



## Balancing Housing Expansion with Sustainability

This editorial is based on [“Beyond shelter, dweller needs within the four walls”](#) which was published in The Hindu on 22/02/2024. The article delves into the growing significance of the construction sector in executing PMAY and its contribution to greenhouse gas emissions. It underscores the importance of mitigating the environmental impact of construction activities.

**For Prelims:** [Pradhan Mantri Awas Yojana-Urban](#), [Pradhan Mantri Awas Yojana-Gramin](#), **Ministry of Rural Development**, [Below the Poverty Line \(BPL\)](#), [Socio-Economic Caste Census 2011](#), [Gram Sabha](#), [Affordable Rental Housing Complexes \(ARHCs\)](#), **Global Housing Technology Challenge (GHTC)-India**, [Woman Empowerment](#).

**For Mains:** Sustainable Implementation of Pradhan Mantri Awas Yojana-Gramin

In the [Interim Budget 2024](#), the Ministry of Finance announced the construction of two crore additional houses over the next five years under the [Pradhan Mantri Awas Yojana Gramin \(PMAY-G\)](#) and the introduction of a new housing scheme for the middle class. This is a commendable step towards realising the goals of the ambitious [‘Housing for All’](#) initiative and builds on the success of the [PMAY scheme](#), which has facilitated the construction of nearly three crore rural and 80 lakh urban affordable houses since 2015.

The announcement also prompts us to critically think about the potential trade-offs with quality of life and environmental concerns as a result of the rapid expansion of the housing sector. This is evident in the case of affordable housing, where the emphasis is on mass production, prioritising speed, cost, and ease of construction over factors such as thermal comfort and the implementation of low-carbon infrastructure.

### What is PMAY?

#### ▪ Pradhan Mantri Awaas Yojana- Gramin (PMAY-G):

- **Launch:** To achieve the objective of “Housing for All” by 2022, the erstwhile rural housing scheme Indira Awaas Yojana (IAY) was restructured to Pradhan Mantri Awaas Yojana-Gramin (PMAY-G) w.e.f 1st April, 2016.
- **Ministry Involved:** Ministry of Rural development.
- **Aim:** To provide a pucca house with basic amenities to all rural families, who are homeless or living in kutcha or dilapidated houses by the end of March 2022.
- To help rural people Below the Poverty Line (BPL) in construction of dwelling units and upgradation of existing unserviceable kutcha houses by providing assistance in the form of a full grant.
- **Beneficiaries:** People belonging to SCs/STs, freed bonded labourers and non-SC/ST categories, widows or next-of-kin of defence personnel killed in action, ex servicemen and retired members of the paramilitary forces, disabled persons and minorities.
- **Selection of Beneficiaries:** Through a three stage validation - Socio Economic Caste

Census 2011, Gram Sabha, and geo-tagging.

- **Cost Sharing:** The cost of unit assistance is shared between Central and State Governments in the ratio 60:40 in plain areas and 90:10 for North Eastern and hilly states.
- **Pradhan Mantri Awas Yojana - Urban (PMAY-U):**
  - **Launch:** 25<sup>th</sup> June 2015, intends to provide housing for all in urban areas by year 2022.
  - **Implemented by:** Ministry of Housing and Urban Affairs
  - **Features:**
    - Addresses Urban housing shortage among the Urban Poor including the Slum Dwellers by ensuring a pucca house to eligible urban poor.
    - The Mission covers the entire urban area consisting of Statutory Towns, Notified Planning Areas, Development Authorities, Special Area Development Authorities, Industrial Development Authorities or any such authority under State legislation which is entrusted with the functions of urban planning & regulations.
    - The Mission promotes women empowerment by providing the ownership of houses in the name of female members or in joint name.
  - **Divided into Four Verticals:**
    - In-situ Rehabilitation of existing slum dwellers using land as a resource through private participation.
    - Credit Linked Subsidy.
    - Affordable Housing in Partnership.
    - Beneficiary-led individual house construction/enhancement.

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Category	Household Income	Maximum House Area	Govt Subsidy	NPV of subsidy
Economically Weaker Section (EWS)	<3 lacs	30 sqm	6.5% for loan up to 6 lacs	2.67 lacs
Lower Income Group (LIG)	3-6 lacs	60 sqm	6.5% for loan up to 6 lacs	2.67 lacs
Medium Income Group 1 (MIG1)	6-12 lacs	160 sqm	4% for loan up to 9 lacs	2.35 lacs
Medium Income Group 2 (MIG2)	12-18 lacs	200 sqm	3% for loan up to 12 lacs	2.3 lacs

## What are the Different Modern Technologies in the Housing Sector?

Within the framework of the PMAY mission, **Light House Projects (LHPs)** are underway as part of the **Global Housing Technology Challenge (GHTC)**, spanning six sites across six States, apart from **Mivan Technology**. These leverage modern technology and innovative processes so as to reduce construction time and build more resilient and affordable houses for the underprivileged.

