HEALTHY AFFORDABLE HOMES FOR INDIA

White Paper

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July 2023
GLOBAL BUILDINGS PERFORMANCE NETWORK (GBPN)  
FUNDING AGENCY

- Not-for-profit organisation.
- A mission to reduce the impacts of climate change through policy reform in the buildings sector.

⇒ Project coordination
⇒ Technical & logistical support
⇒ Media and outreach

MONASH UNIVERSITY, AUSTRALIA  
INTERNATIONAL RESEARCH PARTNER

- International research-intensive university, delivering education and research excellence across the Indo-Pacific.
- Work towards addressing climate change and fostering thriving communities.

⇒ International review of best practices - with focus on Health
⇒ Expert dialogue

ASHOK B LALL ARCHITECTS (ABLA)  
IMPLEMENTATION PARTNER

- Architecture practice with focus on sustainable and energy efficient buildings
- Active in research on affordable, sustainable, and low-carbon housing for urban India

⇒ Research and development
⇒ Stakeholders engagement
⇒ Fieldwork & documentation

INDIAN INSTITUTE OF PUBLIC HEALTH – GANDHINAGAR (IIPH-G)  
CONSORTIUM PARTNER

- India’s first and largest Public Health University.
- Works to strengthen the health system in India through education, training, research, and advocacy/policy initiatives.

⇒ Project support from public health perspective
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1. CONTEXT

1.1 RAPID URBANISATION - DEMAND FOR AFFORDABLE HOUSING

Over 50% of India’s population is projected to be urban by 2050. (WUP, 2018).

- From 2018 to 2050, it is projected that India will have added **416 million** urban dweller (WUP, 2018). This puts a huge demand for affordable urban housing.

- As per estimates, the urban housing shortage was **29 million in 2018**, compared to **18.78 million** in 2012 (ICRIER, 2020; MHUPA, 2012).

- **96 to 99 percent** percent of this urban housing shortage is confined to low-income groups (EWS and LIG).
1. CONTEXT

1.1 RAPID URBANISATION – DEMAND FOR AFFORDABLE HOUSING

Under the PMAY(U) mission

**12 million houses**

have been sanctioned, with half of them yet to be constructed.

- Hitherto, the focus has been on an arithmetic pursuit of rapidly delivering **quantities** of dwelling units.

- The **qualitative** attributes such as climate appropriateness for comfort, health and wellbeing, and environmental impact remain neglected.

- Houses built under the Mission will last at least **50-60 years**, and thus have a potential to **impact resource usage** and **wellbeing of inhabitants** during their lifespan.
1. CONTEXT

1.2 CLIMATE CHANGE – ADAPTATION AND REDUCING EMISSIONS

Over 75% of Indian districts are hotspots of extreme climate events (CEEW, 2020).

- Research shows that the country’s average temperature is expected to rise by 4.4 degree Celsius by the end of the year 2100 (MoES, 2020).

- IPCC recognises that the poor populations of the Global South, due to their paucity of resource, will be the most affected by the stress and disruption caused by climate change.

- Designers and builders often do not adapt passive design strategies for climate comfort, leading to greater discomfort.
1. CONTEXT

1.2 CLIMATE CHANGE – ADAPTATION AND REDUCING EMISSIONS

- The **rise in temperatures** is coupled with the increase in the duration and intensity of **heat waves** over large parts of the country.

- This gets accentuated further in urban areas, compounded by the **Urban Heat Island (UHI) effect**, with temperatures rising up to 50 deg. C.

- Besides the potential **health hazards**, this also increases the **demand more energy** (e.g. fans and air-conditioners), that would add to GHG emissions.

- In the case of Affordable Housing in India, the short term demand for energy is limited, but a **latent demand for energy** can be expected as disposable incomes increase within low-income groups, making **passive design** and **energy-efficient strategies** important.

Heat Index of different states in India. (Source: Debnath et al, 2023)
1. CONTEXT

1.3 HEALTH AND WELLBEING – WITH FOCUS ON A GENDER PERSPECTIVE

- The palpable effects of climate change – heat waves, drought, storms and floods – affect most the health and wellbeing of those who are poor.

- India is estimated to have around 42 million home-based workers, most of them women. For them, heat waves have dealt a cruel double blow, affecting both their health and productivity.

