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# DEVELOPMENT ALTERNATIVES



Bridging sustainable design and nature for thriving communities with Dhun Life

Alt Urban: Leading the Shift to Future-Ready Cities



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India's urban population is expected to reach 1 billion by 2050, creating significant social, environmental, and economic challenges. In this editorial, Dr Swayamprabha Das and Mohak Gupta say that as the built environment is responsible for 38% of global carbon emissions, it highlights the need for collaboration in architecture, planning, and industry. They explain that engaging stakeholders and the government, as seen with the National Mission for Sustainable Habitats, is vital for sustainable urban development. Key areas for improvement include innovations in technology, public procurement, green building incentives, and ensuring access to green materials and skilled labour.

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India is projected to house 600 million people by 2036, contributing 70% to the national GDP. Dr Gyanesh Gupta argues that this urbanisation poses challenges such as inadequate housing and infrastructure strain. He explains that while the Bureau of Energy Efficiency has introduced codes to promote energy efficiency, but adoption is limited. He believes enforcing compliance in large housing projects could lead to 20-30% energy savings, aided by innovations like district cooling systems and smart building management.



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The views expressed in the articles in this newsletter are those of the authors and not necessarily those of Development Alternatives.

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## Notions of Sustainability in the Built Environment



Affordable housing project with precast RCC wall panels and precast roofing slab, at Kharkopar, Navi Mumbai, constructed by L&T

India stands at the cusp of exponential urbanisation, with the urban population expected to double to 1 billion people by 2050. As hubs of concentrated human activity, cities have amplified social, environmental, and economic impacts and are also more vulnerable to the intensifying poly-crisis of climate change, disaster risk, pollution, and biodiversity loss. At the same time, there is growing inequity in the access to urban services, resources, and

economic opportunities. In light of these new challenges, it becomes critical to put people and nature at the heart of urban planning and development.

The health of cities and their residents is deeply intertwined with the planning, design, and construction of the built environment. The interaction of the built and the unbuilt, of the grey with the green and blue infrastructure, is a key determinant of the quality of life in a city. Moreover, as major consumers of



energy and resources, buildings significantly impact the environment, accounting for 38% of the total carbon emissions<sup>1</sup> and almost half of the resource extraction globally<sup>2</sup>. Cities undergoing redevelopment and densification are also generating growing quantities of construction and demolition waste (C&D waste) as buildings reach their end-of-life. With strategic planning and proactive measures, Tier II, III and IV cities, which are the upcoming growth centres, can avoid the lock-in of inappropriate carbon and resource-intensive construction practices while incorporating future-looking planning strategies with an emphasis on enhancing climate resilience, decarbonisation, and circularity.

This is where architecture, planning, and industry must work together to push the boundaries for collective action. Various public and private stakeholders across the sectoral value chain have important roles to play in this transition, and platforms that can facilitate knowledge sharing and collaboration will be crucial in driving the desired policy and market shifts.

Several initiatives by the Government of India are directly or indirectly geared towards the objectives of a sustainable built environment, including the National Mission for Sustainable Habitats, the National and State Action Plans for Climate Change, Viksit Bharat, and Mission LiFE. The Energy Conservation Building Code and Eco Niwas Samhita lay out energy efficiency guidelines in commercial and residential buildings, respectively. The India Cooling Action Plan has been developed to meet the challenge of rising temperatures and energy demands. The Pradhan Mantri Awas Yojana - Urban is the primary vehicle for delivering affordable housing nationwide. It also has a technology sub-mission to promote innovative materials and technologies.

There is a need to create opportunities for policy convergence and develop the enabling environment for adopting innovative technologies and solutions, including necessary codes and standards, sustainable public procurement—potentially linked to the Government e-Marketplace (GeM), and integration with large initiatives such as PMAY. Such integration must also extend to the sub-national levels through alignment

with state and city initiatives. With the Master Plan serving as the primary regulatory instrument for shaping the urban fabric, city managers must be equipped with the necessary tools, capacities, and frameworks to develop evidence-based, dynamic action plans that respond to evolving priorities. Strong public participation in the preparation of such plans can help nudge behaviours for improved community engagement and effective implementation.

Policy support can also help directly stimulate the market for green buildings. With a growing footprint of certified green buildings and certification systems such as Green Rating for Integrated Habitat Assessment (GRIHA), Indian Green Building Council (IGBC), Leadership in Energy and Environmental Design (LEED), Edge, and others, the provision of appropriate fiscal and non-fiscal incentives can encourage developers to adopt better designs and greener materials and technologies. Several initiatives by financial institutions provide concessional finance for projects adopting specific green building measures. Fast-tracked approvals, relief on property taxes, and additional floor allowances can be other means of incentivising project owners. States and cities may also explore institutional finance instruments such as green bonds and carbon markets to support large initiatives.

