 28th & 29th, 2022 at Lucknow Development Authority, Lucknow, Uttar Pradesh. The theme of the two-day training was 'Innovative Construction Technologies & Thermal Comfort for Affordable Housing'.

Trainer profile



Trainer 01 –Mr Saif Uddin is an Energy Engineer by Qualification and Building Policy Expert by Profession having more than 8 years' experience in the domain of Energy Conservation Building Code, Eco-Niwas

Samhita implementation with Government of Uttar Pradesh, Himachal Pradesh, Rajasthan & Bihar. Building Energy Simulation for ECBC, ASHRAE 90.1 and general energy optimization is his key expertise. He is a certified IGBC Associate professional, and GRIHA certified professional.

He has been also involved in the development of ENS Tool and ECBC App developed by Bureau of Energy Efficiency, Ministry of Power for Commercial & Residential Buildings.

RACINA



Trainer 02 –Mr. Shobhit Kumar is a post graduate Energy Engineer by Qualification and Building Policy Expert by Profession having more than 7 years' experience in the domain of Energy Conservation Building

Code, Eco-Niwas Samhita implementation with Government of Uttar Pradesh and Himachal Pradesh. Building Energy Simulation for ECBC, ASHRAE 90.1 and general energy optimization is his key expertise. He has involved in development of design philosophy for LEED, & IGBC and ECBC Demonstration projects and provided technical support for preparation of Monitoring, Verification, and commissioning report for LEED, IGBC projects.

Brief event proceedings

Welcome address

Shri Ram Kumar Project Officer UPNEDA, delivered the Welcome Address to all. In his address he welcomed all the senior officials, panellists and participants present and elaborated on RACHNA, the MoHUA's initiative, GHTC-India Challenge, GIZ and its role in sustainability in India.



Welcome address by Shri Ram Kumar Project Officer UPNEDA

Keynote Address:

Shri Awdhesh Tiwari, Chief Engineer, LDA concentrated on the technological aspects of the innovative construction technologies coming up in the building sector in India. He also affirmed the necessity of incorporating and implementing Thermal Comfort Standards in the policy by-laws.



Keynote address by Shri Awdhesh Tiwari, Chief Engineer, LDA

Technical sessions:

Session 1: Importance of Thermal Comfort



Session delivered by expert Mr Saif Uddin

Session 2: Thermal Comfort models: Standards, Codes and Building Materials

Session 3: New age innovative technologies along with the 6 LHP construction technologies

Session 4: Green Buildings

Session 5: EcoNiwas Samhita (ENS) part 1 &2 and its compliances



Mr. Shobhit Kumar talking about EcoNiwas Samhita and its compliances



Session on green buildings

Session 6: Low Energy Comfort Systems, Star Labelling and Best Practices

Outcome & impact of the event

The Two day-long event evoked great responses from over 56 participants from Lucknow Authority, Development Lucknow, Uttar Pradesh, building industry stakeholders, from academia professionals and they were trained on 'Innovative Construction Technologies & Thermal Comfort for Affordable Housing'.



Participants of the event #66

Feedback from participants

The participants found the sessions insightful. They understood the importance of thermal comfort in buildings and its impact on the occupants. Further they understood the role of building materials, passive design strategies in making a building comfortable and latest construction technologies available in the market.



Session on Low energy comfort systems



Location: Lus	cknow Date	echnologies & Thermal Comfort for All 27 th July 2022, Wednesday Time: 10	:00 AM to 5:30 PM	Tanovative C	onstruction	Technologies & Thermal Comfort for Afl	fordable Housing			
TIME	SESSION	TOPIC	SPEAKER	Location: Lu	cknow Dat	te: 28 - July 2022, Thursday Time: 103	00 AM to 5:30 PM			
9-30 - 10:00		Replicenting				AGENDA - Day 2				
		Welcome Askfreus	en	TIME	SESSION	TOPIC	SPEAKER			
10:00 - 10:30		Keymute Address Chief Guest - LDA	10:00 - 11:30	Sexson - 5	Eco Annaz Sanatra 2022 with group exercise	(Expert Trainer)				
	Introductory Sension	Introducing GTZ and climate Smart Holdings Cell (CSD)	Climate Securi	11:30 - 11:45		HIGH TEA and NETWORKING a) ENS 2021 Compliance				
10:30 - 10:45		Introduction to MoHUA's Housing for All Programme, GHTC India Challenge and Light House Projects	Buildings (CSB) Gell	11:45 - 13:00	Session - 6	b) Live damo on Tool Thermal complex analysis Recommendation to current and fature Affectable linearies	(Expert Trainer)			
10:45-11:00		HIGH TEA and NETWORKING	(
		Thermal Confort: a) Indicate b) Thermal comfort in Afforduble Flowing c) Design interface of Building Planas		13:00 - 14:00	Session - 7	LUNCH BREAK ENS 2018 Brief With technical exercise (Calculating BETV etc.)	(Expert Trainer)			
11:00 - 13:00	Session-1 d) Case studies at Day Description	(Expert Trainer)	15:30 - 15:45	HIGH TEA and NETWORKING						
		 Device Architectural Design Strategien Building Construction Material No Cost Solutions 		15:45 - 17:00	Sexsion - 8	a) Low Energy Comfort Systems and BEE Star Labeling b) Indust & International Kint Practices	(Expert Trainer)			
1240-14.00		LUNCH RIEAK	1				Climate-Smart			
14-00-15-00	Section - 2	Thermal Confort models: a) Thermal Confort standards b) LIMAC	(Papert Trainer)	17:00 - 17:15	Concluding	Concluding	Concluding	Concluding	Question & Answer Session	Baildings (CSB) Gell
		 i) is ASHRAN d) b) Effect of materials on thermal comfort 	(all strains)	17:15 - 17:30	Seaston	Vote of Thunks	612			
1500 - 16 60	Session - 3	New upe innovative technologies along with the 6 LNP construction technologies focusing on affective in construction, mainstruction, & replications of technologies, and construction construction of technologies, and construction construction of technologies, and construction	(Expert Trainer)							
16:00 - 16:15		HIGH TEA and NETWORKING								
1615 - 17:15	Session - 4	Green Buildings a) Brief b) Green Meastres c) Indigenous and Jour-embodied materials d) Best Prostan								
		0.61								

Agenda for RACHNA #66

Rachna on Twitter and Newspaper



Training program #66 proceedings on GHTC Handle and local newspaper

RACINA



Training on Climate Smart Buildings for Officers



Date: 04th August 2022No of participants: 25Location:



About the Event

Ministry of Housing and Urban Affairs (MoHUA) in a collaboration with its subsidiary unit Building Material and Technology Promotion Council (BMTPC), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), and the Directorate of Municipal Administration (DMA) - Govt. of Jharkhand organized a Training – cum – Workshop Programme named RACHNA (Resilient, Affordable and Comfortable Housing through National Action) on 4th August 2022 at Hotel Le Lac Sarovar Portico, Ranchi, Jharkhand. The theme of the one-day training was 'Innovative Construction Technologies & Thermal Comfort for Affordable Housing'. The session also focuses on LHP Technology - Precast Concrete Construction System – 3D Volumetric used at LHP Ranchi

Trainer profile



Trainer 01 – Dr. Avijit Ghosh earned his Ph.D. in Energy from Kolkata's Jadavpur University. He is currently employed by the West Bengalbased CSIR-CGCRI as the Principal Technical Officer. He is one of the select few experts

in the nation with the distinction of being both an Energy Auditor and the ECBC Master Trainer approved by the Bureau of Energy Efficiency, Government of India. In addition to these roles, he has also worked as the Gujarat Energy Research & Management Institute's Rooftop Solar Master Trainer. His other credentials include Certified GRIHA Evaluator, Member of The Energy Resources Institute Steering Committee, ECBC Implementation for the State of West Bengal, Ministry of Power, Government of West Bengal, and Mentor, Association for Rivers in India.





Trainer 02 – Shri Saibal Saha done post-graduation in "Urban Environment Management & Law" from National Law University, Delhi. He has above 28 years of experience. He has earned the credentials

like BEE Certified Energy Auditor and ECBC Master Trainer, GRIHA certified professional and is working as Third-Party Assessor for ECBC in Telangana and Andhra Pradesh. He is working in Building-Energy Efficiency, Green Building Certification, Energy –audits, and Environmental Management Plan for large construction (Buildings) projects. He has provided training on the implementation of the 'Energy Conservation Building Code of India' to different state government officials of the country, including more than 51 training and awareness programs on ECBC.

Brief event proceedings

Welcome address

Shri DK Dwivedi, Project Engineering Specialist - DMA Jharkhand, started the event with warm welcome to participants. He emphasized the value of regularly conducting trainings like RACHNA for government officials and emphasized the constant need to advance in terms of the most recent learnings given the way the construction industry is evolving.

Keynote Address:

Shri Bishwajeet Soy, Joint General Manager – HUDCO Jharkhand, stressed the significance of solar energy and its integration into domestic households, emphasizing that if we wish to lead by example in terms of energy conservation in society, we must do so from our homes

GIZ CSB introduction:

Ar. Divya Bansal Talwar, Junior Technical Expert - gave a brief presentation on the 'Climate Smart Buildings' which also highlighted the key initiatives undertaken by GIZ in India, mostly focusing on the sustainability sector, clean energy & energy efficiency services.

Technical sessions:

Session 1: Importance of Thermal Comfort

Session 2: Thermal Comfort models: Standards, Codes and Building Materials

Session 3: New age innovative technologies along with the 6 LHP construction technologies

Session 4: EcoNiwas Samhita (ENS) part 1 &2 and its compliances

Session 5: Low Energy Comfort Systems, Star Labelling and Best Practices

Outcome & impact of the event

The day-long event evoked great responses from over 25 participants from various government departments, building industry stakeholders & professionals from academia and they were trained on 'Innovative Construction Technologies & Thermal Comfort for Affordable Housing'.

Feedback from participants

The participants found the sessions insightful. They understood the importance of thermal comfort in buildings and its impact on the occupants. Further they understood the role of building materials, passive design strategies in making a building comfortable and latest construction technologies available in the market.





Agenda for RACHNA #67

RACINA

Photos of the event



Pictures captured during the event #67





Training on thermal comfort for officers



Date: 29h July 2022No of participants: 48Location:



About the Event

The Rachna for officers was organised for professionals interested in understanding the basics of thermal comfort, its needs and its applicability in affordable housing. Post training, the professionals were able to understand polices on thermal comfort and were equipped with tools for monitoring and evaluating the impact of thermal comfort in upcoming affordable housing. The training targeted Government officials and professionals having degree in engineering or architecture and serving in (a) Urban Local Bodies (b) State government and (c) Central government departments engaged in the development of affordable housing under various government schemes, officials and academicians dealing with implementation and application of codes and policy related to thermal comfort and energy efficiency in affordable housing.

Trainer profile



Mariyam Zakiah is a Green Building Analyst working with the Energy and Policy team of EDS in New Delhi. She has done her MArch in Sustainable Environmental Design from the Architectural Association, London and

her B.Arch. from Jamia Millia Islamia, New Delhi. She has expertise in the field of design optimization, energy and daylight analysis and R&D in the field of sustainability. Her previous experience includes conducting workshops on Insulation in high altitude villages of Sikkim, and participatory design exercise in various parts of India and Nepal.