- Moreover, the trend in affordable housing is towards high-rise and high-density. For small homes (30 - 50 sq m) with large household sizes, high-densities tend to create social and psychological stresses, felt mostly by women and young girls.

- High-rise and high-density create a feeling of loss of privacy and threat to safety among women, and a sense of alienation and confinement for elderly and children.

(Source: www.fullerproject.org)
2. THE WHITE PAPER

2.1 FRAMEWORK

![Diagram showing the intersections of Climate Change Adaptation and Reducing Emissions, Affordable Housing for Lower-Income Groups, and Health and Wellbeing with Focus on a Gender Perspective.]

**Source:** Debnath et al, 2023
2. THE WHITE PAPER

2.2 SCOPE

A holistic definition of ‘Health and Wellbeing’ appropriate for affordable housing.

01 Considerations for physical, social and psychological health of low-income communities.

02 Setting health and climate resilience related standards for design of affordable homes and neighborhoods.

03 Taking into account the felt needs of women, the elderly and the sick, and children, along with their need for secure social interaction.

04 Recommendations for upgrading codes and regulations, along with necessary institutional and regulatory frameworks.
2. THE WHITE PAPER

2.3 OPPORTUNITIES – COMPLEMENTARY NATIONAL INITIATIVES


Bureau of Energy Efficiency (BEE) - Design Guidelines for Energy Efficiency Multi-Storey Residential Buildings, Eco Niwas Samhita (ENS)

National Disaster Management Authority (NDMA) – Heat Action Plans (HAPs)
2. THE WHITE PAPER

2.3 OPPORTUNITIES - COMPLEMENTARY NATIONAL INITIATIVES

- United Nations (UN) – Sustainable Development Goals (SDGs)
- India’s Nationally Determined Contribution (NDC) Commitments
- Affordable Housing finance – at concessional interest rate for 'green' outcomes
2. THE WHITE PAPER

2.2 METHODOLOGY

DEFINING HEALTHY AFFORDABLE HOME
- Desk Research
- Expert Engagement
  - Understand the healthy building scenario for residential buildings in India

IDENTIFYING OPPORTUNITIES
- Desk Research
- Stakeholder Consultation
  - Identify opportunities in policy, codes, regulations, and green building rating systems – for encouraging healthy Affordable Housing

PILOT STUDY – A LIVING LAB
- Design Charrette
- Occupants’ Survey
- Building Performance Analysis
  - 4 Affordable Housing projects in Gujarat
  - On-site measurements and focus group discussions
  - A live project incorporating the ‘Healthy Affordable Homes’ strategies

RECOMMENDATIONS
- White Paper
  - Recommendations for
    - National Building Codes (NBC)
    - Model Building Bye-Laws (MBBL)
    - Gujarat Development Control Regulations (GDCR)
    - Green building rating systems
3. HEALTHY HOMES

3.1 DEFINING HEALTHY AFFORDABLE HOMES – LITERATURE

- **Healthy Building definition** is of many kinds: WHO, UNEP ...

- Much of the concerns for ‘healthy buildings’ in literature are for *artificially controlled indoor environments in the developed world*: sick building syndrome, indoor air quality, communicable infectious diseases, active cooling anticipating temperature rise and heat waves.

- **No theoretical framework to define ‘healthy buildings’ for the developing countries** like India - where majority of buildings, especially residential buildings for lower income groups, are not closed and artificially conditioned.

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**WHO**

“…supports a state of complete physical, mental and social well-being”.

**UN HABITAT**

“Provides protection from the elements, adequate living space, culturally acceptable living arrangements…”

**LEED**

“By intentionally deploying green building strategies …promote health and well-being ..”
3. HEALTHY HOMES

3.1 DEFINING HEALTHY AFFORDABLE HOMES - PROPOSAL

A holistic definition of ‘Health and Wellbeing’

PHYSICAL HEALTH

PSYCHOLOGICAL HEALTH

SOCIAL HEALTH

RESILIENCE AGAINST CLIMATE CHANGE

(Image Source: Helen Farley, Kelley Johnson, Eva Leung, and Jackson Lindsay)
3. HEALTHY HOMES

