

# Mainstreaming Sustainable Social Housing in India

## Findings and insights from the MaS-SHIP project

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10<sup>th</sup> GRIHA Summit, New Delhi, 11 December 2018

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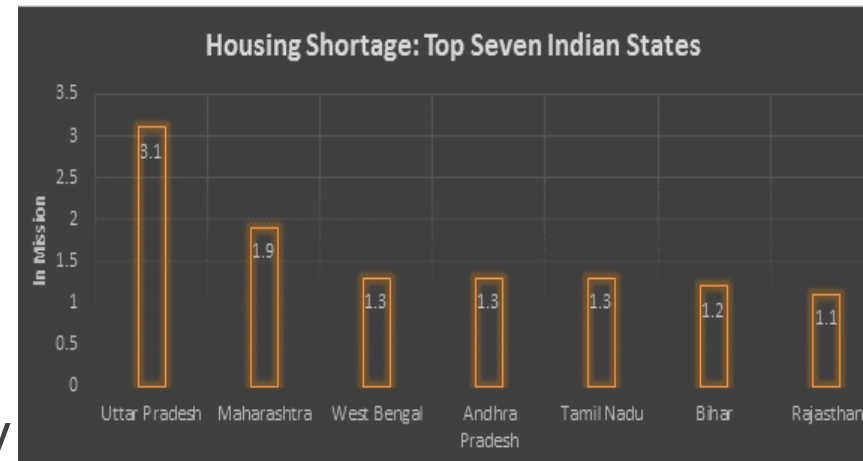
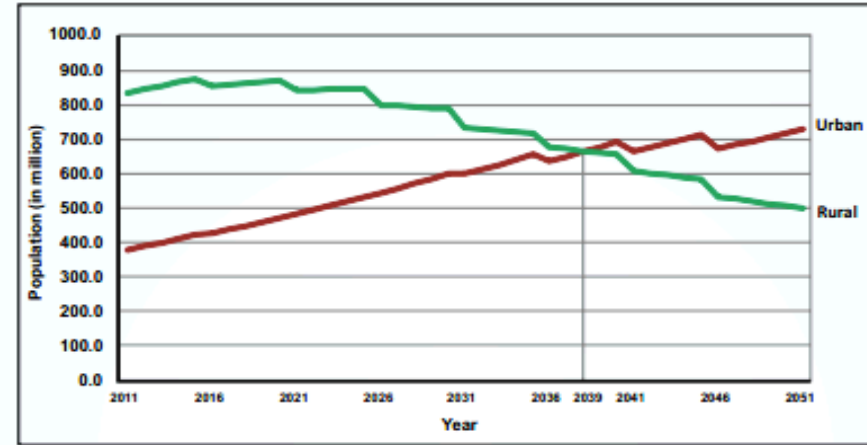
# Mainstreaming Sustainable Social Housing in India

## MaS-SHIP project team

Professor Rajat Gupta (project lead), Sanjay Seth, Zeenat Niazi, Jesús S Villanueva, Sanjoli Tuteja, Megha Behal, Pratibha Caleb, Ayushman Banerjee, Kiran Ghosh, Aravind Harikumar, Ankita Bokhad, Pankaj Khanna and Apurva Singh

# Why focus on social housing in India?

Projected urban and rural population of India: 2011-2051



- Housing sector in India contributes to **24% of the total CO<sub>2</sub>** emissions
- Estimated housing shortage by end of 2017 is **10 million**
- **95%** of this shortage is faced by **Economically Weaker Sections (EWS)** and **Lower Income Group (LIG)**
  - Initiatives such as *Housing for All by 2022*
- Opportunity to provide a method for **identifying** the most **optimal** **building materials and technologies**.
  - Not an easy task in an inherently **data poor** environment.