Brief event proceedings

Welcome address

At the on-set over the Google Meet platform Ms. Upma Tiwari, Consultant, Marketing and Communication, Global Evolutionary Energy Design, New Delhi officially initiated the training programme. She rendered a sincere welcome to all the panellists; the Government Officials and other stakeholders present as participants. She further gave detailed introduction of the panellists and the expert trainer. Ms. Upma then introduced RACHNA, the initiative by MoHUA and shared the brief objective of the training.

GIZ CSB introduction:

Moving forward, Mr. Abdullah Nisar Siddiqui, Technical Expert from GIZ delivered the welcome address for all the participants. He welcomed all the participants and communicated in detail about the initiatives of the Ministry of Housing and Urban Affairs in partnership with the GIZ in the fields of sustainability. The introduction session gave an overview of PMAY(U) and the GIZ-CSB initiative, the project objectives and the team experts involved. He highlighted that GIZ on behalf of The Federal Ministry of Economic Cooperation and Development (BMZ), Germany, and in cooperation with the Ministry of Housing and Urban Affairs, Government of India aims to foster sustainability in built environment to use sustainable materials for Thermal comfort and in turn improve the environment and climate conditions.



Technical sessions: Session 1: Thermal Comfort:

- a) Indices
- b) Thermal comfort in Affordable Housing

- c) Passive strategies & Building Physics
- d) Case studies

Session 2: Thermal Comfort models:

- a) Thermal Comfort standards
 - i. IMAC & ii. ASHRAE
- b) Effect of materials on thermal comfort



Session 2 on Thermal Comfort models

Session 3: New age innovative technologies along with the 6 LHP construction technologies



New age innovative technologies being explained

Session 4: EcoNiwas Samhita Part 1 & 2 and its compliance



Session on EcoNiwas Samhita and its compliance



Session 5: Low Energy cooling Technologies and Comfort

- a) Low Energy Comfort Systems and BEE Star Labelling
- b) Indian & International Best Practices



Outcome & impact of the event

The event was attended by 48 participants. These predominantly represented engineers, architects and planners who were practitioners from the public sector from across the country. The training program saw a healthy discussion amongst participants and the trainers discussing real life situations related to passive design strategies such as shading and orientation for various climate zones across the country. The aspects of thermal comfort and affordability were also discussed.

Feedback from participants

The participants found the sessions thorough and much inspiring. They understood the importance of using passive strategies for designing low cost thermally comfortable housing in India which was well explained with the help of case studies, photographs and examples. The participants appreciated the interactive nature of the sessions and the quality of the content specifically designed for improving thermal comfort in affordable housing in India. The participants being practicing architects and representatives from the construction and building material industry were keen to understand and adopt the learning from this training on codes and ENS compliance in their projects.

The sessions concluded with a vote of thanks from Mr Anurag Verma from GIZ's CSB program. He encouraged the participants to register as Technograhi to get regular updates on such event and newsletters from PMAY(U).



Screenshot of participants attending the event



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RACINA	Tonovati Location: O	ve Construc uline (Googl	tion Technologies & Thermal Comfort for A ie Meet) Date: 29 th July 2022, Friday Time: AGENDA	ffordable Housing' 11:00 AM to 4:00 PM	
	TIME	SESSION	TOPIC	SPEAKER	
RESILIENT, AFFORDABLE AND COMFORTABLE HOUSING THROUGH NATIONAL ACTION			Weicome Address	GEED	
	11:00 - 11:15	Introductory	Krymote Address	GIZ	
Online Training Programme for Government Officials, on	11:15 - 11:50	Session	Introduction to MaHUA's Housing for All Programme. GLL and the Blateral Programme - Climate Sniert Buildings	GIZ	
Location: Online (Google Meet) Date: 29 th July 2022, Friday Time: 11:00 AM to 4:00 PM OUT THE TRAINING PROGRAMME	11:30 - 12:10	Session 1	Thermal Comfort: a) Indices b) Thermal comfort in Affordable Housing c) Passive strotogies & Building Physics d) Gase studies	Ms. Mariyam Zakaah (Expert Trainer)	
ACHNA for Government Officials' training program will deliver in-depth knowledge on	12:10 - 12:15	1	Question & Answer Section		
sermal condort, its muances, and its relationship with building physics. Moreover, it will licuss design strategies, construction techniques, policy documents, building codes, international practices, and other aspects relevant to thermal confort in affordable housing hrough a suite of case studies. Additionally, it will familiarize participants with the evaluation more of themal confort the stratistics and information much and and will a solid scale studies.	12:15 - 12:55	Session - 2	Thermal Comfort models a) Thermal Comfort standards i MAC i ASHRAE b) Effect a materials on thermal confort	Ma. Mariyam Zakial (Expert Trainer)	
chnologies and their applicability in various climates.	12:55 - 13:00		Question & Answer Selation		
Un and the state of a service of a strength of any strength of the strength of	13:00 - 14:00		LUNCH BREAK		
eeting-Link: eet.google.com/age-bjnm-grd	14:00 - 14:25	Section - 3	New age innovative technologies along with the 6 LHP construction technologies focusing on - efficiency in construction, mainstreaming & replication of technologies, and sustainable cum thermal comfort expects.	(Expert Trainer)	
	14:25 - 14:30		Question & Answer Section		
face Dentals. Minise drop an ensul se gendladusing	14:30 - 15:25	Session - 4	EcoNiwes Samhita Part 1 & 2 and its compliance	Ms. Martyam Zakiah	
EI SIARERVLVERS	15:25 - 15:30		Question & Answer Seation	(Expert Trainer)	
11 A	15:30 - 15:45	Section - S	a) Low Energy Comfort Systems and BEE Star Labelling b) Indum & International Best Practices	Ms. Mariyam Zakiah (Expert Trainer)	
R-environment Building Sector	15:45 - 15:55		Question & Answer / Feedback Septon	0.0000000000	
t. Departments Builders / Developers	15-55-16-00	Concluding	the of the de	244	

Agenda of RACHNA #68

Picture from the event



Technical session in progress

RACINA



Training on Climate Smart Buildings for Officers



Date: 29th July 2022No of participants: 30Location:



About the Event

Ministry of Housing and Urban Affairs (MoHUA) in collaboration with Building Material and Technology Promotion Council (BMTPC), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), hosted the training on Climate Smart Buildings, Innovative Construction Technologies & Thermal Comfort for Affordable Housing under the banner of RACHNA (Resilient, Affordable and Comfortable Housing through National Action). The prime focus of these trainings were to make the Govt Officials, Academicians and

Professionals aware about the latest technology being used at LHP along with concepts of Thermal Comfort, Green Buildings, Eco Niwas Samhita tool and standard and passive design measures.

Trainer's profile



Trainer 01 –Chinta Shree Sowmya is a Managing Director of M/s. Environ Architects, Hyderabad. She is a green building and sustainability professional with over 10+ years of experience in the construction

industry. She has done bachelor's in architecture **JNAFAU** from University, Hyderabad, (University Gold medalist). She has done her Master's in Architecture, specializing in Energy Efficiency and Sustainability by Research from CEPT University. She is an ECBC Master Trainer, Certified ECBC third party assessor for AP and Telangana, IGBC AP, GRIHA CP, and LEED Green Associate. She has worked in ASCI as an ECBC technical consultant for ECBC implementation in the states of AP and Telangana. She has trained more than 400 participants on Energy simulation and ECBC. Her specialization includes training


professionals on ECBC, Green Building consultancy for GRIHA, LEED IGBC ratings, Energy simulation, Daylight simulation, and ECBC consultancy. She has worked on various prestigious projects such as Infosys, Manipal University, and IPE, for obtaining a platinum rating.



Trainer 02 – Mr Jeevan Mohan is an Associate partner and head of sustainable design at Terra Viridis Consultants LLP, Hyderabad. He completed his B.Arch from School of Planning & Architecture, INTU Hyderabad and M.Arch

in Technology & Sustainable Design from University of Nottingham UK. He is a certified GRIHA and LEED AP professional. Sustainable technology being the core module of his study, he has been awarded special commendation Corus student award for environmental design in structures. Mr Mohan Specializes in Daylight & Sunlight assessment by means of computational analysis. He is also a GRIHA accredited trainer & evaluator

Brief event proceedings



Shri S Vikash Ranjan, Program Head, GIZ-CSB Project introducing the project

Welcome address

The event started at 10:00 am with lamp lighting and Felicitation session for the dignitaries. Mr. Vikash Ranjan, Project Head, GIZ, inaugurated the session with a warm welcome to the people. He started with the welcome of Mr. Shailesh Kumar Agarwal. Followed by welcoming honourable Senior Government officials who were present as participants and the ECBC Master trainers Mr. Jeevan Mohan & Ms. Sowmya.



Felicitation session for the dignitaries

He introduced the participants to the "RACHNA" program, Ministry of Housing and Urban Affairs (MoHUA), Mission – Housing for All, overview of PMAY(U) and Global Housing Technology Challenge. Further he informed the participants about GIZ, their association with the Indian Govt on different projects and objective fulfilments. Climate Smart Buildings program was introduced with CSB cell initiatives, project objectives and the team experts.



Session in progress with the participants from various departments

Keynote Address

Dr Shailesh Kumar Aggarwal, Executive Director, BMTPC gave the keynote address to all



RACHNA

the participants. He then continued with session 1 where he spoke about 'New age technologies along with the 6 LHP construction technologies.



Keynote address by Dr Shailesh Kumar Aggarwal, Executive Director, BMTPC

Technical sessions:

Session 1: New age innovative technologies along with the 6 LHP construction technologies

Session 2: Thermal Comfort:

- a) Indices
- b) Thermal comfort in Affordable Housing
- c) Passive strategies & Building Physics

d) Case studies in Affordable Housing & Passive Designs

Session 3: Thermal Comfort models:

a) Thermal Comfort standards

i . IMAC & ii. ASHRAE

b) Effect of materials on thermal comfort

Session 4: EcoNiwas Samhita (ENS) part 1 and its compliance

Session 5: EcoNiwas Samhita Part 2 and its compliance

Outcome & impact of the event

The training covered the thermal comfort basics, materials influences, low-cost solutions & codes that are available especially in India to create Climate-Smart Buildings. The training was successful in sensitising the Senior Govt. Officials and Practitioners to the concept of thermal comfort & it's need, new technology, green building concepts & urged them to adopt these in their practice and upcoming projects.

The event evoked great response from the participants that included Senior Officials, Architects, Planner and Engineers from Govt. departments. Also, Professionals, Practitioners who are senior resources in their organizations.

Feedback from participants

The participants shared their experiences on the event through a feedback questionnaire, majority of the participants found the training session informative and interesting in terms of learnings and its approaches towards practical implementation. Many participants were happy to be introduced to the ECBC and ENS codes as they were not aware of these previously. They also emphasized on having more such events and trainings as they found it very useful.



Q&A session with participants





Agenda of RACHNA #69

Rachna on Twitter



Govt officials, private architects & builders participated at training in Hyderabad to understand the importance to include thermal comfort in #affordablehousing.



Training program #69 proceedings on GHTC twitter handle

RACINA



Training on emerging construction technologies & thermal comfort in Light House Projects for officers



Date : No of participants : Location :

: 29 July 2022 : 30



About the Event

The Rachna for officers was organised for professionals interested in understanding the basics of thermal comfort, its needs and its applicability in affordable housing. Post training, the professionals were able to understand polices on thermal comfort and were equipped with tools for monitoring and evaluating the impact of thermal comfort in upcoming affordable housing. The training targeted Government officials and professionals having degree in engineering or architecture and serving in (a) Urban Local Bodies (b) State government and (c) Central government departments engaged in the development of affordable housing under various government schemes, officials and academicians dealing with implementation and application of codes and policy related to thermal comfort and energy efficiency in affordable housing.