3.1 DEFINING HEALTHY AFFORDABLE HOMES - INDICATORS

<table>
<thead>
<tr>
<th>PHYSICAL HEALTH</th>
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<tbody>
<tr>
<td>○ Thermal Comfort</td>
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<tr>
<td>○ Visual Comfort</td>
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<tr>
<td>○ Protection from Diseases</td>
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<td>- Vector diseases</td>
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<td>- Allergies and respiratory reactions</td>
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<td>- Air pollution</td>
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<td>- Noise pollution</td>
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<th>SOCIAL HEALTH</th>
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<tr>
<td>○ Social interaction</td>
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<td>○ Gender equity</td>
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<td>○ Adequate space - Limits to crowding and densities</td>
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<th>PSYCHOLOGICAL HEALTH</th>
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<td>○ Limits to overcrowding, privacy, safety</td>
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<td>○ Access to nature</td>
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<td>○ Aesthetics, choice, and flexibility</td>
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<tr>
<th>RESILIENCE AGAINST CLIMATE CHANGE &amp; PANDEMICS</th>
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<td>○ Measures to be incorporated in design for protection against extreme events and contagious pandemics</td>
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<td>○ Protection of habitable space and essential services from disasters</td>
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<td>○ Provision of facilities for disasters preparedness</td>
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Applicable to the individual home, the building, the residential community, and the neighbourhood.
3. HEALTHY HOMES

3.2 PHYSICAL HEALTH

Healthy Building and its neighborhood will –

Optimise the integration of climate-responsive passive design strategies and low-energy devices to maximise the duration of indoor thermal comfort.

Enable good ventilation in habitable indoor gathering and meeting spaces, and avoid causes of dampness in indoor spaces and provide means of flushing out or removal of humidity.

Ensure drainage of all exterior surfaces to avoid waterlogging. Pools and ponds will have larvae eating fish. Indoor spaces will be protected from mosquitoes with netting.

Optimise availability of diffused daylight during warm/hot periods in all habitable spaces, and also enable its modulation with external shading systems.

Require residential neighborhoods to be segregated from heavy traffic arteries and will minimise the intrusion of air polluting motor vehicles and their movement within the residential zones.

Require residential zones to be protected from loud noise of traffic or other sources of loud noise.

(Image Source: Helen Farley, Kelley Johnson, Eva Leung, and Jackson Lindsay)
3. HEALTHY HOMES

3.3 SOCIAL HEALTH

Healthy Building and its neighborhood will –

Promote social health by designing outdoor and common shared spaces for social interaction, group activities and recreation.

Provide space for recreation of children and youth, and sheltered spaces for group activities.

Provide convenient access to community health and resilience centres equipped for protection and care for the most vulnerable residents during pandemics and heat waves.

Meet the special concerns and needs of women residents with respect to hygiene, facilities for health care and workspaces for income generation.

Engage women as equal stakeholders in the operation, management and maintenance of the shared community assets.

Meet minimum standards for space per person in homes, in the common spaces within buildings and as ‘habitable’ outdoors and terraces.

(Image Source: Helen Fairley, Kelley Johnson, Eva Leung, and Jackson Lindsay)
3. HEALTHY HOMES

3.4 PSYCHOLOGICAL HEALTH

Healthy Building and its neighborhood will –

Observe limits to occupant density to avoid overcrowding and offer occupants the means of balancing their needs for community and for privacy according to their preferences.

Integrate positive open green and will provide places, terraces and balconies for growing and tending plants by residents.

Provide useful flexibility in the design of structural systems and planning of internal spaces of the residential units.

(Image Source: Helen Farley, Kelley Johnson, Eva Leung, and Jackson Lindsay)
3. HEALTHY HOMES

3.5 RESILIENCE AGAINST CLIMATE CHANGE & PANDEMICS

Healthy Building and its neighborhood will –

- Have **additional measures in design and provision of additional facilities** at the neighborhood level, as a measure for **resilience** during periods of extreme events and contagious epidemics.

- Ensure **protection of habitable spaces and essential services** against flooding and contamination of drinking water during extreme rainfall events.

- Provide a **reserve store of drinking water** to meet essential needs during periods of drought.