# What is MAS-SHIP?

- Research project (2016-2018) developed to promote sustainability in terms of environment performance, affordability and social inclusion as an integral part of social housing.
- Funded by United Nations Environment Programme (UNEP) 10 Year Framework of Programme on Sustainable Consumption and Production (10YFP)
- Consortium partners- Oxford Brookes University (Oxford, UK), Development Alternatives (DA), The Energy and Resources Institute (TERI) and UNHABITAT

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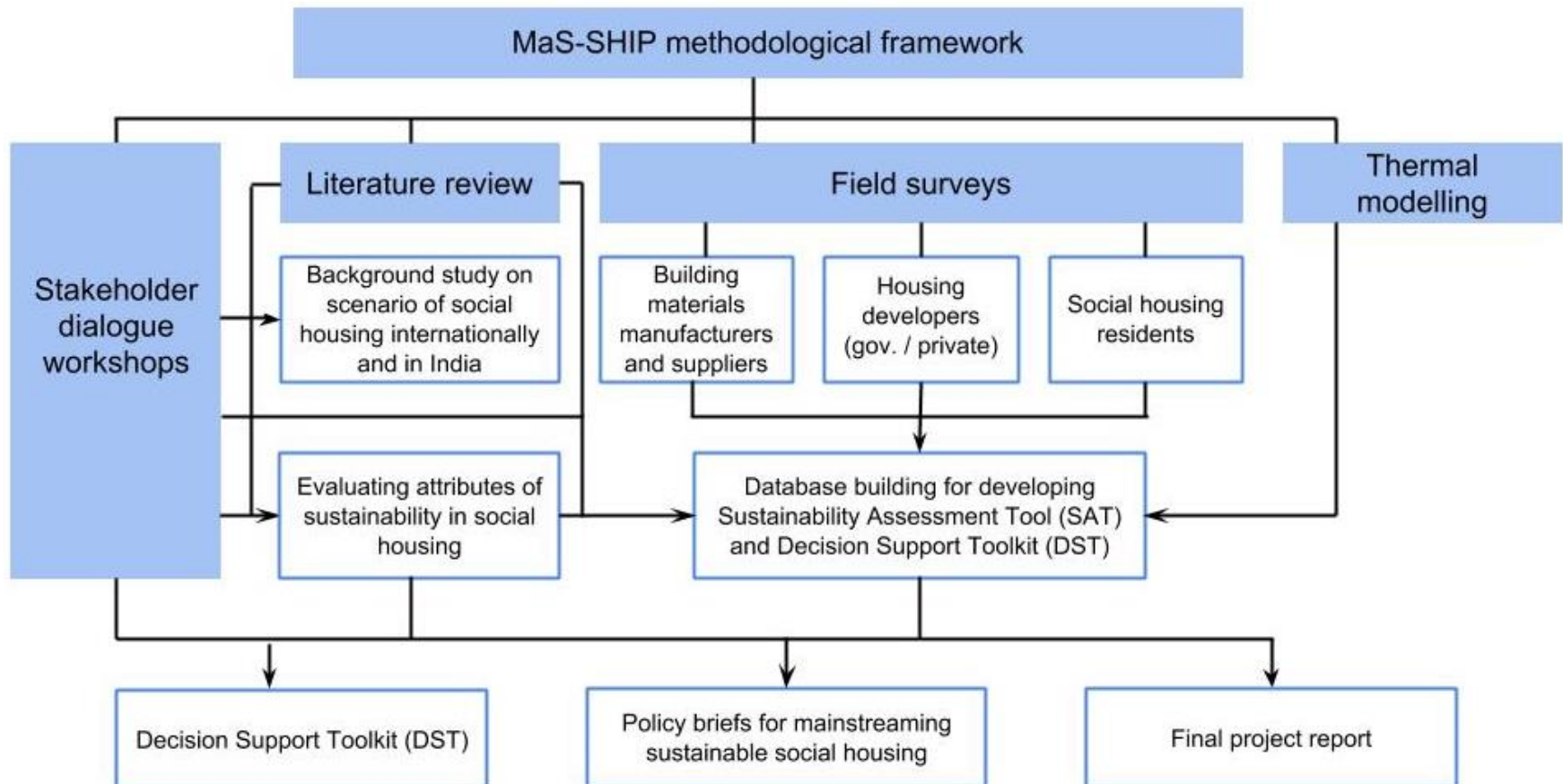


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# Aims and methods

To enhance **sustainability** in social housing through adoption of **sustainable building materials and systems**, as well as **design & management practices**.