Such demand-side interventions also need to be supported with an adequate supply of green products and services. For developers to deliver green projects, tested and verified solutions must be available in the market and architects, engineers, and construction professionals must be able to design and execute them. Masons, artisans, and the construction workforce must be trained to use new technologies. In other words, the entire value chain needs to be designed to support skill development for eco-friendly and low-carbon initiatives.

There is a dire need to ease the entry barrier for new materials and technologies and support innovation in this arena. In the mainstreaming of low-carbon and circular building materials and technologies, the advent of low-carbon cement and the utilisation of industrial by-products, such as fly ash from thermal power plants, blast furnace slag from the steel industry, and



others, is helping to make concrete more sustainable. Secondary aggregates from C&D waste are also a potential opportunity to minimise the mining of natural stone and sand for concrete. Another exciting development area is bio-based materials, including applications utilising agri-waste, hemp, earth, mycelium, and other circular uses of waste streams such as plastics and textiles. Many of these technologies are also conducive to micro and small-scale production and present an opportunity to set up decentralised production facilities based on local needs and the availability of resources. While many market-ready technologies exist, their adoption remains far from effective. The decarbonisation agenda cannot move without addressing the embodied carbon aspects of construction materials, which in turn requires a robust green building material supply chain.

The construction sector links to over 250 ancillary industries and is among the toughest to move owing to the capital-intensive and risk-averse nature of real estate development and the long life of infrastructure assets, combined with a high degree of informality in the value chain. Homes are also emotional and aspirational investments for consumers who are reluctant to experiment with new technologies against the regular brick and concrete structures they are familiar with. However, living environments have deep implications for the physical and mental health of users and must be treated as such, going beyond individual plot boundaries and applying to cities as a whole. Livability must become the cornerstone of urban planning and construction to ensure that the physical systems are designed to balance the needs of people and the planet.

The Development Alternatives Group is working to advance this narrative through the Alt Urban programme with a key focus on four thematic areas: *Low-carbon and Circular Built Environment, Climate-Resilient Urban Planning and Habitat Solutions, Improved Urban Water and Waste Management, and Climate Education and Sustainable Lifestyles.*

To drive this agenda, it is crucial to understand cities as complex, layered entities with unique identities. They are composed of people with various socio-economic-cultural dynamics that guide their aspirations and behaviours,



Group housing site at Bhubaneswar

nature and various ecosystem services it provides, and the built infrastructure that provides shelter and basic services. To make cities more inclusive, 'affordability' becomes just as important as affordable housing. Management of green spaces and water bodies is crucial in responding to rising temperatures and supporting urban biodiversity. Adaptive, technology-driven pathways for urban planning that are cognisant of climatic shifts and can meet the needs of various actors will be critical in laying the foundation for green urban futures<sup>3</sup> that are resilient, smart, and sustainable. □

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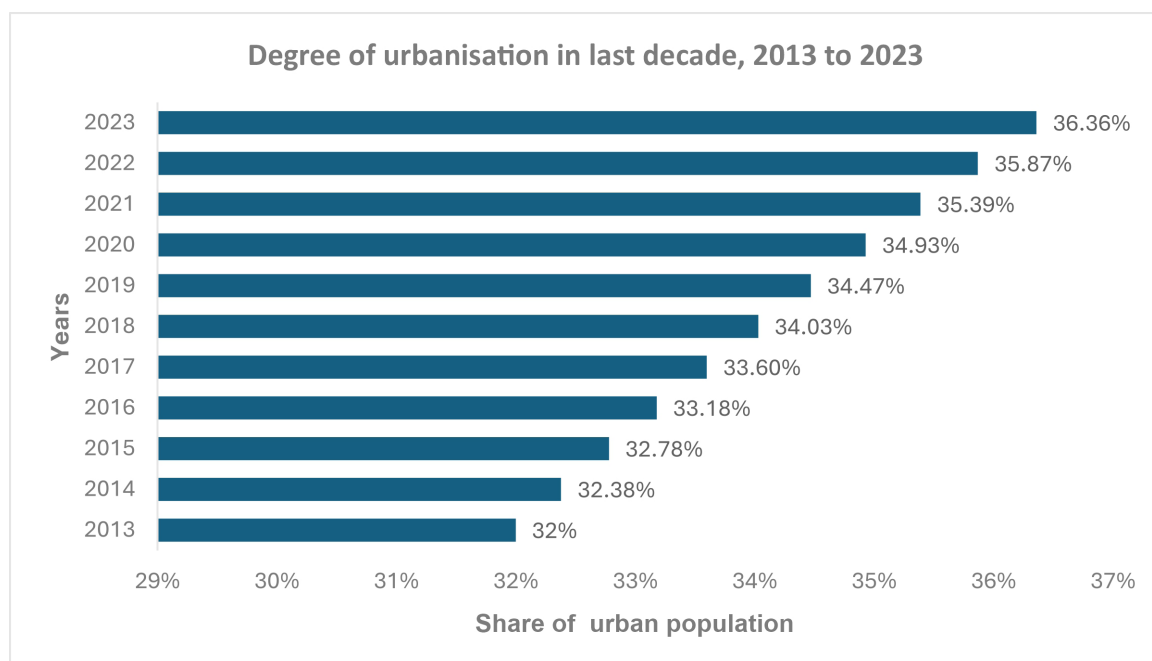
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## MINDFUL CONSTRUCTIONS: Unlocking the Potential of Eco Niwas Samhita