(Image Source: Helen Farley, Kelley Johnson, Eva Leung, and Jackson Lindsay)
DETERMINANTS OF HEALTH

INDICATORS

ACTIONS FOR HEALTHY BUILDINGS AND NEIGHBOURHOODS

INSTITUTIONS

PHYSICAL HEALTH

THERMAL COMFORT

Visual comfort

Protection from diseases (and pollutants)

SOCIAL HEALTH

Social interaction

Gender equity, provisions for vulnerable populations

Adequate space - limits to crowding and densities

Limits to overcrowding, privacy, safety

Access to nature

Psychological health

Aesthetics, choice, and flexibility

Protection against extreme events and pandemics

Resilience against climate change and pandemic

Protection of habitable space & essential services from disasters

 Provision of facilities for disasters preparedness

Promote social health by designing outdoor and common shared spaces for social interaction, group activities and recreation.

Provide space for recreation of children and youth, and sheltered spaces for group activities.

Access to community health and resilience centres equipped for protection and care for the most vulnerable residents during pandemics and heat waves.

Meet the special concerns and needs of women residents with respect to hygiene, facilities for health care and workspaces for income generation.

Engage women as equal stakeholders in the operation, management and maintenance of the shared community assets.

Meet minimum standards for space per person in homes, in the common spaces within buildings and as 'habitable' outdoors and terraces.

Observe limits to occupant density to avoid overcrowding, offer occupants the means of balancing their needs for community and for privacy.

Integrate positive open green and provide places, terraces and balconies for growing and tending plants by residents.

Provide useful flexibility in the design of structural systems and planning of internal spaces of the residential units.

Additional measures in design and additional facilities at the neighborhood level for resilience during periods of extreme events and contagious epidemics.

Ensure protection of habitable spaces and essential services against flooding and contamination of drinking water during extreme rainfall events.

Provide a reserve store of drinking water to meet essential needs during periods of drought.

Optimise the integration of climate-responsive passive design strategies and low-energy devices.

Optimise availability of diffused daylight, enable its modulation with external shading systems.

Ensure drainage of all exterior surfaces to avoid waterlogging. Indoor spaces will be protected from mosquitoes with netting.

Enable good ventilation in habitable spaces, avoid causes of dampness in indoor spaces and provide means of flushing out or removal of humidity.

To be segregated from heavy traffic arteries, minimise the intrusion of air polluting vehicles within the residential zones.

Protected from loud noise of traffic or other sources of loud noise.

NATIONAL POLICIES, CODES, AND PROGRAMMES

STATE AND ULB LEVEL REGULATIONS

GREEN BUILDING RATING SYSTEMS

HEALTHY AFFORDABLE HOMES IN INDIA
4. RECOMMENDATIONS

4.1 HARMONISING DESIGN GUIDELINES

- Align the objectives of the National Urban Habitat and Housing Policy (NUHHP) with the National Health Policy (NHP).

- Coordinated extension of NBC and MBBL - to incorporate aspects of health and wellbeing, and resilience to climate change - instituting mandatory provisions for execution by ULBs.

- The PMAY, flagship mission for housing, expected to extend further, awaits reformulation for the coming decade.

- This paper strongly recommends that the minimum standards for PMAY (U) bring all forms of group housing under an upgraded NBC and MBBL which would dedicate a special section to affordable housing, including objectives of health and well-being, in the context of climate change.
4. RECOMMENDATIONS

4.2 INSTITUTIONAL FRAMEWORK

- **Ministry of Housing and Urban Affairs (MOHUA)**
  - Programs - PMAY, AMRUT
- **Ministry of Health and Family Welfare (MOH)**
  - NUHHP (National Urban Habitat and Housing Policy)
  - MBBL (Model Building Bye Laws)
  - NHP (National Health Policy)
- **National Health Policy (NHP)**
  - Heat Action Plans
- **National Mission for Sustainable Habitat (NMSH)**
  - INSTITUTE OF TOWN PLANNERS (ITP)
- **Urban and Regional Development Plans Formulation and Implementation (URDPEI)**
  - National Building Code (NBC)
- **Central Government**
- **State Government & ULBs**
  - Development Control Regulations (DCRs)
  - Local Building Bye Laws

**Key Initiatives**:
- **PMAY** (Pradhan Mantri Awas Yojana)
- **AMRUT** (Atal Mission for Rejuvenation and Urban Transformation)
- **PMAY-G** (Ghar Ghar Tapao)
- **NUHHP** (National Urban Habitat and Housing Policy)
- **NMSH** (National Mission for Sustainable Habitat)
- **NBC** (National Building Code)
- **URDPEI** (Urban and Regional Development Plans Formulation and Implementation)
- **ITP** (Institute of Town Planners)
- **DCRs** (Development Control Regulations)
- **Local Building Bye Laws**
4. RECOMMENDATIONS

4.3 ROADMAP

1. Enhancement of and coordination between the National Urban Habitat and Housing Policy (NUHHP) and the National Health Policy (NHP), in light of climate change mitigation and adaptation.