# Project outputs

- **Background study report** on *Sustainable Social Housing in India: Definition, Challenges and Opportunities*
- **Developed a Decision Support Toolkit (DST)** to assist in better decision making for integrating sustainability in social housing
- **'Sustainability Assessment Tool (SAT)'** based on selected attributes for evaluating the performance of building materials and technologies.
- **Reports** on findings from householder survey of nearly 750 households in **five social housing developments across three climatic zones**.
- **Total 8 stakeholder events** at national and regional level
- **Final project report**
- Project website, leaflet and summary available for dissemination.



# Implementation structure



## Project team



## Technical peer reviewers

Experts willing to peer review project deliverables

## Project Advisory Board

Policy makers, industry experts and practitioners

## Stakeholders

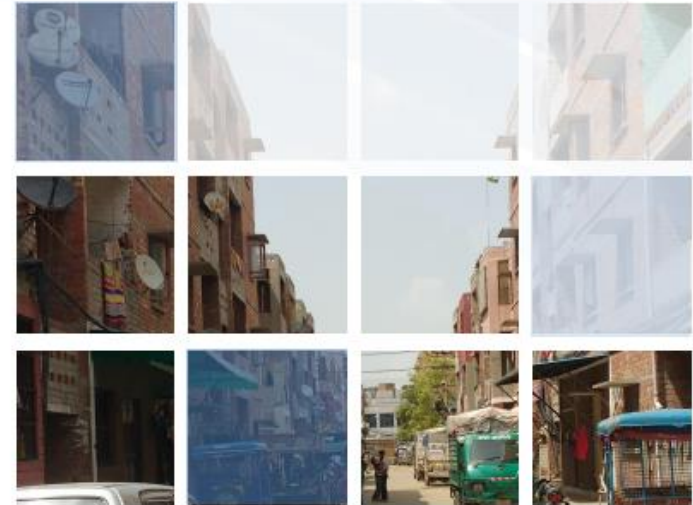
Developers, architects, policy-makers, supply chain  
Invited to stakeholder dialogue events and regional workshops

# Final report : Findings and insights from the MaS-SHIP project

- Introduction to **MaS-SHIP**.
- **Attributes for assessing sustainability** performance of building systems.
- **Characterizing sustainability performance** of selected building systems
- **Resident's experience** of building systems living in social housing developments.
- **Tools** for informing design and performance of building systems.
- **Policy implications.**