Urbanisation in India in the last decade, from 2013 to 2023

India's cities are at a crossroads, with a burgeoning population and rapid urbanisation. By 2036, cities in India are projected to house 600 million people and contribute 70% to the country's gross domestic product (GDP). This rapid urban growth is intensifying issues such as inadequate housing, poor transportation, and unreliable utilities that worsen living conditions, putting a strain on government infrastructure, and destabilising urban planning. Over the last decade, urbanisation in India has increased by more than 4%, meaning people are migrating from rural areas to the cities for opportunities in the service sectors<sup>1</sup>.

While urbanisation is often seen as a strain on resources, policymakers are increasingly recognising it as a driver of economic development. According to the International Institute for Population Sciences (IIPS)<sup>2</sup>, urban vibrancy is critical for achieving the ambitious goal of 9–10% GDP growth. Meeting the fundamental needs of the population should be the priority, as decent living standards are essential. To achieve this, initiatives such as achieving Net Zero by 2070, creating a low-carbon built environment, and providing adequate infrastructure for the masses must all go hand in hand.

### The Need for Healthy Housing

As extreme weather events are becoming more frequent due to climate change, it is essential to design

buildings that can withstand region-specific challenges such as heatwaves, droughts, storms, and flooding. The adverse impacts of climate change significantly affect the health and well-being of communities. *The construction of four walls and a roof for the community is not enough; it is also evident that health, well-being, quality of life, and security are equally important.*

The need for energy-efficient buildings is critical for reducing the carbon footprints and achieving India's net-zero goals. Decarbonisation and energy-efficient buildings offer a range of benefits, such as improved air quality, energy cost savings, enhanced property values, human health benefits, climate resilience, community empowerment, and job creation.

### The Housing Sector and Energy Implications

The building and construction sector accounts for **38% of total energy-related emissions**, with 10% indirectly from materials; therefore, it is emerging as a focal point for the government. The building sector consumes 37% of India's primary energy, and the residential sector consumes around 75% of the total electricity, placing it among India's second most energy consumers<sup>3</sup>. The residential sector accounts for a significant share of India's energy consumption due to insufficient design and technologies. The growth in income and urbanisation implies that **electricity**



**consumption is expected to increase significantly** in the coming decades.

To address this, the Bureau of Energy Efficiency (BEE) and State Designated Agencies (SDAs) are formed in every state to coordinate, regulate, and enforce the provision of the **Energy Conservation Building Codes (ECBC)**. For residential construction, **Eco Niwas Samhita (ENS)** was introduced for each of India's five climatic zones (as per NBC)<sup>4</sup>.

ENS provides a comprehensive framework for improving building energy performance by addressing key aspects of energy use, waste management, water conservation, design optimisation, and sustainable materials. The **Residential Envelope Transmittance Value (RETV)** measures the heat gain through a building envelope, which includes walls, roofs, and windows. Lower RETV values indicate better thermal performance, significantly reducing cooling loads and thermal comfort. It promotes **natural lighting and cross-ventilation** to minimise reliance on artificial lighting and mechanical cooling while improving indoor air quality. **Thermal comfort** standards focus on maintaining optimal indoor temperatures through passive design strategies, which is crucial for populations without access to active cooling solutions.

India's Cooling Action Plan 2019<sup>5</sup> has also categorically stated the goal of **Thermal Comfort for All**, integrating these aspects into the housing segment. While improving the energy efficiency of the buildings, it is also essential to target the **improvement of thermal comfort and quality of life**. **Energy-efficient technologies**, including energy-saving appliances, efficient heating, ventilation, and air conditioning (HVAC), solar water heaters, and rooftop solar systems, are encouraged to enhance overall efficiency and sustainability.

