



GreenScape

BANGLADESH

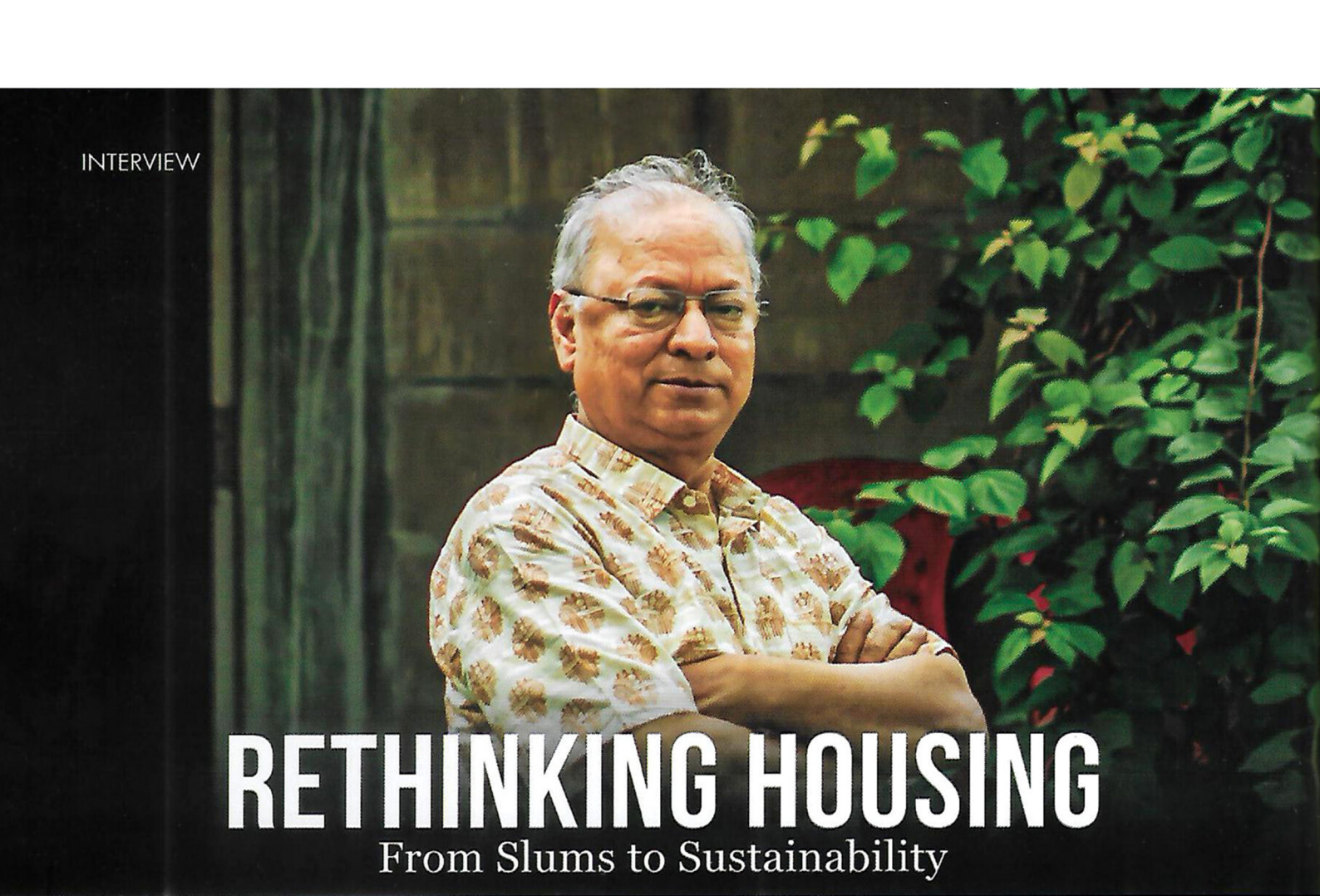
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RETHINKING HOUSING