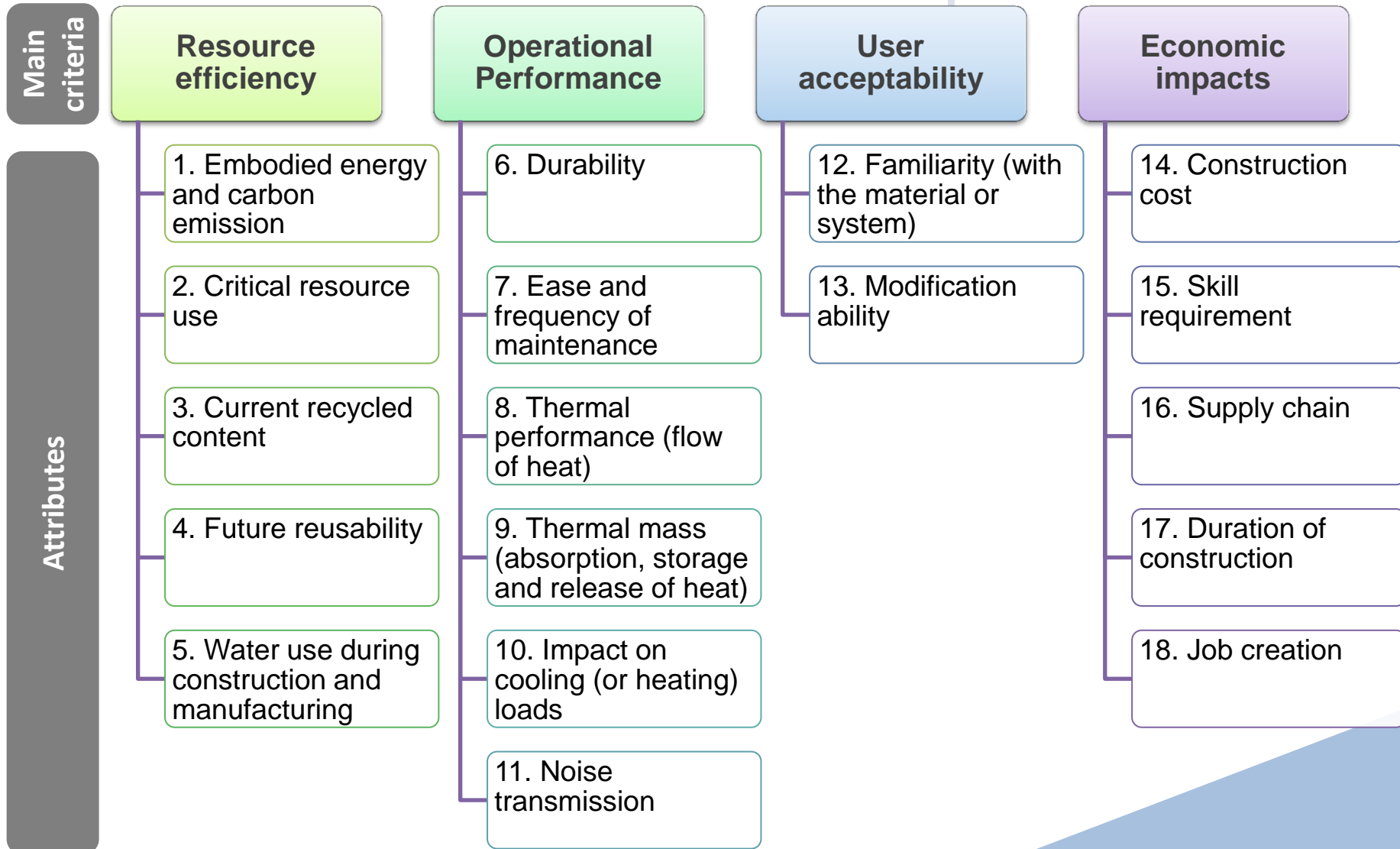
## Mainstreaming Sustainable Social Housing in India

Findings and insights from the MaS-SHIP project





# Attributes for assessing sustainability performance of building systems



# Characterising sustainability performance of selected building systems

Established and Practiced Systems		Emerging systems validated and promoted by BMTPC
Type 1: Readily available in the market	Type 2: On site production based / in-situ	Type 3: Evidence of use in demonstration project on social housing
1. Burnt clay brickwork English bond	7. Stone-crete blocks	13. Glass Fibre Reinforced Gypsum (GFRG) Panel system
2. Fly ash brick masonry	8. Stabilized Compressed Earth Blocks (SCEB)	14. Monolithic concrete building system using plastic/aluminium composite
3. Rat rap bond using burnt clay bricks	9. RCC Filler Slab roof	15. Light Gauge Steel Frame (LGSF) system
4. Solid Concrete block masonry	10. Precast RCC Plank and Joist Roof	16. Reinforced EPS Core Panel System
5. Hollow Concrete block masonry	11. Precast Ferro-cement channel roof	17. Precast large Concrete Panel System
6. Aerated Autoclave Concrete (AAC) blocks	12. Reinforced Brick Panel roof	

# Tools for informing design and performance of building systems

The assimilated data and knowledge in the project was brought together in the form of **web-based Decision Support Toolkit (DST)** which contains the following key tools and information-

- Sustainability Assessment Tool (SAT)
- Material Mapping
- Sustainable building design guidelines for social housing in India
- Building systems catalogues
- Information on residents' experience of living in social housing developments in India.
- Policy implications

# Decision Support Toolkit

# What is MaS-SHIP- Decision Support Toolkit (DST)?

Interactive web-based toolkit that brings together the various outputs of the project and provides insights on -

1. **Why** should sustainability be integrated in social housing projects? **Why** does this matter?
2. **How** should sustainability be integrated into the design of social housing across different climatic zones in India?
3. **What** sustainable building materials and technologies are appropriate for social housing projects? **What** criteria should be used to evaluate their performance?
4. **Where** are these sustainable building materials available?
5. **Who** are the residents of social housing and what are their experiences of living in such developments?