## Scaling Up ENS and Emerging Technologies

Despite its potential, ENS adoption remains limited. Mandating ENS compliance in large housing projects could reduce energy consumption by 20–30% while improving resilience. Key technological advancements include the following:

- **District cooling systems:** Integrating the centralised cooling system for large housing colonies can dynamically adjust cooling based on available resources during seasonal peak and non-peak hours, ensuring savings while maintaining the thermal comfort of occupants.
- **Smart building management systems (BMS):** Monitoring energy consumption and indoor conditions and optimising lighting, cooling, and

ventilation systems in real-time based on usage type, space occupancy, and external weather conditions.

- **Low carbon, high-performance materials:** Introducing advanced materials and reflective coatings can reduce RETV; adequate insulations and traditional design practices can stabilise the indoor temperature.
- **Water-energy synergies:** Integrating circularity aspects by utilising wastewater for cooling towers, recycling greywater for landscape usage, and conservation of rainwater can improve overall resource efficiency.

While 16 states<sup>5</sup> have adopted ECBC in their building bylaws for commercial buildings, ECBC-R is limited to the state's adoption. Andhra Pradesh is one of the first states to mandate amendment and adoption



Representative image

of ECBC to building bylaws<sup>6</sup> and take the initiative to implement energy efficiency measures in the Mass Housing Project<sup>7</sup>.

## PMAY-U: A Powerful Tool

Covering the landscape of India, the aspiration of providing basic infrastructure and housing for the growing population in urban areas is managed by initiatives like Pradhan Mantri Awas Yojana (PMAY-U)<sup>8</sup>. PMAY 2.0, launched in September 2024, will provide financial aid to 1 crore urban economically weaker section (EWS) and middle-class families for affordable housing over the period of five years. However, the success of this ambitious programme hinges on its ability to deliver not just shelter but also sustainable and liveable homes.

Beyond the four walls of PMAY, the focus should be on delivering 'Healthy Housing' that integrates innovative solutions. These are as follows:



- Mandatory integration of **ENS and advanced energy-efficient technologies** in all the upcoming buildings (with large housing projects led by the government).
- Embedding climate adaptability into the design, planning, and construction of buildings.

## The Path Forward

The housing sector under PMAY-driven construction



must integrate building energy conservation codes (ENS) and incentivise developers to integrate renewable energy systems and adopt green building standards. It is essential to demonstrate ENS benefits through pilot projects. Additionally, capacity should be built by training stakeholders and raising awareness among residents. Finally, monitoring systems should be established to evaluate energy performance and drive continuous improvement.

Beneficiaries must have access to low-interest 'green loans' within the financial ecosystem to support sustainable housing. Additionally, technical guidance should be provided to encourage the integration of renewable energy systems, such as solar panels. Homes that incorporate these features can be incentivised with reduced electricity tariffs or special low rates for a specified period.

For the **future vision for buildings**, it is essential that they be equipped with smart systems that optimise temperature, air quality, and energy usage for greater efficiency and comfort. Integrating these systems with local energy providers, such as Vidyut Vibhag, can support better energy management by adjusting consumption based on seasonal peak and non-peak hours. This approach reduces resource strain and makes buildings climate-responsive; it also contributes to decarbonisation by lowering greenhouse gas emissions.

Introducing energy benchmarking for dwellings is also essential as this provides a reference point to evaluate and track the performance<sup>9</sup>. The system not only helps track energy consumption but also motivates residents to adopt new technologies, invest in energy-efficient appliances and drive behaviour change towards energy conservation<sup>10</sup>.

India's housing sector stands at a pivotal juncture. By mandating ENS compliance, promoting smart technologies, and embedding sustainability into affordable housing projects, the nation can transition from 'just housing' to creating liveable, climate-resilient homes. This vision requires collective action from policymakers, developers, and communities to ensure urban energy resilience and decarbonisation for future generations.

Make buildings smarter and more efficient while supporting urban energy resilience.

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## Use of Emerging Technologies in Building/Housing Sector in Urban Areas: Opportunities and Challenges



Residential structure with G+4 stories completed by BDA, Adjacent to N.H-16, Kalinga Nagar Zone K-9 (B)

**R**apid urbanisation in India is creating unprecedented demand for housing, infrastructure, and urban services. Under Pradhan Mantri Awas Yojna (Urban) (PMAY) - 2, one crore additional houses for urban poor and middle-class families are targeted in the next five years. In order to speed up the work and bring quality, disaster resilience, sustainability and comfort, amongst various initiatives, the Ministry of Housing and Urban Affairs (MoHUA), GoI, through the Global Housing Technology Challenge (GHTC-India), has identified 54 emerging technologies from across the globe for mass housing. Six Light House Projects in Chennai, Rajkot, Indore, Lucknow, Ranchi, and Agartala are propagating the use of these technologies, broadly grouped into six categories namely; Precast Concrete Construction System (assembled at site), Monolithic Concrete Construction Using

Modular Formwork, Prefabricated Sandwich Panel System, Stay in Place Formwork System, and Precast Concrete Construction – 3 D Precast Volumetric system. PMAY 2 also has provisions to give additional subsidies in the form of a technology innovation grant for houses built under Affordable Housing in Partnership (AHP) and Affordable Rental Housing (ARH) verticals of PMAY for using these technologies in PMAY projects. In addition, MoHUA is supporting the development of 3D Printing Technology for construction and further innovations/testing of new emerging technologies under the Technology Sub Mission of PMAY. These initiatives provide big **opportunities** to change the country's construction scenario. However, their actual use in projects also brings many **challenges**, which must be addressed suitably.