Trainer profile



Trainer 01 – Shri Saibal Saha has done post-graduation in "Urban Environment Management & Law" from National Law University, Delhi. He has above 28 years of experience. He has earned the credentials

like BEE Certified Energy Auditor and ECBC Master Trainer, GRIHA certified professional and is working as Third-Party Assessor for ECBC in Telangana and Andhra Pradesh. He is working in Building-Energy Efficiency, Green Building Certification, Energy –audits, and Environmental Management Plan for large construction (Buildings) projects. He has provided training on the implementation of the 'Energy Conservation Building Code of India'



to different state government officials of the country, including more than 50 training and awareness programs on ECBC.



Trainer 02 – Miss. Ragini Goswami is an Architect and a certified Green Building Professional with more than 9 years of work experience in providing specialized services to obtain green certifications under LEED, IGBC, GRIHA,

EDGE and ECBC Compliance for the Buildings. She has earned credentials from IGBC AP and GRIHA CP and BEE as Certified ECBC Master Trainer. She has conducted more than 15 training programs in Chhattisgarh, Meghalaya, Manipur, Meghalaya, Mizoram, Nagaland on ECBC 2017 code (Commercial building) and Eco-Niwas Samhita (ENS) code (Residential buildings) as a Master trainer.

Brief event proceedings

Welcome address

Smt. Nitoli Sema, Executive Engineer, PWD Nagaland started the event with an inspiring address that established the tone for the day, greeting all attendees, sharing a brief of the session. Shri Sayan Maitra, Team member – CSB Cell, East Cluster, Agartala was the moderator of the session.



Welcome address by Smt. Nitoli Sema, Executive Engineer, PWD Nagaland

He informed the participants that the current Rachna training is designed specifically for govt. officers who will be instrumental in developing new policies and complement implementation of policies through advanced knowledge of passive building design for thermal comfort in affordable housing.

GIZ CSB introduction:

Shri Rahul Bose, Architect – CSB Cell, East Cluster, Agartala spoke in detail about the various initiatives of GIZ in India in the sustainability sector, clean energy & energy efficiency services. He also shared the objective of introducing this project as to ameliorate climate resilience and thermal comfort in buildings constructed under Pradhan Mantri Aawas Yojana (Urban).



GIZ CSB introduction by Shri Rahul Bose, Architect – CSB Cell, East Cluster, Agartala

Further, he updated that the Light House Projects is happening across six states of the country with different technologies with the sole intention of providing ready to live-in homes with minimal time and cost along with highquality of construction in a sustainable manner.

Technical sessions:

Brief of all the sessions is discussed below:

Session 1: Thermal Comfort:

- Indices
- Thermal comfort in Affordable Housing
- Passive strategies and building physics
- Case Studies.

Session 2: Thermal Comfort Models:

- Thermal Comfort Standards i IMAC and ii ASHRAE
- Effects of materials on thermal comfort

Session 3: New Age innovative technologies along with the 6 LHP construction technologies.

Session 4: Eco-Niwas Samhita 1&2 and its compliance





Session by Shri Saibal Saha

Session 5:

- Low energy Comfort System and BEE Star Labelling
- Indian International Best Practices.

Outcome & impact of the event

The event was attended by 30 government officials. These officials represented PWD Nagaland (Housing Division), The training program saw a healthy discussion amongst each other, the trainer and discusses real life situations related to costs of materials, timeline of projects and highlighted projects that are already using sustainable materials that have been ensuring thermally comfortable living environments for the occupants. The event was an amalgamation of theoretical, design & compliance along with practical facets. Post the technical sessions, the participants were given a multiple choice-based questionnaire covering all aspects related to innovation construction technology and thermal comfort. The attendees participated wholeheartedly and with utmost enthusiasm. Here are some of the feedbacks received from the participants.

Feedback from participants

The participants found the sessions thorough and much inspiring. They understood the importance of low cost thermally comfortable housing in India designed using passive strategies and really appreciated the interactive nature of the sessions and the quality of the content specifically designed for improving thermal comfort in affordable housing in India. Shri Sayan Maitra, Team Member – CSB Cell, East Cluster, Agartala delivered the vote of thanks. He applauded MoHUA team members along with the volunteers involved for their active efforts in the overall coordination and arrangement of this event.



Participants attending the session



	Innovati	ve Construction Technologies & The tion: Dimapur Date : 29 th July 2022 , F AGEN	rmal Comfort for Affordable Housi iday Time : 09:30 AM to 5:30 PM DA	
	DURATION	TOPIC	SPEAKER	
	9:30-10:00	Registration		
ESILIENT, AFFORDABLE AND COMFORTABLE HOUSING THROUGH NATIONAL ACTION	10:00-10:15	Welsome Address	Sent. Nitoli Sema Executive Engineer PWD Negaland	
Innovative Construction Technologies & Thermal Comfort for Affordable Housing' Location: Dimagur Date : 29 th July 2022 , Friday Time : 09:30 AM to 5:30 PM	10:15-10:90	Introduction to MoRUA's Housing for AB Programme, GL and the Illiateral Programme – Climate Smart Buildings (CSB)	02 Team	
BOUT THE TRAINING:	10:30-10:45	HERI-TEA & NETWORKING		
he Ministry of Housing & Urban Affairs (MOHIA) in partnership with GIZ and Building Material and echnology promotion Council (BMTPC) is hosting series of trainings/workshops on innovative onstruction Technologies & Thermal Comfort for Affordable Housing named RACINA (Resilient, flordable and Comfortable Housing through National Action. The prime focus of this training is hermal comfort and its necessity in the affordable housing sector. The training covers the thermal	10:45-12:15	Session 1: Thermal Comfort: a) Indices b) Thermal comfort in Affordable Housing () Posilve strategies & Building Physics, d) Case studies	Sent, Ragini Goowani KCR: Annue Tunne (artified by Suman of Songy Officiency	
smort basis, material industries, tow-cost solutions a cooles that are available in initial to create initial-Smart Buildings. The outcome of the training would be to make the stakeholders in the fordable housing sector understand the need for thermal comfort & urge them to include no cost or w-cost strategies in upcoming projects.	12:15-13:00	Session 2: Thermal Comfort models: a) Thermal Comfort standards i. IMAC & 5: ASBRAE b) Effect of materials on thermal comfort	Sent, Ragini Goswani 100: Mana Trainer certified by James of Longy Efficiency	
NN US AT:	1100-1400	iu.	KOHBARAK	
ND Office Complex Inference Hall – 3 rd Floor	14:00-15:00	Section 3: New age innovative technologies along with the 6 LHP construction technologies	Shri Kahul Bose Architet - Cill Fast Cluster Cell	
mapor - 197113 r Further Details, Please drop an emoil to - Rainsh Detabarma	15:00-16:00	Session 4: Ecolónias Sambita Part 1 & 2 and its compliances	Shri Sabal Saha KOBC Maner Trainer certified by turnes of thergy Efficiency	
agartala_glz_csbcell@pwc.com	16:05-17:00	HON-TE	& NETWORKING	
RGETED STAKEHOLDERS	16:15-17:00	Session 5: 4) Low Energy Comfort Systems and BEE Star Labelling & b) Indian & International Best Practices	Shel Salbol Saha EGE: Master Trainer cartified by Burnas of Energy Efficiency	
		1997200		
	17:00-17:15	Q&A and feedback	Climate Smart Buildings (CIB) East Chuster Cell	

Agenda for RACHNA #70

Rachna on Twitter



Training program #70 proceedings on GHTC twitter handle

RACINA



Date: 1st August 2022No of participants: 42Location:



About the Event

The Rachna for practitioners training program was organised to deliver in-depth knowledge on thermal comfort, its nuances, and its relationship with building physics. Moreover, it discussed design strategies, construction techniques, policy documents, building codes, international practices, and other aspects relevant to thermal comfort in affordable housing through a suite of

case studies. Additionally, it was formulated to familiarize participants with the evaluation process of thermal comfort, the statistics, and indicators involved as well as affordable cooling technologies and their applicability in various climates. This training targeted practicing architects, civil engineers and urban planners who were interested in understanding the basics of thermal comfort needs and its applicability in affordable housing. Post training, the participants are equipped with tools and knowhow to design and evaluate affordable housing that provides enhanced thermal comfort.

Trainer profile



Mariyam Zakiah is a Green Building Analyst working with the Energy and Policy team of EDS in New Delhi. She has done her MArch in Sustainable Environmental Design from the Architectural Association. London and

her B.Arch. from Jamia Millia Islamia, New Delhi. She has expertise in the field of design optimization, energy and daylight analysis and R&D in the field of sustainability. Her previous experience includes conducting workshops on Insulation in high altitude villages of Sikkim, and participatory design exercise in various parts of India and Nepal.



Brief event proceedings

Welcome address

The one-day training programme was conducted over the Google Meet platform and was formally opened by Ms. Upma Tiwari, Consultant, Marketing and Communication, Global Evolutionary Energy Design, New Delhi. She warmly welcomed all the panellists and the participants. She further welcomed all the panellists and stated their elaborate background. Ms. Upma then introduced RACHNA, the initiative by MoHUA and shared the brief objectives of the training.



Welcome address by Ms. Upma Tiwari

GIZ CSB introduction:

Moving forward, Mr S. Vikash Ranjan Project Head, Climate Smart Buildings, from GIZ delivered the welcome address to all the participants. He evoked everyone to not only understand and learn the technical aspects of the new innovative technologies but simultaneously also implement and incorporate the learnings in their current and future projects. Also, he described the initiatives taken by the Ministry of Housing and Urban Affairs in partnership with GIZ in accomplishing the objectives under the Indo-German Energy Programme.



Shri S Vikash Ranjan, Program Head, GIZ-CSB Project introducing the project

Technical sessions:

Session 1: Thermal Comfort:

- a) Indices
- b) Thermal comfort in Affordable Housing
- c) Passive strategies & Building Physics
- d) Case studies



Session 2: Thermal Comfort models:

- a) Thermal Comfort standards
 - i. IMAC & ii. ASHRAE
- b) Effect of materials on thermal comfort



Session 2 on thermal comfort models

Session 3: New age innovative technologies along with the 6 LHP construction technologies





Session 4: EcoNiwas Samhita Part 1 & 2 and its compliance

Session 5: Low Energy cooling Technologies and Comfort

- a) Low Energy Comfort Systems and BEE Star Labellings
- b) Indian & International Best Practices

Outcome & impact of the event

The event was attended by 42 participants from engineering, architecture, and urban planning background from various parts of the country. A majority of the participants were working with the public sector and found the training content very interesting and new. They understood the importance of low cost thermally comfortable housing in India and really appreciated the interactive nature of the sessions and the quality of the content specifically designed for improving thermal comfort in affordable housing in India.



Feedback from participants

The participants found the sessions thorough and much inspiring. The participants found the training content and topics covered new and informative and they would be able to adopt these concepts in their practice/ profession. They felt that more such trainings and programs would be beneficial for better understanding and adoption of the codes at ground.