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### MaS-SHIP- Decision Support Toolkit

*Integrating sustainability in social housing in India*

WHY	HOW	WHAT	WHO
<p><i>Why should sustainability be integrated in social housing projects? Why does this matter?</i></p>	<p><i>How should sustainability be integrated into the design of social housing across different climatic zones in India?</i></p>	<p><i>What sustainable building materials and technologies are appropriate for social housing projects? What criteria should be used to evaluate their performance?</i></p>	<p><i>Who should be involved in the design and construction of social housing?</i></p>
Policy measures for mainstreaming sustainable social housing		Decision making using the sustainability assessment tool	

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**Guidelines for integrating sustainability in social housing developments in India**  
August 2018

**Composite climate zone**

The purpose of this document is to complement the guidance provided by the Government and Green Building certification bodies in India.

These guidelines are based on learnings derived from the MaS-SHIP project as well as secondary literature.

Insights are also shared from resident surveys conducted in five social housing developments in India.

Incorporating these guidelines in the design and construction of social housing developments will contribute to enhance the sustainability and quality of life of the residents.

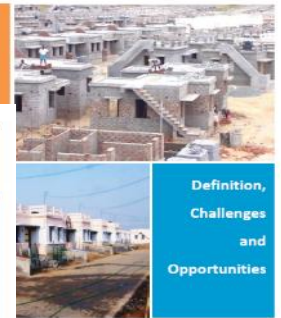
**Key principles**

- Provide convenient accessibility to basic day to day amenities and proper connectivity to places of work.
- Minimise solar exposure of the building envelope, by optimum orientation (long axis EW), built form and mutual shading of building blocks.
- Design & orient the window openings and shading devices, to avoid direct solar gain in summer, but allow for solar radiation to penetrate into the building during winters.
- Windows should allow for sufficient daylight penetration into regularly occupied areas, to avoid internal heat gains due to electrical lighting.
- Maintain quality of construction to developing of cracks, breakage in walls and material joints. Adequate water proofing and good quality plumbing design and installation is imperative to avoid discomfort and damage caused due to occurrence of dampness.
- Adequate provisions for natural ventilation along with passive cooling strategies are important to enhance thermal comfort in social housing, at a low cost.

**Prominent Indian cities within the composite climatic zone (I)**

Alahabad, Amidsar, Bhopal, Chandigarh, Dehradun, Gorakhpur, Gwalior, Hissar, Hyderabad, Indore, Jabalpur, Jaipur, Jalandhar, Lucknow, Ludhiana, Nagpur, New Delhi, Patna, Raipur, Rajkot, Ranchi, Saharanpur

#### Sustainable Social Housing in India



#### Technical Report

Gregor Herdler, Sonia Rami,  
Anshika Rathi, Gauri, Rajen Dugga,  
Megha Rathi, Matt Cragg, Sriyani Hazza

May 2017

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# Where: Material Mapping

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### MaS-SHIP- Decision Support Toolkit

*Integrating sustainability in social housing in India*



# For Whom

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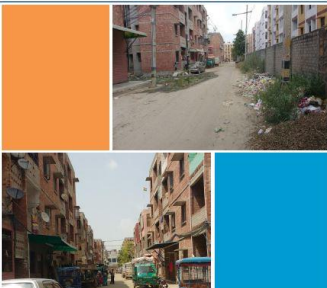
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### MaS-SHIP- Decision Support Toolkit

*Integrating sustainability in social housing in India*

Social housing  
case study –  
Summarised as  
per climatic zones

**Findings from householder survey in Bawana housing development, Delhi**



**Case study report**

Rajni Gupta, Sanjay Taneja,  
Pratibha Bhatnagar, Megha Bhatnagar,  
Jesús Salcedo