Some of the challenges faced in the adoption of emerging technologies requiring due attention are as follows:

- **Predominant use of steel and concrete:** Both materials have significant embodied carbon due to energy-intensive production processes. Heavy reliance on these materials in their original form risks undermining India's commitment to reducing emissions intensity and achieving net zero by 2070.

While the use of fly ash and ground blast furnace slag (GGBS) in concrete is well established to make concrete green, also advanced high-strength steel exists, which could reduce steel consumption, but their availability across regions remains inconsistent.

Balancing their use with climate action goals requires adopting strategies that reduce environmental impact while maintaining desired construction standards.

- **Non-availability of fine aggregate:** Due to environmental constraints, fine aggregate from natural sources—an essential component of concrete—is not available in many parts of the country. Alternate sources for fine aggregates (copper slag, manufactured sand, demolition wastes, etc.) have their own limitation. They are not readily available in all parts of the country, producing concrete of desired quality difficult and inconsistent.
- **High initial investment:** Advanced emerging technologies require significant upfront capital, making adoption difficult for small-scale developers. There is a lack of good, financially sound contractors to execute big projects. Also, there are limited financing options tailored to technological upgrades in construction.
- **Lack of resources:** Some of these technologies are at a nascent stage, and the supply of related components is highly irregular, affecting the progress of projects badly.
- **Lack of awareness:** There is a lack of awareness among architects and engineers about these emerging technologies.

- **Lack of skilled workforce:** Adopting new emerging technologies demands specialised skills, currently lacking in the Indian construction workforce.
- **Regulatory and policy hurdles:** Existing approval processes, including contractor payment terms, do not align with emerging construction methods. There is also a lack of codes and specification for maintaining quality and consistency.
- **Infrastructure gaps:** Poor transport logistics, especially in hilly areas and northeast, affect the delivery of materials badly, causing abnormal project delays.

The building and housing sector is both a challenge and an opportunity for India's carbon reduction journey, aiming for net zero emissions by 2070.

To enhance energy efficiency in building and mass housing projects, we need targeted interventions, a strong policy framework, and collaboration among various stakeholders. This includes policymakers, manufacturers, engineers, architects, innovators, developers, and communities. Key strategies involve:

- Implementing decentralised production for essential components.
- Effectively utilising resources such as fly ash, GGBS, demolition waste, and alternative fine sand.
- Generating awareness and building the capacity of professionals and the workforce.
- Developing updated codes and specifications while modifying the approval process.
- Leveraging emerging technologies.

By focusing on these areas, we can significantly improve energy efficiency in construction. With these initiatives, the sector can effectively contribute to achieving climate action goals besides fulfilling the housing needs of the masses. □

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## Resource Efficiency in Rural Habitat: Through the Lens of Mador Village in Bundelkhand



Eco-housing work undertaken by TARA Karigar Mandal, Madore, Orchha, Madhya Pradesh

**B**undelkhand is a microcosm of rural India, located in the heart of the country, comprising 13 districts straddling Uttar Pradesh and Madhya Pradesh. From a land rich in cultural heritage and natural resources during the 14th-century reign of Bundela Kings, what came to be by the 20th century was a degraded landscape with its waters dried up, forests diminished, and millions living in poverty. The drought-prone ecology (and, therefore, the economy) of this semi-arid terrain and low agricultural productivity led to seasonal migrations to cities for jobs. When Development Alternatives (DA) took up the cause of transforming lives in Bundelkhand in the mid-1980s, regeneration of natural resources, sustainable livelihoods, and strengthening capacities of local communities were the top priorities. Water security and sufficiency through water harvesting and watershed management

consistently remained a focus, with close to 300 check dams constructed from 1989 to 2019. Sustainable construction through locally produced low-carbon and durable building materials and resource-efficient construction practices have been integral to DA's work in the region.

Mador village, located in Niwari block of Tikamgarh district (MP), is one such landscape and community where DA has sought to bring about a broad-based transformation since 2008. Water sufficiency, sustainable housing, and non-farm livelihoods (poultry) have been the major engagements. A recent visit to the village, as part of the TARAGram Yatra (2024), brought to notice things that have moved in the right direction and some realisations about the direction ahead.