Agenda for RACHNA #71

Photographs from the event

Mariyam Zaklah is presenting			
	aneaty of Autors Afters Support of Mark Afters Stript Right-Right		
EFFECT OF BUILDIN	G MATERIAL PROPERTIES ON T	HERMAL COMFORT	100
 Materials has a direct im of a building due to their 	pact on the achievement of the requ different thermal properties.	ired thermal properties	Marryan Zakish
1. Thermal Conductivity: transferred through uni	The amount of heat		tipma Timet
with unit thickness in un thermal conductivity. i	it time is termed as t is measured in (W)	(m) Thermal conductivity (W/(m.k))	Kohawenad Raypan
W/(m.K). The lowe conductivity of a mater	er the thermal Temperature 1 (K) —— rial, the better the	Temperature 2 (K)	N States
Amish Chalured has left the meeting			
2:14 PM foy-novo-totm	S D B D E 🖸		۵ گ 🖻 ک

Ms Mariyam Zakiah explaining the thermal properties of materials





Training on Climate Smart Buildings for Officers



Date: 04th August 2022No of participants: 45Location:



About the Event

Ministry of Housing and Urban Affairs (MoHUA) in collaboration with its subsidiary unit Building Material and Technology Promotion Council (BMTPC), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), hosted a series of trainings on Innovative Construction Technologies & Thermal Comfort for Affordable Housing under the banner name RACHNA (Resilient, Affordable and Comfortable Housing through National Action). The prime focus of this training was to make the Govt Officials, Academicians and Professionals aware about the latest construction technologies being used at LHPs, also about Thermal Comfort, Green Building Concept, Eco Niwas Samhita tool and standard. The trainings covered the thermal comfort basics, material influences, low-cost solutions & codes that are available in India to create Climate-Smart Buildings.

Trainer's profile



Mr Saif Uddin is an Energy Engineer by Qualification and Building Policy Expert by Profession having more than 8 years' experience in the domain of Energy Conservation Building Code, Eco-Niwas Samhita

implementation with Government of Uttar Pradesh, Himachal Pradesh, Rajasthan & Bihar. Building Energy Simulation for ECBC, ASHRAE 90.1 and general energy optimization is his key expertise. He is a certified IGBC Associate professional, and GRIHA certified professional.

He has been also involved in the development of ENS Tool and ECBC App developed by Bureau of Energy Efficiency, Ministry of Power for Commercial & Residential Buildings.



Brief event proceedings

Welcome address

Mr. Amrish Chaturvedi, Team Manager, CSB Cell, Lucknow in his address welcomed all the senior officials, panellists and participants present and emphasized and stressed on the need of integrating thermal comfort in affordable housing segment. Post his address, all the dignitaries were facilitated by handing over plantlets.



Welcome address by Mr. Amrish Chaturvedi, Team Manager, CSB Cell, Lucknow

Keynote Address

Shri Deewan Chandra Sharma, Senior Architect, HIMUDA, delivered the Keynote Address. In his address he concentrated on the technological aspects of the innovative construction technologies coming up in the building sector in India.



Keynote address by Shri Deewan Chandra Sharma, Senior Architect, HIMUDA

Special Address I

Shri Rajiv Sharma, Chief Architect, PWD. In his extremely elucidating words, he gave several

illustrations connected with the subject of the training and emphasised on the need of Thermal Comfort in the residential housing segment.

Special Address II

Another special address was also delivered by Shri Deepak Jashotia, Dy. Chief Engineer, DoE. In his extremely elucidating words, he gave overview of his work on ECBC and Energy efficiency in state. He also connected with the subject of the training and emphasised on the need of energy efficiency in the residential housing segment.



Special address by Shri Deepak Jashotia, Dy. Chief Engineer, DoE

Technical sessions:

Session 1: New age innovative technologies along with the 6 LHP construction technologies



Session 1 on innovative technologies

Session 2: Thermal Comfort in Affordable Housing & Passive Designs

RACINA



Thermal comfort in affordable housing being explained by expert

Session 3: Thermal Comfort models: Standards, Codes and Building Materials

Session 4: EcoNiwas Samhita (ENS) part 1 &2 and its compliances



Mr Saif Uddin explaining thermal comfort models

Session 5: Low Energy Comfort Systems, Star Labelling and Best Practices



Session on Low energy comfort systems

Outcome & impact of the event

The outcome of the training was to make the Senior Govt. Officials and Practitioners understand the concept of the technology, it's need, green building concepts & urge them to adopt include in their practices and upcoming projects. The event evoked great response from 45 participants. The participants include Senior Officials, Architects, Planner and Engineers from Govt. departments. Also, Professionals, Practitioners who are senior resources in their organizations.

Feedback from participants

They have shared their experiences on the event, found it informative and interested in terms of learnings and its approaches towards practical implementations. They also added & emphasize to get organize such more events / small training sessions.



	¥ 6	Name Name Name Name Name Name Name Name	timine giz
	Innovative Location: S	Construction Technologies & Thermal Co himla Date : 4 th August 2022, Thursday AGENDA	mfort for Affordable Housing Time : 10:00 AM - 4:30 PM
	DURATION	TOPIC	SPEAKER
	10:00 - 10:30	Registration	
	10:30 - 10:40	Lamp Lighting	By Dignitaries
NT, AFFORDABLE AND COMFORTABLE HOUSING THROUGH NATIONAL ACTION	10:40 - 10:50	Welcome Address	Climate Smart Buildings (CSB) Cell
ining #70. On a Day Testising Decomposition of	10:50 - 11:00	Felicitation of Dignitaries	Climate Smart Buildings (CSB) Cell
ing #72: One-Day Training Programme on	11:00 - 11:15	Keynote Address	Shiri Rajiy Sharma
ruction Technologies & Thermal Comfort for Affordable Housing	11-15-11-20	HIGH TEA & NET	Chief Architect, PWD
Itee Construction Technologies & Thermal Comfort for Affordable Housing m: Shimia Date : 4 th August 2022, Thursday Time : 10:00 AM - 04:30 PM ITE TRAINING PROGRAMME: ry of Housing & Urban Affairs (MoHUA) in partnership with GIZ and the Building Material ology Protoction Council (BMTPC) is hosting a series of training/workshops on Innovative on Technologies & Thermal Confect for Affordable Housing mane BACHNA (Realifest.	11:30 - 12:00	New age innovative technologies along with the 6 LHP construction technologies focusing on - efficiency in construction, mainstreaming & replication of technologies.	Mr. Amrish Chaturvedi Climate Smart Buildings (CSB) Cell
in Council (EMTPC) is hosting a series of trainings/workabops on innovative as & Thermal Comfort for Affordable Housing named RACHNA (Resilient, able Housing through National Action). The prime focus of this training	12:00 - 12:30	Introduction: Thermal Comfort for Affordable Housing	Mr. Amrish Chaturvedi Climate Smart Buildings (CSB) Cell
rticipanti gain knowledge on thermal comfort and its necessity in the her programme covers material influences, low-cost solutions & codes that state Climate Smart Buildings. The participants will also get familiae with a s and global best practices. The outcome of the programme would be to participating policymakers and implementers for mainstreaming thermal and incorporating thermal coeffort provisions in Byelaws.	12:30 - 13:15	Session J: Thermal Comfort a) Need and Impact b) Thermal comfort in Affordable Housing c) Passive strategies & Building Physics d) Case Studies	Mr. Saif Uddin (Expert Trainer)
	13:15 - 14:15	LUNCH BRI	AK
- 171001	14:15 - 14:45	Session 2: Thermal Comfort Models a) Thermal comfort standards 1. IMAC 2. ASHRAE b) Effect of materials on thermal comfort	Mr. Saif Uddin (Expert Trainer)
mite	14:45 - 15:30	Session 3: Eco Niwas Samhite EcoNiwas Samhita Part 1 & 2. Overview and its role in Thermal Comfort and Energy Efficiency in Affordable Housing	Mr. Saif Uddin (Expert Trainer)
	15:30 - 16:00	Session 4: a) Low Energy Comfort Systems and BEE Star Labelling b) Indian & International Best Practices	Mr. Saif Uddin (Expert Trainer)
C. Cont	16:00 - 16:15	HIGH TEA & NET	VORKING
Built-environment Building professionals & Sector Govt. Departments Stakoholders	16:15 - 16:30	Vote of thanks	Mr. Ashwini Kumar Consultant Architect at SDA, Directorate of Energy Government of HP

Agenda for RACHNA #72

Photograph of Event



Trainers having discussion with participants





Awareness drive in architectural college



Date: 2 -3 August 2022No of participants: 126Location:



About the Event

Ministry of Housing and Urban Affairs (MoHUA) in collaboration with Building Material and Technology Promotion Council (BMTPC) and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) organised a Two-day Awareness Program at School of Planning and Architecture on 2nd & 3rd August 2022 on Innovative Construction Technologies & Thermal Comfort for Affordable Housing under the banner name RACHNA (Resilient, Affordable and Comfortable Housing through National Action). The prime focus of this training was to make the Academicians and students aware about New Technologies and need of Thermal Comfort where day one focused on the Light House Project Technologies, Passive Architecture, Thermal Comfort and the standards & Tools like Eco Niwas Samhita Compliance Tool & BEE Star Labelling for Residential Buildings can be used in designing an affordable residential housings while day two was focused on the Climate Responsive Architecture case studies and the design related challenges and experiences.

Trainer's profile



Architect Girija Rajarathinam is an ardent advocate of Sustainable living and Energy Efficiency. Her passion lies in leading the change and bringing awareness to green building and net zero concepts. She holds her

bachelor's degree from the School of Architecture and Planning and Post Graduate Research on Seismic Architecture from the University of Tokyo. With 20 years of International and Local experience in Architectural Design, Project Management, Business Development, and



Policy Implementation, she is currently the Consultant Architect for the TN Government and oversees Sustainable and Energy Efficiency code Implementation in the State. She is a Registered Architect with COA, a Fellow Member of IIA, and Well Accredited Professional.

Brief event proceedings

Keynote & Special address

Dr. Vijayalaxmi Iyer, Head of Department, Architecture of School of Planning & Architecture Vijayawada (SPAV), inaugurated the session with a warm welcome to the attendees. She started with the welcome of Dr. Srikonda Ramesh, Professor, SPAV & Mr. Anand, Team Leader, CSB, South Cluster Cell. Followed by, she welcomed the session trainer Ms. Girija and, the staff & students of SPAV.



Keynote address by Dr. Vijayalaxmi Iyer, Head of Department, Architecture of School of Planning & Architecture Vijayawada (SPAV)

GIZ CSB introduction:

The session by Mr. Anand Sachithanantham, Team Manager, Climate Smart Buildings Cell, South India began with an introduction session on the overview of PMAY(U) and the GIZ-CSB initiative, the project objectives, and the team experts involved.



Dignitaries on the panel

He briefed about the Indo-German partnership for green & sustainable development and its ongoing project. He explained that GIZ's focus areas are Energy, Environment, Preservation, Sustainable Use of Natural Resources, Sustainable Urban & Industrial Development, and Sustainable Economic Development.

Further, he introduced the Global Housing Technology Challenge – India (GHTC) to the students and faculties for a better understanding of the Light House Project (LHP) project as well as explained all the six LHP's overall technology and GHTC aims & achievements.

Finally, his session ended with a brief note on climate-smart buildings, and the activities taking place at LHP Chennai. He explained the innovative construction technologies used in six LHPs and their special features.

Technical sessions

Session 1: New age innovative tech.