2. Setting guidelines for the enhancement of the National Building Code (NBC).

3. Requesting the Bureau of Indian Standards to consider the guidelines in the awaited review process of the National Building Code (NBC), particularly for sections on ‘Low-income Housing’ and ‘Approach to Sustainability’.

4. Model Building Bye Laws (MBBL) to be developed for affordable housing and coordinated with the National Building Code (NBC), in line with the NUHHP.

5. Requesting the Institute of Town Planners to enhance the Urban and Regional Development Plans Formulation and Implementation (URDPFI) Guidelines with special reference to urban affordable housing.
## 4. RECOMMENDATIONS

### 4.4 NATIONAL BUILDING CODE (2016)

**RESILIENCE AGAINST CLIMATE CHANGE & PANDEMICS**

**PHYSICAL HEALTH**

- Adherence to **Eco Niwas Samhita (ENS) Energy Conservation Building Code (ECBC) (R)** for thermal comfort – this could be made prescriptive, giving standard solutions for walling, windows, external shading and roofing, for ease of implementation
- Provision for mechanically aided **ventilation**
- Mandating **roof construction** with reflective coating and high insulation
- Provision for **roof mounted Solar PV** as a resilience measure
- Protection of homes from **mosquitoes** and vermin
- Design of on-site **drainage** for no stagnant water.
- **Minimum buffer** between land for affordable housing and major transportation arteries to **minimise pollution**
- Provision of **emergency water storage** at the community level
- Provision of **sheltered resilience centres**
4. RECOMMENDATIONS

4.4 NATIONAL BUILDING CODE (2016)

RESILIENCE AGAINST CLIMATE CHANGE & PANDEMICS

SOCIAL AND PSYCHOLOGICAL HEALTH

- Minimum standard for accessible shared space, sheltered or open, adjacent to homes as compensation for small dwelling units with high occupancy.
- Prohibit FAR incentives that contradict social and cultural appropriateness and environmental sustainability.
- Inclusion of women in post-occupancy management of community assets as changemakers for sustainable lifestyles.
- Limit to building heights to stilts plus four storeys as a fundamental requirement.
- Limit to densities of housing (DUs/hectare of land) to avoid overcrowding.
- Limit to hard paving and vehicular access, minimum standards for green and soft ground.
- Review of on-site provision of vehicular parking to maximise green open spaces.
- Review of fire tender access rules to optimise green open space.
- Recommendation for design to permit flexibility in partitioning of internal spaces.
4. RECOMMENDATIONS

4.5 MODEL BUILDING BYE-LAWS (2016)

RESILIENCE AGAINST CLIMATE CHANGE & PANDEMICS

PHYSICAL HEALTH

- Adherence to Eco Niwas Samhita (ENS) Energy Conservation Building Code (ECBC) (R) for thermal comfort – this could be made prescriptive, giving standard solutions for walling, windows, external shading and roofing, for ease of implementation
- Provision for mechanically aided ventilation
- Mandating roof construction with reflective coating and high insulation
- Provision for roof mounted Solar PV as a resilience measure
- Protection of homes from mosquitoes and vermin
- Design of on-site drainage for no stagnant water.
- Minimum buffer between land for affordable housing and major transportation arteries to minimise pollution
- Provision of emergency water storage at the community level
- Provision of sheltered resilience centres
4. RECOMMENDATIONS

4.5  MODEL BUILDING BYE-LAWS (2016)

RESILIENCE AGAINST CLIMATE CHANGE & PANDEMICS

- Minimum standard for accessible shared space, sheltered or open, adjacent to homes as compensation for small dwelling units with high occupancy
- Limit to building heights to stilts plus four storeys as a fundamental requirement
- Limit to densities of housing (DUs/hectare of land) to avoid overcrowding
- Inclusion of women in post-occupancy management of community assets as changemakers for sustainable lifestyles