The biggest change is water sufficiency, where a solar pump-driven system delivers

adequate water to each household to meet basic needs. This has directly improved the lives of women by freeing them from the daily effort of water-procurement trips. It also provided the impetus to women in the community to mobilise the community effort to implement the piped water supply system. It is equally significant that the watershed management work in the vicinity of the village is foundational to nourishing the groundwater aquifers to meet water requirements for domestic and agricultural purposes. Many houses in the village bear testimony to resource and cost-efficient construction. It is instructive to note that this was made possible only with the convergence of three streams of work:

- A financing model enabled by land tenure security and micro-finance.



An eco-house in Madore, Orchha, Madhya Pradesh

- Technology support and cost-effective building alternatives brought in by TARAGram.
- Strengthening livelihoods of local construction artisans through training and federation into TARA Karigar Mandal (TKM).

Some of these houses seamlessly integrate with the vernacular courtyard-based layout of households in the region. TKM, as an artisan-managed institution, has improved incomes and work security for its members. The poultry-linked livelihoods introduced in the village continue to generate good additional incomes for families.

The last twenty years of engagement with Mador village, while bringing evident change in its residents' lives, should realistically be seen as the first stage of basic needs fulfilment and confidence building of the community. Any paradigm of resource efficiency in the context of rural development must consistently deal with improving livelihoods and incomes. The uncertainties brought about by climate change mean that farming practices need to be strengthened regarding productivity, crop diversity, and overall water consumption. In Mador's context, significant poultry waste must be seen as an agricultural resource through composting. This comes with its own cultural implications, as the community points out that the composting facility should be sufficiently distant from habitation. Equally critical is to continue to support women in the community through livelihoods and financial saving models. The potential of women to anchor economic prosperity and lead change is evident from much of the work undertaken not just by DA but by CSOs across the country. This further strengthens the community's link with the larger economic development movement pursued by the government.

Housing quality is intricately linked to the financial capacity of families, as households continue to expand incrementally whenever enough money is available for the purpose. TKM and the artisan community need newer skills and capacities to consolidate their position as 'artisans with a difference'. Building upon the presence of TARAGram, which has been instrumental in introducing alternative materials in the region, bio-based and circular materials using natural resources such as agri-waste is a significant emerging opportunity. It certainly does not help that burnt clay brick continues to be the predominant wall material, and there are still village clamps that are temporarily set up, being a source of affordable but highly resource-inefficient bricks. Fly ash bricks, though they are a good and clean alternative to red bricks, are still unaffordable for families and, in many instances, are perceived as poorer in quality than red bricks. Many flyash brick producers have come up in the region, but there is poor compliance with quality guidelines in order to be competitive. A policy-driven movement by state-level authorities that promotes the adoption of clean and





Community Centre, Madore, Orchha, Madhya Pradesh

resource-efficient building materials in the housing sector and enforces quality compliance is needed to bring necessary alignment to the construction sector.

The issue of adequate sanitation continues to be a challenge, connected as it is to not just water availability but, more importantly, behavioural shifts. Even though most houses have toilets and access to water for their use, the house-level wastewater management infrastructure (mostly soak pits and some septic tanks) is not seen as something that needs maintenance and cleaning every few years. As a result of this, there is a risk of toilets becoming dysfunctional. Disposing of grey water from the kitchen and bathroom into soak pits, as opposed to running in the open drain, is another issue that needs attention. It can be emphatically stated that national schemes like Swachh Bharat Abhiyan must start looking beyond basic toilet coverage to comprehensive management of wastewater in villages.

One opportunity that has emerged in the last few years and is being promoted by national and state governments is eco-tourism. Homestays have come up in popular

tourist places like Orchha. While eco-tourism is mainly seen as an opportunity for enhancing the incomes of rural households, its potential has remained untapped. This can be extended from individual homestays to sustainable tourism infrastructure developed by the government and managed by trained rural communities. Besides income growth, sustainable tourism is also an invaluable opportunity to bring together and demonstrate breakthrough ideas and practices of resource-efficient construction and water and waste management.

The above concerns and potentials are not just limited to Madore village but are relevant in the case of thousands of others across the country. The emerging paradigm of resource efficiency holds great potential if it embeds in itself the fundamental aspect of sustainable livelihoods, continued enrichment of the natural resource base, and enhanced climate resilience of communities. □

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## Viksit Bharat: A Vision for India's Urban Future



Representative image

India's trajectory towards becoming the third-largest economy in the world by 2050 is not only fueled by its geopolitical rise but also by its ability to sustain self-reliance through economic empowerment and inclusive growth. Urban India, which contributes more than 60% of the national gross domestic product (GDP), is central to this transformation. The vision of a 'Viksit Bharat' embodies a future

where India thrives on its values, historical richness, economic vibrancy, demographic advantage, and innovative potential. As urban India grows, it is shaping a future rooted in sustainable economic practices, social inclusivity, and environmental resilience—yet much of this remains aspirational, requiring thoughtful action to bring it into reality. This includes curating sector-specific knowledge on



topics such as urban ecology, responsible consumption, local market revitalisation, and circular economies.