- a) LHP construction technologies
- b) LHP Chennai features
- c) LHP Chennai Video

Session 2: Thermal Comfort:

- a) Indices
- b) Thermal Comfort in Affordable Housing
- c) Passive strategies and building physics

Session 3: Thermal Comfort models:

- a) Thermal Comfort standards i. IMAC & ii. ASHRAE
- b) Effect of materials on thermal comfort

Session 4: EcoNiwas Samhita Part 1 and its Compliances

Session 5: EcoNiwas Samhita Part 2 and its compliances

Session 6: EcoNiwas Samhita Part Compliance Tool

Session 7: ENS Compliance Actual Cases

- a) LHP Chennai
- b) DHP Puducherry



Session 8: Design Challenge Affordable Housing

- a) Brief
- b) Grouping
- c) Design challenge exercise

Session 9: Design Challenge Presentation by students



Students working on design submission

Session 10: Design Challenge Judgment & Winner Announcement

Outcome & impact of the event

The two-day event evoked great response from the participants after receiving training on "Innovative Construction Technologies & Thermal Comfort Measures for Affordable Housing," the participants took part in an architectural design challenge. The participants found the content of the technical sessions very interesting as was captured through feedback forms. The sessions were very interactive and lots of questions were raised by the participants. The questions were majorly on the panel as walling system & its effectiveness, thermal comfort, cost benefit, services inclusion in panel walls, measurement of thermal comfort, use of tools & standards, passive designs. All the answers were very well explained by the Trainer and Experts from CSB Cell.

Feedback from participants

The Participants appreciated the efforts put in by CSB Cell members and successful completion of the event. The participants highly appreciated the initiative by the CSB LHP cell in organising training which included a design challenge and allowing them to use their training in architecture and new concepts of thermal comfort and passive building design.



Brainstorming session by the participants on the design submission



Participants attending the training session

324



'Innovat Lo	ive Construction Technologies & Th cation: Vijayawada Date : 2 ⁰⁰ & 3 ¹⁹ Augu	ermal Comfort for Affordable Housing" nt 2022 Time : 10:00 AM to 4:30 PM	"Innova Li	tive Construction Technologies & Ti ocation: Vijayawada Date : 2 ⁴⁴ & 3 ⁴⁴ Aug	termal Comfort for Affordable Housin ast 2022 Time : 10:00 AM to 4:30 PM
	AGENDA DAY 1 AGENDA DAY 2				DAY 2
DURATION	TOPIC	SPEAKER	DAMATHON	TOPIC	SPEAKER
0.00-10.15	Registration		10:00-10:30	Registration	
8 15-10/20 8 20 10/25	Welcome Address Reynote Address	Climate Smart Buildings Cell Mrs. Vijayalasmi	10.30-10:45	Session 7: ENS Compliance - Actual Cases a) UIP Chennii b) DHF Puducherry	Mr. Anand Sachithanantham Team Manager, CBE Cell
10.25-10.30	Special Address	Dr. Schonda Ramesh Professor, SPA, Vjayawada	10.45-11.15	Section & Design Challenge - Affordable Hoosing a) brief b) Groupine	Mr. Anand Sachithanantham Team Manager, CSB Col
10.30-10.45	GLZ and the Bilateral Programme - Climate Smart Buildings (CSB) 5. Its activities	Mr. Anand Sachkhananthain Team Mananer CM Cell	11 15-11 50	NICH TEA & NETWORKING	
10.45 11.00	Session 1: New age innovative technologies a) 6 UHP construction technologies b) UHP Chennai - Features	Mr. Anand Sachithanantham Team Manager, CSS Cell	11 30-13 50	Setsion 8 (contil.): Design Challenge Exercise	Mr. Anand Sachthanantham Them Manager, CBI Call
	<) LHP Chennai - Video		13.00-14.00	LUNCH MEAN	
11 15-12-15	Session 2: Thermal Comfort: a) Indices, b) Thermal comfort in Affordable	Mit. Girija Rajarathinam Ganadean Architez - 5080 & ENS Cell Th	14:00-15:00	Session 8 (contd.): Design Challenge Exercise	Mr. Anand Sachithanantham Team Manager, CSR Cell
	Housing () Passive strategies & building Physics		1300-1800	Session 9: Design Challenge Presentation	Students Team
2-15-13:00	Session 3: Thermal Comfort models a) Thermal Confort standards L BARC & E. ASHBAR b) Effect of materials on thermal comfort	Ms. Girija Rajarathinam Consultant Architect - ECBC & END Cell TN	18/80-18/30	Session 30: Design Challenge Judgment & Winner Announcement	Trainty & CSB Team
1.00 14.00		NCH BREAK		High Tea & End of Semicon	
14.00-13.00	Session 4: EcoNowas Samhita Part 1 and its compliances	Ms. Girija Bajarathinam Consultant Architect – tCBC & ENS Cell TN		CLOSE	
13 00-18 00	Session 3. EcoNowas Sambita Part 2 and its compliances	Mis. Girija Rajalathinam Consultant Architect – DCBC & ENG Cell TH			
16:00-16:15	Session 6: EcoNiwas Samhita Part - Compliance Tool	Ms. Grija Rajarathinam Consultant Architect – FCRC & EVG Cell TN			
# 15-19 30		Q6A			
	Inc	f of Sessions			

Agenda for RACHNA #73

Rachna on Twitter



Rachna #73 on Twitter







Training on emerging construction technologies & thermal comfort in Light House Projects for officers



Date No of participants Location

: 05th August 2022 : 38

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About the Event

Ministry of Housing and Urban Affairs (MoHUA) in a collaboration with its subsidiary unit Building Material and Technology Promotion Council (BMTPC), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) organized a Training - cum - Workshop named RACHNA Programme (Resilient, Affordable and Comfortable Housing through National Action) on August 05, 2022, at Raipur, Chhattisgarh. The theme of the one-day training was 'Innovative Construction Technologies & Thermal Comfort for Affordable Housing'.

Trainer profile



Trainer 01 – Kaushal Lodaya, Director of Sustainable Services Private Ltd. is an Architecture and Engineering Firm, which look forward towards policy reformations, net-zero building designing, green building certification

and various other activities related to Sustainable Architecture & Engineering. Kaushal Lodaya is leading the firm with his 10+ years of experience in Sustainable Building Design and its Implementation. He is a mechanical engineer and have completed post-graduation in Energy Management, with core areas of expertise in designing of Passive cooling system, energy efficient/ EPCO-friendly building designing, and green building certification.



Trainer 02 – Amardeep Kaur is IGBC Accredited Professional, GRIHA Certified Professional & GRIHA Evaluator having an experience of 10 Years. She is working with Arch-Tech Consultants as an Engineer

Sustainability from last 9 years Her work includes green building, arranging workshop



on ECBC along with CREDA, ECBC compliance works, working on simulation software. She also worked as an Assistant Professor in NIT RAIPUR.

Brief event proceedings

Welcome address

Shelendra Kumar Chanderiya, CSB Cell Member started off the event with an inspiring address that established the tone for the day, greeting all dignitaries and attendees and giving them a glimpse of the session.



Dignitaries on the panel

Keynote Address:

Shri Sanjeev Jain (Chief Engineer, CREDA, Raipur) in his address expressed his joy and happiness by highlighting the key milestones achieved by the CREDA and team in Raipur & entire CG state.



Shri Anurag Verma, GIZ gave insight on CSB project and RACHNA

Shri R K Choubey (Chief Engineer, Raipur Municipal Corporation, Raipur) in his address expressed his joy & happiness by highlighting the key milestones achieved by RMC and team in Raipur & CG State. He said that the EPS Technology is good to adopt and suggested all senior officials to take a step ahead and be the first in state / country to adopt the EPS Panels technologies in coming projects and set the alternate live laboratories in CG state for the other states to follow. He was also keen to interact with audiences and to know about the expected take aways from the training sessions. Also, as a professional how we can help & kind of initiatives can be taken towards adoption of the technology in local construction market.



Address by Shri R K Choubey (Chief Engineer, Raipur Municipal Corporation, Raipur)

Post welcome address, Shri Anurag Verma, GIZ started the session and began with introduction of "RACHNA" program, Ministry of Housing and Urban Affairs (MoHUA), Mission -Housing for All, overview of PMAY(U) and Global Housing Technology Challenge. Further delivered & informed about GIZ, their association with Indian Government on different project and objective fulfilments. About Climate Smart Buildings program and CSB cell initiative, project objectives and the team experts involved. It further elaborated on interpretation of the project objectives and the roles of the relevant stakeholders.



Introduction on thermal comfort by Kaushal Lodaya

Technical sessions:

Session 1: Importance of Thermal Comfort Session 2: Thermal Comfort models: Standards, Codes and Building Materials

Session 3: New age innovative technologies along with the 6 LHP construction technologies





Session on thermal comfort models

Session 4: EcoNiwas Samhita (ENS) part 1 & 2 and its compliances

Session 5: Low Energy Comfort Systems, Star Labelling and Best Practices



Questions being addressed by experts

Outcome & impact of the event

The day-long event evoked great responses from over 38 participants from various government departments, building industry stakeholders, professionals from academia and they were trained on 'Innovative Construction Technologies & Thermal Comfort for Affordable Housing'.



Session on innovative technologies used at 6 LHPs

Feedback from participants

The participants found the sessions insightful. They understood the importance of thermal comfort in buildings and its impact on the occupants. Further they understood the role of building materials, passive design strategies in making a building comfortable and latest construction technologies available in the market.



Amardeep Kaur delivering session on EcoNiwas Samhita





Agenda for RACHNA #74

Rachna on Newspaper



Training program #74 proceedings in local newspaper





Awareness drive in architectural college



Date: 12th & 13th August 2022No of participants: 37Location:



About the Event

Ministry of Housing and Urban Affairs (MoHUA) in collaboration with Building Material and Technology Promotion Council (BMTPC) and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) organised a two-day Awareness Program at Goa College of Architecture, Altinho, Panji, Goa on 12th & 13th August 2022. This was the concluding event in the series of 75 trainings on Innovative Construction Technologies & Thermal Comfort for Affordable Housing under the banner name RACHNA (Resilient, Affordable and Comfortable Housing through National Action). The prime focus of this training was to make the Academicians and students aware about New Technologies and need of Thermal Comfort where day one focused on the Light House Project Technologies, Passive Architecture, Thermal Comfort and the standards & Tools like Eco Niwas Samhita Compliance Tool & BEE Star Labelling for Residential Buildings can be used in designing an affordable residential housings while day two focused on the Climate Responsive Architecture case studies and the design related challenges and experiences.

Trainer's profile



Dr Aniruddha S. Pawar, is B.Arch, M.Arch and an PhD Scholar. Dr Pawar has gathered a diverse set of skills while working with equal enthusiasm in the fields of academics, architectural profession and research. He

completed doctoral research at Indian Institute of Technology Roorkee, with his research area spanning across domains of Climatology, Responsive Design and Building Legislation. He has research papers published in international / national peer reviewed journals and conferences.



His Professional experience includes handling projects varying from recreational farmhouses to long span suspension bridges. He has coordinated the design development and execution of million sq.ft. commercial building as part of an interdisciplinary consultancy.

Brief event proceedings

Inaugural session

The event started with the registration of participants (students and faculties) followed by the Welcome address for the guests, faculties and the students invited. Mr. Shelendra Kumar Chanderiya from the central CSB cell started the event with an inspiring address that established the tone for the day, greeting all guests, faculties and students and giving them a glimpse of the sessions ahead. The participants were also introduced to the "RACHNA" initiative by MoHUA & GIZ.

Welcome address

Dr. Ashish K Rege, Principal from GCA also welcomed students, faculties and CSB Cell. During his speech, he praised the new technologies and indicated that ancient knowledge "Vastu" can be clubbed with technology and lead to better design which will be affordable, thermally comfortable, sustainable and climate resilient. Dr. Aniruddha Subarao Pawar, Ar. Shriya K Korde, Ar. Noah A Fernandes, Ar. Ujjawala Sinha were invited as guests. All the dignitaries were welcomed.