- Limit to hard paving and vehicular access, minimum standards for green and soft ground
- Review of on-site provision of vehicular parking to maximise green open spaces
- Review of fire tender access rules to optimise green open space
- Recommendation for design to permit flexibility in partitioning of internal spaces

SOCIAL AND PSYCHOLOGICAL HEALTH
4. RECOMMENDATIONS

4.6 DEVELOPMENT CONTROL REGULATIONS (2017)

RESILIENCY AGAINST CLIMATE CHANGE & PANDEMICS

PHYSICAL HEALTH

- **Minimum buffer** between land for affordable housing and major transportation arteries **to minimise pollution**
- Protection from **flooding** during extreme weather events

SOCIAL AND PSYCHOLOGICAL HEALTH

- **Limit to building heights** to stilt plus four storeys as a fundamental requirement
- **Limit to densities** of housing (DUs/hectare of land) to avoid overcrowding
- **Limit to hard paving** and vehicular access, minimum standards for **green and soft ground**
- Review of on-site provision of vehicular **parking** to **maximise green open spaces**
- Review of **fire tender** access rules to optimise **green open space**
4. RECOMMENDATIONS

4.7 GREEN BUILDING RATING SYSTEMS

GREEN RATING FOR INTEGRATED HABITAT ASSESSMENT (GRIHA): INDIAN GREEN BUILDING COUNCIL (IGBC): EXCELLENCE IN DESIGN FOR GREATER EFFICIENCIES (EDGE)

RESILIENCE AGAINST CLIMATE CHANGE & PANDEMICS

PHYSICAL HEALTH

- Prescription on cross ventilation, and external shading of windows according to orientation
- Provision of habitable outdoors adjacent to dwelling units
- On-site waste management and recycling
- Provision for roof mounted Solar PV as a resilience measure
- Protection of homes from mosquitoes and vermin
- Ensuring on-site drainage for no stagnant water
- Minimum buffer between land for affordable housing and major transportation arteries to minimise pollution
- Provision of emergency water storage at the community level
- Provision of sheltered resilience centres
- Protection from flooding during extreme weather events
4. RECOMMENDATIONS

4.7 GREEN BUILDING RATING SYSTEMS

- Green Rating for Integrated Habitat Assessment (GRIHA): Indian Green Building Council (IGBC): Excellence in Design for Greater Efficiencies (EDGE)

RESILIENCE AGAINST CLIMATE CHANGE & PANDEMICS

SOCIAL AND PSYCHOLOGICAL HEALTH

- Provision of social spaces adjacent to dwelling units as secure spaces for women and girls
- Provision for on-site community facilities
- Provision for on-site, home-based income generation activities
- Limits to building heights and densities in affordable housing developments for cultural appropriateness and to avoid overcrowding
- Inclusion of women in post-occupancy management of community assets as changemakers for sustainable lifestyles.
- Design for adaptability and flexibility in the subdivision of internal spaces of dwelling units
- Distributing green areas among housing blocks for connection with Nature and for safe places for children
NEXT STEPS

FROM RECOMMENDATIONS TO TECHNICAL CLAUSES

1. Enhancement of and coordination between the **National Urban Habitat and Housing Policy (NUHHP)** and the **National Health Policy (NHP)**, in light of climate change mitigation and adaptation.

2. Setting guidelines for the enhancement of the **National Building Code (NBC)**.

3. Requesting the **Bureau of Indian Standards** to consider the guidelines in the awaited review process of the **National Building Code (NBC)**, particularly for sections on ‘Low-cost Housing’ and ‘Approach to Sustainability’.

4. **Model Building Bye Laws (MBBL)** to be developed for affordable housing and coordinated with the **National Building Code (NBC)**, in line with the NUHHP.

5. Requesting the Institute of Town Planners to enhance the **Urban and Regional Development Plans Formulation and Implementation (URDPFI)** Guidelines with special reference to urban affordable housing.
NEXT STEPS

FEEDBACK FOR IMPROVEMENT

➔ IMPROVING THE WHITE PAPER
Feedback from webinar participants is requested - to improve and expand the white paper.

➔ TESTING FEASIBILITY
Check the feasibility of the recommendations - by demonstrating and integrating in 2 projects for Affordable Housing. The learnings from the process will inform the white paper.
THANK YOU

More information:
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