India's urbanisation has evolved through various phases, from the early urban settlements of the Indus Valley Civilisation to the second urbanisation along the Ganges-Yamuna Doab, with cities like Kashi (Varanasi) standing as some of the oldest continuously inhabited urban spaces globally. However, India's transition from an agrarian economy to an urban one has been largely organic, driven by demographic changes, rural-to-urban migration, and gradual shifts in economic models. After independence, India focused on industrialisation and private sector growth, which boosted urban infrastructure. Yet, the pace of urbanisation remained slow until the late 20th century, when rapid urban growth, fueled by population increase, area reclassification, and rural migration, presented a unique set of challenges. This led to lopsided urbanisation, where cities with populations over 1 million—Class I cities—grew disproportionately. Many of these cities lacked the necessary industrial foundation and economic infrastructure to sustain long-term development. Urbanisation, driven largely by poverty-induced rural migration, contributed to a rise in slums, unemployment, inequality, and the degradation of living conditions. In many instances, urban growth was more a product of rural push than urban pull, with people moving to cities not for better opportunities but as a last resort due to distress in rural areas due to looming climatic shifts. This resulted in poor infrastructure, informal settlements, inadequate sanitation, and governance challenges that exacerbated urban decay.

### **Building Resilient, Inclusive Urban Spaces**

- To align with the vision of Viksit Bharat, India must prioritise investment in small- and medium-sized cities, which have long been overshadowed by mega-cities such as Mumbai, Delhi, Kolkata, and Chennai. These smaller cities are often more integrated with regional economies and rural hinterlands, making them better suited to promote balanced regional development. Leveraging their

low land costs, reduced congestion, and strong community ties, these cities can adopt more sustainable and climate-resilient urbanisation models. Cities like Coimbatore, Vadodara, Bhubaneswar, Indore, Surat, Nagpur, and Mysuru have already made strides in this direction. Redirecting investments towards these cities can reduce migration flows to already saturated urban centres, foster balanced regional development, and create a more equitable urban landscape.

### **Inclusive Urban Policies and Community Empowerment**

- Policies such as the **Jawaharlal Nehru National Urban Renewal Mission (JNNURM)**, which laid the foundation for comprehensive urban planning, have helped alleviate the pressures on overburdened cities, reduce regional disparities, and make urban growth more sustainable. In the last two decades, programmes like the **Smart City Mission**, **Atal Mission for Rejuvenation and Urban Transformation (AMRUT)**, **Swachh Bharat Mission**, **National Urban Transport Policy**, and **Pradhan Mantri Awas Yojana (PMAY)** have catalysed city-level transformations. Notably, Bengaluru's Smart City initiatives and Indore's waste management under Swachh Bharat have set benchmarks for modern urban governance and environmental sustainability.
- One of the most promising examples of inclusive urban development has been the **Jaga Mission** in Odisha, which focuses on providing land tenure and climate-resilient housing to urban slum dwellers. This programme has not only improved living conditions but also empowered marginalised communities to secure sustainable homes while addressing climate vulnerabilities. The emphasis on **participatory governance**, especially among women and marginalised groups, further strengthens the cities' ability to meet the needs of all citizens. The success of the Jaga Mission has inspired other states, such as Punjab and Himachal Pradesh, to explore similar pathways to address urban inequalities.

## Bridging the Rural-Urban Divide and Promoting Economic Hubs

- To address distress migration and foster balanced regional growth, policies have focused on **cluster-based development**, leveraging local resources to reduce migration pressures. Initiatives like **Make in India** and **Startup India** have worked to bolster urban manufacturing hubs and industrial growth in small- and medium-sized cities. States such as **Rajasthan, Odisha, and Karnataka** have also provided region-specific incentives to foster local entrepreneurship. Educational reforms have supported innovation by encouraging academic institutions to collaborate with industries and incubate startup ecosystems.
- As urbanisation accelerates, waste generation has increased in tandem, creating new challenges for cities. However, this urban growth has also sparked the rise of over 5,000 startups focused on solving waste management issues. These startups are leveraging innovative technologies in waste segregation, recycling, composting, and waste-to-energy solutions. By converting waste into resources and engaging communities, these entrepreneurs are reducing pollution and driving the circular economy, thus supporting India's broader goals of sustainable urban development and climate resilience. This entrepreneurial ecosystem exemplifies how innovation can align with the broader vision of a **Viksit Bharat**.