Welcome address by Dr. Ashish K Rege, Principal from GCA

Keynote Address

Dr. Ashish K Rege, Professor & Principal, Goa College of Architecture in his address expressed his joy and happiness by highlighting the key achievements of the College, team and the students. He enlightened about the courses, thesis work and ongoing Projects and their key features. He also added and encouraged students and faculties to participate in such events. He also encouraged students to register themselves as TECHNOGRAHI(s).

GIZ CSB introduction:

Post the Welcome Address, Mr. Shelendra Kumar Chanderiya from CSB Cell began with introduction of Ministry of Housing and Urban Affairs (MoHUA), Mission – Housing for All, overview of PMAY(U) and Global Housing Technology Challenge. Further he informed the participants about GIZ and Climate Smart Buildings program and CSB cell initiative, project objectives and the team experts involved.

Technical sessions

Session 1: Thermal Comfort in Affordable Housing & Passive Designs, Standards



Session 1 on thermal comfort

Session 2: Eco Niwas Samhita Part 1 & 2, Compliance & Tool Demonstration

Session 3: Affordable Housing Design Challenge

Session 4: Design Challenge Judgment and Certificate Distribution



Session on EcoNiwas Samhita by expert



Outcome & impact of the event

The two-day event evoked great response from the participants. After receiving training on "Innovative Construction Technologies & Thermal Comfort Measures for Affordable Housing" the participants took part in an architectural design challenge. The participants found the content of the technical sessions very interesting and were happy to learn about Compliance tools, Standards, Innovative Technologies etc. The sessions were very interactive and lots of questions were raised by the participants. The questions were majorly on the panel as walling system & its effectiveness, thermal comfort, cost benefit, services inclusion in panel walls, measurement of thermal comfort, use of tools & standards, passive designs. All the answers were very well explained by the Trainer and Experts from CSB Cell.

Feedback from participants

The Participants appreciated the efforts put in by CSB Cell members and successful completion of the event. They found the training very informative and interesting in terms of learnings and its approaches towards practical implementations. They emphasized the need to attend more such events. The faculty shared their plans to consider this content on Technology and related materials as a part of their academic courses.



Photographs captured during design challenge



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		TIME	2040	SPEAKER
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RESILIENT, AFFORDABLE AND COMFORTABLE HO Training #75: Two Dav(4) Awa		30 HEAN - 11 DEAM	 New age innovative technologies along with the EUP construction technologies focusing an - efficiency in construction, maintenancing & replications of technologies, and successfully construction technol by CMPS & AMPCs 	CBI Cel number
		11 00444 15 05 444	Charter and answer terring	
INNOVATIVE CONSTRUCTION TECHNOLOGIES & THERM	AL COMFORT FOR AFFORDABLE HOUSING*	11/05AM - 11:30AM	Teo Break	
Date: 12 th & 13 th August 2022 Time: 10:30 AM to 05:00 PM ABOUT THE TRAINING: The Ministry of Housing & Urban Affairs (MoHUA) in partnership with GiZ and Building Material and Technology promotion Council (BMTPC) is hosting series of trainings/workshops on innovative Construction Technologies & Thermal Comfort for Affordable Housing named RACHNA (Resilient, Affordable and Comfortable Housing through National Action). The prime focus of this training is to make Architectural Students aware about the Thermal Comfort, Measuring Indices, Standards & Codes, Tools & Compliances are being		11-30444 - 12-00444	Sector 1: Oralingua & American Housing Oralingua & American Concern Oralingua & American Concern Oralingua & American Concern Tearray Comfett Tearray Tearray Confett Sociol Sociol	Full Anirubilita Fanar
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Shelendra Kr. Chanderiya #91-9654419859		11/00/04 - 01 00/04	Jeanser & (General)	1
CSB Coll. Control Churter	00.000	The second second	Design Challenge Lientise	
CSB Cen, Central Cluster	GIZ, India	01.00PM - 02.00PM	Lands Break	International Advancements
Light House Project,	B-5/5, Safdarjung Enclave	02:00FM - 04:00FM	Decigo Oraliango Travilla	Cill Call mandage
Kanadia ext., Sanyogitaganj Mandal,	New Delhi, 110 029	04.00PM - 54-3 UPM	Tea Break	
(Landmark: near Gulmarg Parisar)		OR THREE - DA AT THE	Session 4	Part of the local division of the
Indore, Madhya Pradesh	⊠ vikash.ranjan@giz.de	Orten al - Orten al	Design Oraliarge Autgement and Cartificate Distribution	and the second s
☑ indore.gizcsbcell@gmail.com		04.45PM - 05:00PM	Vote of Thanks	Principal, Goa college of

Agenda for RACHNA #75

Photograph of the event



CSB team with students and faculty





5. Learnings and Way forward



5.1 Learnings and Impact of RACHNA trainings

Special attention and care were put into curating the modules from a broad range of topics covering energy efficiency and thermal comfort aspects for utilization in affordable housing. The content was tweaked and creatively delivered keeping in mind the stakeholder it was being addressed to. This allowed better grasp from the participants and ensured that they take back home an advanced understanding of the topics covered. This section covers the impact of the training programs and the various learnings such that the RACHNA initiative is carried forward in the future with a higher impact.

The RACHNA trainings for practitioners

These training events were successful in connecting the knowledge and practical experiences of the professionals from the built-environment with the concepts of thermal comfort and energy efficiency:

- Introduction to new & innovative ways of building: Majority of the participants were aware of the passive design strategies, principles of design and services optimisation methods. But discussions and deliberation on innovative materials and new available technologies in the market and their utilization in achieving energy performance and ensuring thermal comfort was a new resource for enhancing their practice.
- **Informed design choices:** The trainings helped them corelate building performance with material properties and make informed choices in future projects.
- Awareness on codes: The practitioners working in the field of building construction are aware of the byelaws in the region where they operate but many were unaware of the Econiwas Samhita code for residential buildings and its compliance mechanisms. The participants gave positive feedback on the idea of incorporating the energy efficiency code into the state byelaws and making them mandatory for more outreach and adoption. On the other hand, the metrices of thermal comfort were very new for most participants due to lack of any standard defining and benchmarking thermal comfort.
- **Introduction to performance assessment tools:** The trainings helped them understand the concepts of designing efficient building envelops by way of modulating opening sizes, exposed wall surface, shading and appropriate material selection. It took them a step further by introducing tools for measuring the building performance to test their design against the code benchmarks, multiple free and online tools to ensure code compliance, thus empowering them to keep a check on building performance without needing to go for any external certification agency.

The RACHNA trainings for officers

These trainings provided a platform for policy makers and building construction professionals working within the implementing agencies and govt. departments to acknowledge and engage in discussions around the environmental impact of construction and the need to prioritise comfort in the housing provided under various state and central govt. programs.

- Setting the context: The trainings were successful in establishing the urgency to adopt climate smart buildings that are resilient in the current context of climate change. For many policy makers the concepts of thermal comfort were very new and the outreach of energy efficiency codes such as Econiwas Samhita and is limited in many cities that are yet to adopt the code within their byelaws framework.
- Addressing need for technical support in policy implementation: There is an urgent need for handholding policy makers and implementers in adopting the codes and standards and equipping them with tools to monitor and ensure compliance.

• Focused content: Since the trainings for officers were planned as one day events it was important to have these trainings focus more on the practical aspects of thermal comfort and its adoption and need in buildings than delving into the technical details of building physics. The sessions on innovative construction technologies and Light House Projects which were supported by short videos or site visits where possible were well received and appreciated.

The RACHNA trainings for construction workers

Understanding the need for knowledge on building climate smart buildings to trickle down to the most important stakeholder in the construction process, i.e., the mason working on site, these trainings took the concepts of thermal comfort, sustainable construction and green building to the grassroots level. The construction workers were introduced to the new construction technologies being adopted at the Light House Projects and the elements of construction involved in use of these technologies.

- Setting the context: For long term impact it is imperative that the participants of these sessions understand the importance of adopting sustainable materials and improved construction practices and are equipped with the skills to execute them right. This was made possible by showcasing in real time the workings of new technologies on the site itself, explanation of concepts in simple and straightforward language.
- Long term impact: Their learning will go beyond the current project and will accelerate the adoption of new and innovative construction technologies in future projects. It will also ensure availability of a skilled work force for new and upcoming projects that want to adopt construction of thermally comfortable buildings that are climate resilient. Though the response was encouraging at many sites there is still a long way to go to have greater outreach at grassroots level.

The RACHNA awareness programs for students

The trainings & workshops held at architectural colleges got tremendous response and participation from students as well as faculties from the field of architecture, engineering and building science and services. The training sessions focused on technical concepts relating to building physics supported by practical understanding of design parameters through case studies and best practices from around the country.

- Introduction to knowledge domain & tools: The students were eager to learn more and try their hands at the various free and easily accessible assessment and simulation tools that were introduced to them in these trainings. These trainings became a medium of introducing the young and future professionals to the large knowledge base that is available at various platforms through various govt initiatives and academic resources.
- **Inclusion of thermal comfort in professional education:** The academia and faculty were very encouraging towards these workshops and showed keen interest in adopting the training material into their curriculum.
- Focus on application-based learning: The trainings for students culminated with a session on a design exercise where the students were encouraged to apply the learnings from the training to a design case. The following section shares a glimpse of these sessions held across 11 architectural colleges in India.



Design Competition Held Under "RACHNA" Program at FOAP, AKTU Lucknow

Theme: Thermally Comfortable EWS Housing

As the affordable housing crisis is expanding in cities around the country, natural resources are dwindling in the face of climate and economic crises, the competition seeks easy-to-replicate ideas to better serve our changing world.

The housing design competition was organized under the RACHNA trainings program at Faculty of Architecture & Planning, FOAP AKTU, Lucknow, Uttar Pradesh on **21**st & **22**nd **April 2022**. More than **80 students in 08 groups** participated in the design challenge competition.

Participants were encouraged to rethink spatial organization and incorporate unique aesthetics, new technologies, solar passive techniques, naturally ventilation, innovative and thermally suitable materials.

Design challenge:

Design a thermally comfortable affordable housing for economically weaker sections of society. Proposals should be able to demonstrate how the multiple attributes pertaining to thermal comfort are considered in a holistic response and how innovative approaches, as well as product and process innovations, are deployed.

Best selected design:

A group of 9 students designed EWS thermally comfortable housing by using RCC frame, 230mm cavity wall of solid burnt clay brick and mud-phuska as envelope material to reduce the heat transmission. Their groups incorporated most of the techniques of passive solar design and heat transfer control to make the project more energy efficient than conventional housing project.





Design Competition Held Under "RACHNA" Program at The School of Architecture, Reva University, Bengaluru

Theme: Thermally Comfortable in affordable Housing

The housing design competition was organized under the RACHNA trainings program at The School of Architecture, Reva University, Bengaluru on **16th May 2022**. More than **40 students in 08 groups** participated in the design challenge competition in different teams.

The event was organized for the students to understand the need for thermal comfort & encourage them to include no-cost or low-cost strategies in their future projects.

Design challenge:

- a) The proposal should contain a minimum of 40 Houses with sustainable, cost and time-effective emerging alternate housing construction technologies suitable to the climatic conditions of the area.
- b) The proposal should include on-site infrastructure development such as internal roads, pathways, a common green area, a boundary wall, an underground water tank, and, external electrification. The use of renewable energy is encouraged.
- c) The dwelling units should be designed keeping in view the requirements laid down in the National Building Code (NBC) 2016 with good aesthetics, adequate daylighting, natural ventilation and storage space, etc.
- d) Disaster-resistant features as per the requirements of existing NBC/BIS and applicable international standards on earthquakes, cyclones, and floods should also be incorporated. Design to include innovative systems of water supply, drainage, rainwater harvesting, and renewable energy sources.