From Slums to Sustainability

In Bangladesh, where rapid urban growth intersects with acute climate risks, the urgency for safe, affordable, and sustainable housing is greater than ever. Leading efforts to tackle these intertwined challenges is Mr. Mohammad Abu Sadeque, PEng, Executive Director of the Centre for Housing and Building Research (HBRC). A forward-thinking engineer and passionate policy advocate, Mr. Sadeque has devoted his career to transforming not just how we construct homes, but how we create resilient, environmentally responsible communities where every citizen can live with dignity. In this discussion, he provides an insightful perspective on the critical shortcomings in Bangladesh's housing sector and explains how HBRC is addressing them through pioneering innovations, advocating for better regulations, and empowering communities at the grassroots level.

How is HBRC working to ensure city building safety, especially considering the number of old buildings in Dhaka? Are we prepared for large-scale disasters like earthquakes?

HBRC's initiatives extend well beyond urban boundaries, prioritizing building safety throughout Bangladesh, including rural regions. However, ensuring building safety becomes challenging if structures are built without proper adherence to regulations. Without structurally sound construction, safe urban development remains unattainable. Unfortunately, the existing building permit system in Bangladesh has notable shortcomings, lagging behind even other South Asian countries in quality and thoroughness. Despite these obstacles, HBRC continues advocating vigorously for policy reforms, pushing the government to adopt a comprehensive and standardized

building permit process that requires submission and approval of complete structural, mechanical-electrical-plumbing (MEP), and fire safety design drawings. Additionally, HBRC recognizes a widespread lack of awareness and commitment among professionals and authorities regarding safe city planning and is actively working to bridge this knowledge and commitment gap.

Despite Bangladesh being highly vulnerable to earthquakes, this risk is seldom incorporated into city development processes. Typically, authorities approve only architectural designs during construction, while critical aspects such as structural integrity, mechanical, plumbing, and fire safety systems are frequently neglected and lack proper regulatory oversight. This creates severe vulnerabilities, particularly in older buildings, most of which do not comply with the National Building Code (BNBC). HBRC actively promotes the practice of regular building health audits, structural assessments, and retrofitting. Recently, HBRC audited a renowned pharmaceutical factory, provided comprehensive retrofitting design plans, and supervised the ongoing retrofitting work. Thus, HBRC remains committed to providing support for auditing and retrofitting both public and private buildings, irrespective of their occupancy type.

You're working with the 'Housing for All' vision. Realistically, is affordable housing still a dream, or can we see its practical implementation soon?

"Housing for All" has been a popular national slogan since Bangladesh's independence, but HBRC emphasizes the vision as "Sustainable Housing for All," highlighting sustainability as the crucial factor. If homes aren't built sustainably, this vision can't be realized effectively.

Sustainable housing can comfortably last 50 to 70 years or more, significantly reducing the risk of families becoming homeless again. With the right policies and sincere government commitment, affordable housing is realistically achievable in the near future.

The lack of adequate representation for low-income communities in policy-making teams means that their pressing concerns are often excluded from policy debates. The absence of comprehensive housing codes, particularly for rural areas, and clear policy guidelines discourages the adoption of sustainable and suitable building materials and technologies, despite the limited efforts of organizations like HBRC. With nearly 70 percent of households in the country living in substandard housing, it is crucial to address these issues through inclusive and sustainable housing initiatives to achieve the goals of SDG 7 and SDG 11. Nevertheless, housing, which is a fundamental human need after food and clothing, still lacks a dedicated national budget allocation.

Sustainable housing also demands alternative building materials and technologies. HBRC is nationally and internationally recognized and awarded for its sustainable and energy-efficient innovations. Current reliance on clay bricks makes housing vulnerable to disasters and energy-inefficient. HBRC's innovative, low-energy alternatives to traditional bricks, if adopted widely through government policies, can transform the vision into reality. HBRC remains hopeful and believes there is no reason for despair.

We often use imported materials in construction. How is HBRC promoting local innovations or indigenous materials?