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HOW	WHAT	WHERE	FOR WHOM	
			Resident experiences Composite climate	Resident experiences Warm-humid climate
Social housing case study - Report			Resident experiences Temperate climate	House holder survey form
			Resident experiences: Delhi case study	
			Resident experiences: Jaipur case study	
			Resident experiences: Dehradun case study	
			Resident experiences: Vijayawada case study	
			Resident experiences: Bangalore case study	

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**Resident perceptions of living conditions in a social housing development located in the warm humid climate of Vijayawada**  
October 2018

The construction of 12 million social housing units under the Government of India's Housing for All by 2022 scheme, presents an opportunity to inform the design, performance and specification of these units, from the experiences of residents inhabiting such developments. As part of the MaS-SHIP project, field study was conducted in the social housing developments across three climatic zones of India. The purpose of the questionnaire survey-based study was to gather subjective feedback from residents about their perception of the overall living conditions related to indoor environmental conditions in their homes. Familiarity with the building materials, maintenance, upkeep and access to day-to-day amenities around the development. This document describes the learnings from one of the field surveys of 162 households in a social housing development (Jakkampudi colony), located in the warm-humid climate of Vijayawada (Andhra Pradesh).

#### Key findings

##### 1. Indoor environment was perceived to be just bearable

Majority of the residents perceived indoor temperature and air quality in their dwellings to be (just) bearable during summer and winter. As compared to the summer period, double the number of households found indoor temperature to be satisfactory in winter, while nearly half the number of households perceived indoor air quality to be satisfactory in winter. Although this is likely to be due to the relatively moderate conditions (Avg. temperature-max = 25 to 30°C, min = 20 to 25°C, Avg. RH = 75%) in the winter period of Vijayawada, the findings imply the inability of the building envelope to provide comfortable indoor environment (in absence of air-conditioning) in the summer season (Avg. temperature-max = 30 to 35°C, min = 25 to 30°C, Avg. RH = 80% (Figure 1).

Figure 1: Perceived indoor temperature



Figure 2: Window opening onto the staircase



##### 2. Daylighting was affected by window location though air movement inside was adequate

Windows are intended to provide adequate daylight and ventilation for maintaining a good indoor environment. However, in the case study development, windows were found to be inappropriately

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### MaS-SHIP- Decision Support Toolkit

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Policy measures for mainstreaming sustainable social housing	Decision making using the sustainability assessment tool	Institutional mechanisms for adopting DST		

Policy briefings



# Purpose of MaS-SHIP- Decision Support Toolkit (DST)

- Assist in better decision-making related to integration of sustainability in social housing projects.
- Provide design guidance and tools to enable selection of sustainable materials and technologies for social housing projects.
- Provide insights from residents' experience of living in social housing development in five different cities.

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Policy measures for mainstreaming sustainable social housing.	Decision making using the sustainability assessment tool	Institutional mechanisms for adopting DST		



# Dissemination activities

## News & events



Paper presentation at SDBE  
conference  
September 13, 2018  
London



Stakeholder Dialogue 4  
February 1, 2018  
New Delhi



MaS-Ship at the 9th GRIHA  
Summit  
December 19, 2017  
New Delhi



MaS-Ship on BBC Culture  
November 8, 2017



MaS-Ship at 2017 UN  
Conference  
November 8, 2017  
Bonn



Stakeholder Dialogue 3  
November 6, 2017  
New Delhi



Regional Workshop 1  
August 21, 2017  
Mumbai



Stakeholder Dialogue 2  
May 4, 2017  
New Delhi



Stakeholder Dialogue 1  
February 1, 2017  
New Delhi



# Project website

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BACKGROUND

WORKSTREAMS

PROJECT TEAM

The project seeks to promote sustainability in terms of environmental performance, affordability and social inclusion as an integrated part of social housing in India

[www.mainstreamingsustainablehousing.org](http://www.mainstreamingsustainablehousing.org)

# Thank you.