## Cities, Shaping Climate Futures

- India's urban climate policies are steadily evolving, with a growing emphasis on sustainable infrastructure, urban resilience, and climate adaptation. Through initiatives like the **National Action Plan on Climate Change (NAPCC)** and missions such as the **National Mission on Sustainable Habitat** and the **National Mission for Enhanced Energy Efficiency**, India is working towards urban spaces that prioritise energy efficiency, water conservation, waste management, and renewable energy. State-specific programmes like **Odisha's Jaga Mission** and the **Smart Cities Mission** underscore

the importance of sustainable urban development in India's growth story.

- The rapid urbanisation of smaller cities presents challenges and opportunities for sustainable growth. These cities can foster more environmentally conscious development by adopting **green technologies** and **ecosystem-based adaptation (EbA)** strategies, such as rainwater harvesting, waste-to-resource solutions, and creating green spaces. National policies like the **National Solar Mission**, the **National Mission for Sustainable Agriculture**, and the **National Water Mission** offer a road map to mitigate environmental challenges associated with urban expansion. Ultimately, the vision of **Viksit Bharat** goes beyond economic growth—it is about creating eco-friendly, inclusive, and resilient cities, ensuring a sustainable and equitable urban future for all.

The vision of **Viksit Bharat** directly addresses the wicked challenges of urbanisation—complex, interwoven issues that span economic, social, environmental, and governance dimensions. As India shifts its focus to smaller cities, it aims to alleviate the pressure on mega-cities while promoting balanced regional growth through sustainable practices, green technologies, and ecosystem-based adaptation. This transition is further supported by innovative policies and programmes that have fostered opportunities, such as the rise of over 5,000 startups tackling waste management and recycling. These startups illustrate how innovation can solve environmental degradation and waste generation—two critical components of urban sustainability. Ultimately, **Viksit Bharat** is more than just a vision for economic growth; it represents a comprehensive, strategic approach to solving the wicked problems of urbanisation, blending innovative solutions with integrated and inclusive urban planning for a sustainable future. □

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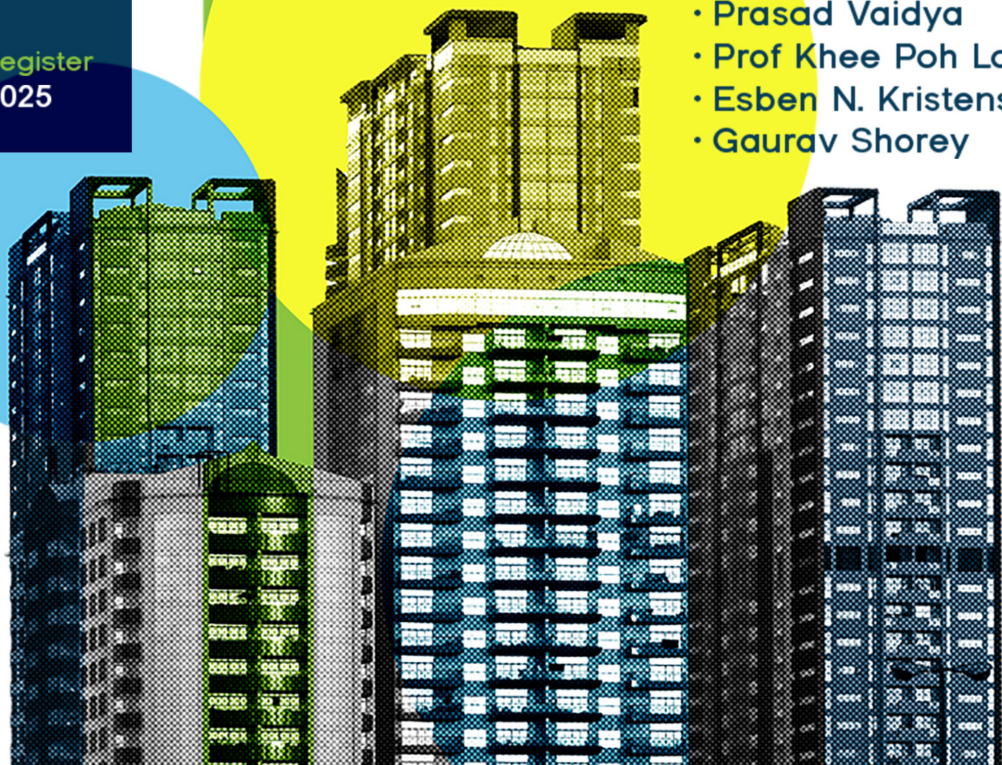
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