At present, Bangladesh's construction sector depends significantly on imported materials like steel, cement clinker, and crushed stone. One of HBRC's key goals is to lessen this reliance by promoting locally sourced, innovative alternatives. Ferrocement stands out as a notable example; it provides an effective substitute for clay bricks and conventional reinforced concrete, while eliminating the need for imported stone. Remarkably, ferrocement components require nearly half the steel and cement typically used for comparable reinforced concrete elements. In addition, ferrocement reduces the use of imported resources such as timber, plastic, and aluminum, offering a comprehensive solution for sustainable construction.

HBRC is deeply invested in exploring local resources, including indigenous sand and riverbed soil, to develop durable, energy-efficient building materials tailored to Bangladesh's environment and economy. Through innovations such as thermal blocks, sandwich panels, ferrocement single & dual-cavity walls, and lightweight roofing systems, HBRC is advancing alternatives that are both affordable and environmentally responsible. Due to the use of lightweight infill materials, imported steel, cement, and crushed stone requirements have been reduced, thereby reducing dependency on imports.

These efforts not only cut construction costs but also create employment opportunities by supporting local industries. HBRC complements its research with extensive

knowledge-sharing activities, equipping engineers, architects, and workers with the skills to implement these materials widely. This approach is helping build a self-reliant, climate-smart construction sector that supports Bangladesh's long-term sustainable development objectives.

What initiatives has HBRC taken in energy-efficient housing, and how applicable is this to middle- and low-income groups?

HBRC has initiated several innovative projects focusing specifically on energy-efficient housing, promoting the use of sustainable, affordable, and climate-resilient building materials. Notable innovations include thermal insulation blocks, sandwich panels for walls and roofs, and lightweight ferrocement walls and roofs. These solutions significantly reduce heat transfer, lowering indoor temperatures and decreasing the need for artificial cooling, thus minimizing energy consumption and costs. Pilot projects constructed using HBRC's innovative material and technology reduced the embodied energy consumption as low as 70% compared to conventional ones.

These energy-efficient technologies are particularly beneficial for middle- and low-income groups due to their affordability, ease of construction, and reduced long-term maintenance expenses. By using locally available materials like riverbed soil and sand, HBRC ensures these innovations remain economically viable and accessible. HBRC's projects, including affordable housing schemes and disaster-resilient shelters, practically demonstrate these materials' effectiveness, affordability, and durability.

Moreover, HBRC provides comprehensive training programs for masons, technicians, and engineers to ensure widespread adoption. If supported by appropriate government policies and financial incentives, HBRC's energy-efficient housing solutions can significantly enhance living conditions for low- and middle-income families, addressing both environmental sustainability and affordability simultaneously.

Globally, there's a growing focus on climate resilience. How climate-adaptive are our housing designs in Bangladesh?

Globally, climate resilience is gaining significant attention, and Bangladesh, being particularly vulnerable to climate change, requires highly adaptive housing designs. However, traditional housing practices in the country often lack climate-resilient features. Recognizing this gap, HBRC has developed and demonstrated numerous innovative housing solutions specifically tailored to withstand Bangladesh's climate hazards, such as flooding, cyclones, salinity, and extreme heat.

HBRC's climate-adaptive designs include raised-platform or stilt houses for flood-prone and tidal surge-prone areas, lightweight ferrocement portable shelters for disaster-affected communities, and cavity-wall and sandwich-panel systems that provide insulation against extreme temperatures. These innovations significantly enhance the structural durability, thermal comfort, and disaster-resilience of homes.

these advancements, broader adoption is limited due to low awareness, inadequate policy support, and a reliance on conventional building methods. HBRC is actively advocating for developing a Rural Housing Code by integrating climate-resilient design standards and promoting wider dissemination through capacity-building initiatives. With stronger government policies, incentives, and public-private collaborations, Bangladesh can effectively mainstream climate-adaptive housing designs to mitigate risks, protecting communities against the growing threats posed by climate change.

HBRC is an interesting initiative. How can young engineers and architects benefit from this platform?