- **Global Housing Technology Challenge-India:**
  - The Ministry of Housing and Urban Affairs has conceptualised a [Global Housing Technology Challenge - India \(GHTC- India\)](#) which aims to identify and mainstream a basket of innovative technologies from across the globe for the housing construction sector that are sustainable, eco-friendly and disaster-resilient.
    - The Prime Minister declared the year 2019-20 as **'Construction Technology Year'** while inaugurating GHTC-India in March 2019.
- **LightHouse Projects at Six Sites:**
  - Six LHPs consisting of about 1,000 houses each with physical & social infrastructure facilities are being constructed at six places across the country namely **Indore** (Madhya Pradesh), **Rajkot** (Gujarat), **Chennai** (Tamil Nadu), **Ranchi** (Jharkhand), **Agartala**

(Tripura) and **Lucknow** (Uttar Pradesh).

- LHPs will demonstrate and deliver ready to live mass housing at an expedited pace as compared to conventional brick and mortar construction and will be more economical, sustainable, of high quality and durability.
- **Mivan Construction Technology:**
  - Additionally, there are ongoing efforts to utilise alternative construction technologies such as Mivan. This technology utilises **advanced aluminium formwork, which is recyclable and reusable**, to cast and construct various building elements.
  - This approach surpasses traditional construction methods in terms of speed and quality and has a relatively lower environmental impact due to reduced wastage in the construction phase.
- **Insulating Concrete Formwork (ICF) Technique:**
  - With an insulating concrete formwork (ICF) approach, builders **use double-walled polystyrene panels as the basis for the walls** of a building.
  - The empty panels are filled with construction-grade ready-mixed concrete to ensure a strong, durable structure. **Airtight ICF systems provide excellent insulation for both heat and sound** and help buildings to maintain steady thermal mass energy.
- **Hybrid Concrete Construction:**
  - As the name suggests, hybrid concrete construction is a combination of construction methods. Specifically, hybrid concrete construction uses cast-in-place concrete with other precast materials like steel or concrete units.
  - A hybrid method using both in-situ construction and precast materials helps to accelerate facility construction and lower project costs while controlling the overall quality of the building process.

## What are the Sustainability Concerns in Development of the Housing Sector?

- **Concerns Due to Different Construction Technologies:**
  - **Issues of Thermal Distress:**
    - The extensive use of cement and steel without proper insulation results in increased heat gain from the building envelope, causing thermal distress.
  - **Elevated Greenhouse Gas (GHG) Emissions:**
    - Due to inadequate insulation, occupants resort to increased use of cooling appliances such as air conditioners. This reliance on cooling appliances triggers a surge in electricity consumption, thereby contributing to elevated greenhouse gas (GHG) emissions.
  - **Increased Electricity Consumption:**
    - The predominant use of lower efficiency appliances owing to lower purchase costs leads to higher electricity consumption and resultant greenhouse gas emissions.
    - This underscores a critical paradox, wherein a technology deemed to offer a low-carbon alternative inadvertently contributes to elevated emissions during the operational stage.
- **Locational Factors Hindering Housing Projects:**
  - PMAY-U requires earmarking of land in master plans for affordable housing. In theory, this should allow cities and towns to ensure that the distance and cost of the daily commute of lower-income population is kept at a minimum.
  - However, 76.2% of the 7,953 census towns in India do not have a master plan. In Delhi, many newly created housing stock have no takers due to its location and acute shortage of public transport.
- **Inadequacies in Building Typology:**
  - Under the PMAY-U, states and cities must provide additional floor area ratio (FAR), floor space index (FSI), or transferable development rights (TDR) and relaxed density rules for slum and low-cost housing, leading to dense, high-rise developments.
    - This approach improves land use efficiency but raises sustainability and affordability concerns due to increased emissions per unit area with taller buildings.
- **Excessive Reliance on Centralised Systems:**
  - India's utility and service infrastructure relies heavily on overburdened centralised systems, leading to deficits of up to 50% in many cities. Centralised systems, while expensive, lack

provisions for rainwater harvesting, decentralised waste management, and wastewater treatment in PMAY-U guidelines, instead guided by various building and environmental regulations.

▪ **Inefficient Beneficiary-Led Construction:**

- Approximately 63% of PMAY-U projects are self-constructed by beneficiaries, allowing for flexible construction pace. However, this informal construction lacks adherence to building norms and safety codes, with limited access to sustainability guidance.
  - This approach, dominant among lower-income groups, highlights the need to integrate affordable sustainability criteria and technical support for improved liveability.