Best selected design:

The best entry had very good strategies, with respect to climate design, thermal comfort design, and construction technology for a Hot & Dry climate. The spatial planning and placement of the dwelling units were good too.





Design Competition Held Under "RACHNA" Program at School of Architecture, IPS College, Indore

Theme: Thermally Comfortable dwelling unit design

Two day "Awareness" event under "RACHNA" programme was conducted at SOA, IPS, Indore dated **17th & 18th May 2022** for the Architectural Students and Faculties. As a part of the Awareness event, a full day session (on 2nd day, date 18th May 2022) was conducted on the design related activities.

Under this session, students were explained the requirements of the project and its passive designs strategies, materials etc. More than **30 students** participated in the design challenge competition.

Design challenge:

As part of the design challenge students were asked to design a thermally comfortable dwelling unit with 30sq.m. Area. Almost 30 students enthusiastically took part and prepared a rough sketch of their proposed designs. The CSB Cell team, along with the Faculties of SOA, discussed all the designs with the students and made observations on their considerations.

Best selected design:

Based on the discussions, the best design shortlisted catered to daylight, ventilation, shading and discussions on usage of material to achieve thermal comfort.

Placed below is the sketch received from student -

The highlights of the winning design are as follows:

- a. Proper utilization of the spaces
- b. Proper selection & placing of door and windows to provide / meet ventilation and day lighting
- c. Orientation of dwelling unit with reference to the sun path.
- d. Size of the opening as per WWR.





Design Competition Held Under "RACHNA" Programs at FOAP&D Integral University, Lucknow

Theme: Thermally Comfortable Affordable Housing

This housing design competitions were organized under the RACHNA (Resilient, Affordable, Comfortable Housing through National Action) initiative at Faculty of Architecture, Planning & Design, Integral University, Lucknow, Uttar Pradesh on **18th and 19th May 2022**. More than **40** students in **06 groups** participated in the design challenge competition.

Participants were encouraged to rethink conventional ways of building and incorporate unique aesthetics, new technologies, solar passive techniques, innovative and thermally suitable materials.

Design challenge:

Design a thermally comfortable affordable housing for economically weaker sections of society. Proposals should be able to demonstrate how the multiple attributes pertaining to thermal comfort are considered in their holistic response and how innovative approaches, as well as product and process innovations, are deployed based on the learnings from the workshop.

Best selected design:

A group of four students designed thermally comfortable EWS housing by using AAC block, Fly Ash brick and mud-phuska as envelope material to reduce the heat transmission. Their group incorporated most of the techniques of passive solar design and heat transfer to the project to make it more energy efficient. The design



selected as best housing design for above theme is showcased below:

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EWS HIGH RISE PRO	JECT	BATCH-2017-2027 FACULTY OF ARCH INTEGRAL UNIVERSITY	HUZAF UK KAHMAN NAHESA WAHED KAMIKA GUPTA IIHTA JAN



Design Competition Held Under "RACHNA" Programs at Royal School of Architecture, Royal Global University, Guwahati

Theme: Thermally Comfortable Affordable Housing

This housing design competitions was organized under the RACHNA (Resilient, Affordable, Comfortable Housing through National Action) initiative at Royal School of Architecture, Royal Global University, Guwahati on **19th and 20th May 2022**. The students were made to form into a group of five each where they participated wholeheartedly and with utmost enthusiasm. The awareness programme was a one-of-its-kind gambit whereby the students were introduced to thermal comfort basics, material influences, low-cost solutions & codes that are available in India to create Climate-Smart Buildings.

Design challenge:

Design an affordable 1-storey 2BHK, detached residential building adhering to the building bylaws of Guwahati. The carpet area of the dwelling unit must not be more than 1500sq ft. Site area is 4500 sq. ft.

- a) Provide passive design strategies that can be considered at Site level and Building level.
- b) List details of envelope construction materials that can be used along with construction techniques.
- c) Provide calculations showing window to wall ratio (WWR), Window to floor area ratio (WFR), Visible Light Transmittance, Thermal Transmittance, Residential Transmittance Value RETV, Thermal Transmittance of building envelop (roof).
- d) Check compliance for Composite Climate, Hot-Dry Climate, Warm Humid Climate and Temperate Climate.
- e) Calculate the total external shading factor and the equivalent SHGC of the fenestration.
- f) Design and list various ways to make the building thermally comfortable.

Best selected design:

Post design completion, the entries were submitted to the jury for evaluation. The evaluators comprised of Ar. Ragini Goswami (ECBC Master Planner) & Ar. Rahul Bose. Post thorough evaluation, the winning & 1st runner-up teams were duly awarded.




Design Competition Held Under "RACHNA" Programs at Architecture Department, North Eastern Hill University (NEHU), Shillong

Theme: Thermally Comfortable Affordable Housing

This housing design competition were organized under the RACHNA (Resilient, Affordable, Comfortable Housing through National Action) initiative at Architecture Department, North Eastern Hill University (NEHU), Shillong held on **24th and 25th May 2022**. The students were divided into groups of five where they attempted to apply the concepts of thermal comfort basics, material influences, low-cost solutions & codes that are available in India to create Climate-Smart Buildings that were covered in the workshop.

Design challenge:

Design an affordable 1-storey 2BHK, detached residential building adhering to the building bylaws of Shillong. The carpet area of the dwelling unit must not be more than 1500sq ft. Site area is 4500 sq. ft.

- a) Provide passive design strategies that can be considered at Site level and Building level.
- b) List details of envelope construction materials that can be used along with construction techniques.
- c) Provide calculations showing window to wall ratio (WWR), Window to floor area ratio (WFR), Visible Light Transmittance, Thermal Transmittance, Residential Transmittance Value RETV, Thermal Transmittance of building envelop (roof).
- d) Check compliance for Composite Climate, Hot-Dry Climate, Warm Humid Climate and Temperate Climate.
- e) Calculate the total external shading factor and the equivalent SHGC of the fenestration.
- f) Design and list various ways to make the building thermally comfortable.

Best selected design:

Post design completion, the entries were submitted to the jury for evaluation. The evaluators comprised of Ar. Ragini Goswami (ECBC Master Planner) & Ar. Rahul Bose. Post thorough evaluation, the winning & 1st runner-up teams were duly awarded.





Design Competition Held Under "RACHNA" Program at Parul University, Vadodara

Theme: Thermally Comfortable Affordable Housing

As the affordable housing crisis is expanding in cities around the country, natural resources are dwindling in the face of climate and economic crises, the competition seeks easy-to-replicate ideas to better serve our changing world.

The housing design competition was organized under the 30th RACHNA training Program as part of a 2 -Day Awareness Workshop on 'Innovative Construction Technologies and Thermal Comfort for Affordable Housing', at Parul University, Vadodara on **9th & 10th June 2022**. 13 groups of students (each comprising 5 students) participated and submitted their design entries for the design challenge.

Design challenge:

The objective of the Design Challenge competition was to design an affordable housing project that catered to all points related to thermal comfort with the use of innovative construction technology and materials. Out of the entries submitted, top two groups (winner and runner-up team) were selected and were facilitated with mementos for their effort and application of knowledge in the designs

Best selected design:

The winning team's design submission covered all the major points provided in the design problem to achieve a thermally comfortable house. Their design incorporated passive design strategies like mutual shading of buildings, shading through trees, proper shading of windows, constant natural ventilation through cross-ventilation in individual dwelling units, thermally efficient AAC blocks as envelope construction material, Low Window-to-Wall ratio (<30%) to reduce heat gain through glass, ENS compliant Window-to-Floor ratio for natural ventilation, and polystyrene insulated roof of 0.48 w/m2.K u-value that reduces heat gain through roof. Further, some of the snapshots of the winning team's design submission are presented below:





Design Competition Held Under "RACHNA" Program at KIIT School of Architecture & Planning, KIIT University, Bhubaneswar

Theme: Thermally Comfortable Affordable Housing for LIG

Two day Awareness event under "RACHNA" programme was conducted at **KIIT School of Architecture & Planning, Bhubaneswar** dated **13**th **& 14**th **July 2022** for the Architectural Students and Faculties. During the second day of the RACHNA Awareness Program for the architectural students, the participants were given an architectural design challenge based on the learnings of the RACHNA Workshop.

Design challenge:

The students were given the task of designing an affordable housing design project for the design challenge. The Design Brief included an affordable housing scheme site, in Bhubaneswar for the LIG Category with ENS (Eco Niwas Samhita) compliance to be met. The groups were split up, and the design challenge required them to create a housing development for LIG. Each team submitted their work to a jury that consisted of senior professors from the department, and following a thorough review, the winners were announced.

Best selected design:

Anuradha Rout, Bidisha Chanda, Prateek Swain, Akhtar Khan, and Shreya Nath were part of the squad that received the First Prize:







Design Competition Held Under "RACHNA" Program at Department of Architecture & Planning, BIT Mesra, Ranchi

Theme: Thermally Comfortable Affordable Housing

Two-day Awareness event under "RACHNA" programme was conducted at **Department of Architecture & Planning, BIT Mesra, Ranchi** on **21**st **& 22**nd **July 2022** for the Architectural Students and Faculties. The students were divided into groups and had to design a housing complex for LIG (Low Income Group). A jury consisting of senior professors from the department was formed to whom, each team presented their work, and after a thorough evaluation, the winners were announced..

Design challenge:

The challenge was to design a low-cost mass housing project on a 2640 square meter plot in Ranchi that complies with the ENS (Eco Niwas Samhita) standard, having a maximum FAR of 3.0. The overall design challenge was developed in order to provide the participants with learnings such as describing passive design approaches for both building and site levels, including use of local sustainable materials and building methods that may be employed to create an envelope in detail, and listing of potential improvements to the thermal comfort of the building as well as some methods for reducing power consumption.

Best selected design:

The winning team consisted of Aditya Aryan, Urvi Priyadarshini, Shivanshi Mallick and Riddhi Sharma. And they also had the opportunity to undertake a two-week internship at the Light House Project -Ranchi, where they learned the entire architectural design and best practices while on the real project site.





Design Competition Held Under "RACHNA" Programs at SAPD, DIT University, Dehradun

Theme: Thermally Comfortable Affordable Housing

The housing design competition was organized under the RACHNA (Resilient, Affordable, Comfortable Housing through National Action) initiative at School of Architecture, Planning & Design, DIT University, Dehradun, Uttarakhand on 1st and 2nd August 2022. More than 40 students in 08 groups participated in the design challenge competition.

Participants were encouraged to rethink spatial organization and incorporate unique aesthetics, new technologies, solar passive techniques, natural ventilation, innovative and thermally suitable materials.

Design challenge:

Design a thermally comfortable affordable housing for economically weaker sections of society. Proposals should be able to demonstrate how the multiple attributes pertaining to the thermal comfort are considered in their holistic response and how innovative approaches, as well as product and process innovations, are deployed.

Best selected design:

A group of four students designed thermally comfortable EWS housing by using AAC, as envelope material to reduce heat transmission. The winning group incorporated most of the techniques of passive solar design and heat transfer control to the project to make it more energy efficient than similar conventional housing projects. The winning group members are -Jasmine Kaur, Ayushi, Amreen Ali, Vivek Kamboj.