The HBRC is a unique and dynamic platform designed specifically to engage young engineers and architects by offering direct access to sustainable and innovative construction practices. Through regular training sessions, seminars, workshops, and site visits, young professionals can gain valuable exposure to alternative building technologies like ferrocement, thermal blocks, sandwich panels, and climate-resilient design strategies. The HBRC actively promotes knowledge-sharing and collaboration, providing networking opportunities with experts, industry leaders, and experienced professionals.

Furthermore, HBRC organizes practical, hands-on training programs, equipping young engineers, planners, and architects with the technical skills required to implement sustainable and energy-efficient construction methods in real-world projects. Participation in pilot projects and live demonstrations allows young professionals to gain experience and build their professional portfolios, enhancing their career prospects. Overall, the HBRC serves as a nurturing platform that bridges academic knowledge with practical expertise, preparing young engineers and architects to actively contribute toward Bangladesh's sustainable development and climate resilience goals.

The construction industry is a huge employment sector. How is HBRC contributing through skill development or training?

The construction industry is one of Bangladesh's largest employment sectors, and HBRC is playing a proactive role in developing the skills of this vital workforce. A key initiative is the nationwide Bar Binder Training Program, implemented in partnership with Bangladesh Steel Rolling Mill (BSRM). This five-year program, now in its third year, is training construction workers across the country in proper steel reinforcement binding techniques, improving workmanship and ensuring quality and safety at construction sites.

Beyond this, HBRC regularly organizes workshops, seminars, and hands-on training for a broad range of professionals, including engineers, architects, site supervisors, and masons, focused on sustainable construction materials, energy-efficient technologies, and climate-resilient design practices. These training programs ensure that both technical professionals and field-level

workers can manufacture and apply HBRC's innovative solutions, such as ferrocement construction, interlocking blocks, thermal blocks, sandwich panels, and cavity wall systems.

As a self-funded voluntary organization, HBRC manages these skill development efforts with limited resources, but remains deeply committed to further research and capacity building. The institute also has plans to expand its research and training reach further if additional funding or collaboration becomes available. Through these efforts, HBRC is helping create a skilled workforce capable of delivering safer, greener, and more sustainable construction across Bangladesh and beyond.

The growing number of concrete buildings in Dhaka is contributing to rising urban temperatures. How can we address this issue? Are there any innovations to make building more environmentally friendly?

The proliferation of concrete structures in Dhaka has intensified the urban heat island effect, driving daytime temperatures higher and increasing energy demand for cooling. To counter these trends, a combination of passive design measures, such as high-albedo roof coatings, green roofs, and vertical gardens, and optimized building orientation with deep overhangs, can significantly reduce solar heat gain. Permeable paving systems and expanded tree canopies also lower pavement temperatures and improve microclimates at street level. In parallel, deploying low-carbon and reflective concrete mixes, incorporating supplementary cementitious materials like fly ash, slag, or locally sourced rice-husk ash, helps both diminish embodied CO₂ and boost surface reflectivity.

Building on these strategies, HBRC has developed a suite of innovations tailored to Dhaka's needs. Its Thermal Block is a lightweight, air-entrained masonry unit with integrated insulation layers that cut wall-surface temperatures by up to 70 % compared to conventional clay or solid concrete blocks. The Sandwich Panel Wall and Roof system uses two thin ferrocement skins bonded to a lightweight insulating core to deliver rapid, modular construction with superior thermal resistance. Meanwhile, Ferrocement Cavity Walls and Roofs employ thin, stiffened ferrocement plates arranged to form a continuous air cavity; this not only reduces material use and embodied energy but also exploits the cavity as a thermal break, further reducing heat transfer into interiors. Together, these HBRC-designed systems accelerate construction, cut both operational and embodied energy, and improve occupant comfort without sacrificing structural performance.

To maximize impact, these innovations should be piloted in public and affordable-housing projects, integrated into the national building code with incentives for developers, and coupled with capacity-building programs for engineers and masons. By pairing green urban planning with HBRC's thermal-optimized materials, Dhaka can both cool its streets and shrink the carbon footprint of its expanding concrete skyline.