▪ **Lack of Awareness Due to Multi-Stakeholder Nature:**

- Implementing passive designs faces challenges due to the complex building value chain involving various stakeholders with differing priorities and awareness levels.
- End-users' lack of awareness about the benefits further impedes adoption, highlighting the need for increased awareness and collaboration among stakeholders.

## What are the Steps Required to Make the Housing Sector More Sustainable?

▪ **Prioritising Thermal Comfort:**

- The escalating heat stress worldwide is anticipated to affect various population segments, leading to a substantial increase in the demand for cooling.
  - However, the impact of this rising demand will be pronounced among communities belonging to the low-income strata with limited access to cooling amenities.
- Therefore, to make vulnerable communities resilient to heat stress, it is imperative that building houses go beyond provisioning basic amenities by integrating passive design strategies for thermal comfort.

▪ **Reinforcing Building Codes:**

- The pathway to achieving a harmonious balance among multiple goals lies in the obligatory implementation of guidelines embedded within building codes, as demonstrated by initiatives such as [Eco Niwas Samhita](#).
  - The Smart Ghar III project in Rajkot, an affordable housing initiative under the PMAY Untenable Slum Redevelopment project, serves as a prime example of achieving indoor thermal comfort through passive design implementation.
- As various construction technologies are being tested for LHPs, there is no better opportune time than now to incorporate detailed passive design aspects in building design mandating the adoption of codes and guidelines.

▪ **Raising Awareness About Passive-Designs:**

- While passive designs offer long-term benefits such as reduced energy bills and improved comfort, these advantages are not always immediately apparent to homeowners.
- Therefore, an ecosystem change is needed across the entire value chain to **encourage the adoption and rightful implementation of the codes**.
  - This requires raising awareness and fostering collaboration among stakeholders and incentivising developers to prioritise passive designs.

▪ **Promoting Green Buildings:**

- Currently, **India's 'Green Buildings'**, though growing consistently, **constitute only 5% of the building market**. However, current evidence shows promising potential in the reduction of energy consumption and emissions through appropriate policies and implementation procedures in place.
- A study by McKinsey indicates that the national power demand can be reduced by as much as 25% in 2030 by improving the energy efficiency of buildings and operations.
  - Estimates by the Bureau of Energy Efficiency (BEE) suggest that existing **buildings also have the potential to save 30-50% of their energy through retrofit measures for improved efficiency**.

▪ **Initiating Location Tailored Projects:**

- Conduct socio-economic surveys to understand the livelihood pattern of the lower-income segment in urban agglomerations.
  - Identify major economic hotspots and suitable locations along transit networks across urban agglomerations to promote mixed-income housing by providing maximum affordable housing in that catchment.

- **Zoning-based inclusion can enable earmarking of land for affordable housing in strategically suitable locations** for the target population.
  - For instance, ensure that basic services like functional primary schools, public medical clinics and other basic amenities exist within a short radius of the affordable housing site.
- **Following Robust Layout and Building Design:**
  - Envelope design and shading devices are majorly responsible for heat gain or loss from a building and hence, determine the need for space cooling or heating.
    - Eco Niwas Samhita, 2018 suggests net heat gain through building envelope (excluding roof) should not exceed 15 watt per sq m, in all climate zones except cold climate.
  - Efficiency of the envelope can also be determined by the ratio of exposed surface area and built-up area of the dwelling unit. Another CSE study on housing project samples from different states reveals that if the ratio is higher than 0.92, the envelope is not efficient.

## Conclusion

The interim Budget 2024's focus on housing marks a commendable step towards 'Housing for All'. While these efforts are crucial, they prompt a critical examination of trade-offs with quality of life and the environment. A shift towards sustainable practices requires a collaborative effort and incentivization to integrate passive designs. As the building sector's environmental impact grows, it's crucial to balance embodied and operational emissions to create resilient structures for the future. By embracing environmental consciousness in housing initiatives, we can build not just homes but models of sustainability for a more inclusive future.

### **Drishti IAS Questions:**

Discuss the Pradhan Mantri Awas Yojana's impact on affordable housing and its sustainability challenges. How can these be addressed for long-term environmental benefits?

## **UPSC Civil Services Examination, Previous Year Question (PYQ)**

### **Mains:**

**Q.** With a brief background of quality of urban life in India, introduce the objectives and strategy of the 'Smart City Programme.' **(2016)**

**Q.** Discuss the various social problems which originated out of the speedy process of urbanization in India. **(2013)**