Design Competition Held Under "RACHNA" Program at The School of Planning and Architecture, Vijayawada

Theme: Thermal Comfort in Affordable Housing

Two days Awareness event under "RACHNA" program was conducted at The School of Planning and Architecture, Vijayawada, on 2nd & 3rd August 2022 for the Architectural Students and Faculty.

A Design Challenge Exercise was organized as part of the Awareness event were students were encouraged to apply the learnings from the 2 day workshop into a design challenge by incorporating passive designs strategies like orientation of block, massing of blocks, openings with respect to direction, Vegetation etc. Around 100+ students participated in this design challenge in different teams. They were six teams that presented the design challenge for the competition.

Design challenge:

- a) The proposal should contain a minimum of 40 Houses with sustainable, cost and time-effective emerging alternate housing construction technologies suitable to the climatic conditions of the area.
- b) The proposal should include on-site infrastructure development such as internal roads, pathways, a common green area, a boundary wall, an underground water tank and external electrification. The use of renewable energy is encouraged.
- c) The dwelling units should be designed keeping in view the requirements laid down in the National Building Code (NBC) 2016 with good aesthetics, adequate daylighting, natural ventilation and storage space, etc.

Best selected design:

The CSB Cell team, along with the faculty judged the entries based on the criteria like site selection and Justification, Concept & Planning, Ergonomics, Affordability, Sustainable & Energy Efficient Design, and Thermal Comfort in Dwelling Units. The best entry is showcased below:





Design Competition Held Under "RACHNA" Program at Goa College of Architecture, Panji, Goa

Theme: Thermally Comfortable Affordable Housing

Two days Awareness event under "RACHNA" programme was conducted at Goa College of Architecture, Panji, Goa, dated **12th & 13th August 2022** for the Architectural Students and Faculty.

A Design Challenge Exercise was organized as part of the Awareness event. Under this session, students were explained the requirements of the project and passive designs strategies like orientation of block, massing of blocks, openings with respect to direction, Vegetation etc. The students were divided in **4 groups with 5 students each** to carry out this exercise.

Design challenge:

The design challenge was for 4th Year students of architecture, in their housing studio. The students were encouraged to propose a redesign in old Goa, for that, students picked up one housing category and designed as per climate responsive architecture, keeping in mind the terrain, orientation, Built form etc.

Best selected design:

The CSB Cell team, along with the Faculties of GCA, discussed all the designs with the students. Based on the discussions, the best design catering to daylight, ventilation, shading and usage of material to achieve thermal comfort was selected.

Placed below is the sketch received from student -

Some salient features of the best entry are as follows:

- a) Proper utilization of the spaces
- b) Conceptual planning of building blocks for mutual shading
- c) Massing of build blocks
- d) Terrain utilisation to have minimum cut & fill
- e) Use of material with reference to vernacular architecture
- f) Using of slopping roof, keeping in mind the rainfall condition.

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5.2 Way Forward

The RACHNA events were successful in establishing the context for discussions around thermal comfort in affordable housing, new and innovative construction technologies and building materials, codes and standards in India for energy efficiency, sustainable building practices, metrices to measure and assess building performance and benchmarking across a wide range of audience associated with the building construction sector. The drive to learn that was started with the Light House Projects has picked up pace with the RACHNA initiative by MoHUA, BMTPC & GIZ along with various institutes and state partners. It is important to take the learnings from these events and progress further.

With a national reach and covering major urban centres of the country in a short period of 5 months, RACHNA has been recognised by the participants who attended, and by the local and national media. However, these events have only just begun the wave of change and the momentum needs to pick up with rigorous awareness, outreach and training programs across the country in the coming months.

Development of visual modules

There is a need to have simpler to understand, graphically represented content and knowledge material relating to thermal comfort, sustainable construction and climate resilience. This can truly bring a change in market dynamics and provide a push to the industry for R&D and manufacturing of new and improved systems for construction.

Development of modules in local languages

To increase the outreach, create understanding and demand from the users of the affordable housing sector, modules need to be developed in local languages to disseminate knowledge through videos, fliers, booklets etc. This need can be complimented

Need for trained professionals

It is also important for the states to recognise the need for trained professionals who can support in understanding, implementing, adopting existing and upcoming codes on energy efficiency and thermal comfort. Large scale change and implementation can only happen once these codes are brought into the legal purview of state byelaws. Future trainings can provide handholding in this context, focusing on tools for compliance checks and monitoring.

Inclusion in academic curriculum

The RACHNA initiative was well received by the academia and students from the field of architecture, engineering and building sciences. It is important that this knowledge is formalised and the content on thermal comfort, new technologies and related materials is developed as a part of academic courses in technical universities and institutes.

GIZ's Climate Smart Buildings program is working with national & international institutes to develop learning modules in various formats through web courses and gaming modules to supplement this knowledge dissemination initiative. The GHTC platform will become a large online source of information and learning material in the time to come. The RACHNA compendium will act as a source of inspiration and information for future events. It will act as a Light House training initiative to guide India to a transformed future. As this document captures the challenges faced and the feedback from participants, it will help develop training content and deliver it in a more focused way for larger outreach and impact.



Annexure I: Institute partners

The focus of these trainings is widespread dissemination of knowledge on thermal comfort and its necessity in the affordable housing sector. Apart from professionals, students who are currently studying architecture, engineering or other related building science courses are targeted. These training ensure wide outreach and awareness among the young professionals of the future. The following institutes across India supported the RACHNA outreach program through workshops and design competitions for students.





Annexure II: Expert Trainers

The RACHNA Trainings would not have been successful without the involvement of professionals and academicians who are the subject matter experts and have shared the immense knowledge and experience gained by them in this field. All expert trainers are engaged with renowned institutes and have a broad range of professional education & background. They bring in knowledge and experience gained over many years of working in a variety of fields relating to building construction and technology such as HVAC, building sciences, architecture, green buildings, real estate, infrastructure etc. Their details are shared below:

Late Mr. Syed Fazlullah Khan General Manager, M/s Pithavadian and Partners NA

Mrs. K. Hamsalatha Coordinator, M/s Pithavadian and Partners pnp_bng@paparchitect.com

Mrs. Rathnashree Prakash General Manager, LEAD Consultancy and Engineering Services rathnashree@lcsind.org

Mr. Dinesh Kumar Managing Director, M/s Inspire Engineering Consultants dineshmech016@gmail.com

Ms. Girija Rajarathinam Architect, LEAD Consultancy and Engineering Services girija@lcsind.org

Ms. Chinta Shree Sowmya Managing Director, M/s. Environ Architects environ architects@gmail.com

Ms. Neha V Vyas Founder, Enverte Consultancy ar.nehavyas@gmail.com

Mr. Crosby Paul Energy Engineer, L&T Construction crosbyingod@gmail.com

Mr. Kaushal Lodaya Director, Sustainable Services Private Limited kaushal.lodaya@sustainableservices.in

Mr. Rambabu Raghuvanshi Technical Director, SABS INDIA SALES CORPORATION Indoreram.raghuwanshi1989@ gmail.com

Mr. Rana Pratap Poddar Consultant, Agnikrida ranapratap.poddar@gmail.com

Mr. Jitendra Vyas Structural & Sustainability Consultant, Techcare Indorejitendrakvyas@gmail.com



Mr. Yatin Choudhary Fellow, Sustainable Habitat Division, TERI yatin.choudhary@teri.res.in

Ms. Amardeep Kaur Sr. Engineer - Sustainability, Arch-Tech Consultants amardeepkgandhi@gmail.com

Mr. Kashinath Kinge Project Head, KPR Projectcon Pvt. Ltd kinge0722@gmail.com

Dr. Aniruddha Subarao Pawar Professor,Goa college of Architecture aniruddha.s.pawar@gmail.com

Mr. Vitrang Sompu Project Manager, Magicrete Building Solutions vitrang.sompura@magicrete.in

Mr. Siddharth Sharma President - Precast Division, Magicrete Building Solutions siddharth.sharma@magicrete.in

Mr. Vitrang Sompu Project Manager , Magicrete Building Solutions vitrang.sompura@magicrete.in

Mr. Ashish Sharma Deputy Manager-Production , Magicrete Building Solutions ashish.kumar@sgcmagicrete.in

Mr. Saibal Saha Founding Director, En-Simulated Solutions LLP saibalsaha2@gmail.com

Ms. Ragini Goswami Proprietor, ECOSPACE-Green Design Consultancy ecospace.gdc@gmail.com

Dr. Avijit Ghosh Principal Technical Officer-R &D,Central Glass and Ceramic Research Institute (CSIR) avijitenergy@gmail.com

Mr. Kumar Biplab VP- Engineering, Livolt LLCkumarbiplab1@gmail.com

Mr. Gaurav Shorey Director & Co-Founder, PSI Energy Pvt. Limited & 5waraj (NGO) gaurava@5waraj.in

Mr. Abu Talha Farooqi Assistant Professor , Jindal School of Art & Architecture OP Jindal Global Universitytalha.mf@gmail.com



Mr. Munish Nassa Consultant, BMTPC mknassa@gmail.com

Mr. Shobhit Kumar Consultant Engineer, GEED Simulations Pvt. Ltd. shobhit@geedsim.com

Mr. Girish Kuttan Project Manager, JAM Sustainable LLP pm.lucknow@jamsustainablehousing.com

Mr Saif Uddin Building Policy Expert, GEED Simulations Pvt. Ltd. saif@geedindia.org

Mr. Dinesh Patel Engineer - Third Party Quality Control, CUBE - IIT Madras pateldineshkumar04@gmail.com

Mr. Jaydip Patel Site Engineer, BMTPC jjpatel2081994@gmail.com

Mr. Dipen Thakkar Senior Engineer, Katira Construction Ltd dipen@katiraconstruction.com

Mr. Ankit Suvagiya Municipal Engineer, Rajkot Municipal Corporation ankitpatel.rmc@gmail.com

Dr. Rajan Rawal Senior Advisor, CEPT-CRDF rajanrawal@cept.ac.in

Dr. Yash Shukla Principal Researcher, CEPT-CRDF yash.shukla@cept.ac.in

Ms. Smita Chandiwala Founder, Energe-se smita@energese.in

Dr. Anand Achari Principal, Vivekanand Education Society's College of Architecture anandachari@gmail.com

Ms. Bhavya Pathak Research Associate, CEPT-CRDF bhavya.pathak@cept.ac.in



Knowledge Partners

Climate Smart Buildings Cell – Chennai Supported by LEED Consultancy, Bangalore

Climate Smart Buildings Cell – Lucknow Supported by GEED Simulations Pvt. Ltd, New Delhi

Climate Smart Buildings Cell – Indore Supported by TERI

Climate Smart Buildings Cell – Rajkot Supported by PwC

Climate Smart Buildings Cell – Ranchi Supported by PwC

Climate Smart Buildings Cell – Agartala Supported by PwC

CEPT Research and Development Foundation (CRDF) CEPT University, Ahmedabad

GEED Simulations Pvt. Ltd. Jamia Nagar, New Delhi

Administrative Staff College of India (ASCI) Banjara Hills, Hyderabad



RESILIENT, AFFORDABLE AND COMFORTABLE HOUSING THROUGH NATIONAL ACTION



The Joint Secretary & Mission Director (Housing for All) Ministry of Housing & Urban Affairs Government of India Room No.116, G-Wing, Nirman Bhawan, New Delhi Tel: 011-2306 1419; Fax: 011-2306 1420 E-mail: jshfa-mhua@gov.in



The Cluster Coordinator, Indo German Energy Program Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH B-5/5, Safdarjung Enclave, New Delhi 110029, India