

A REPORT ON

'ENABLING ECOSYSTEM TO IMPROVE ACCESS TO GREEN AFFORDABLE HOUSING FOR WOMEN IN INDIA'

ASIAN DEVELOPMENT BANK AND IIFL HOME FINANCE LTD.

TECHNICAL ASSISTANCE PARTNERSHIP



IIFL
HOME LOAN



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All the financials and related figures are as on 31st March, 2024. Please note that a conversion rate of approximately 1 USD = 82 INR has been applied to round of financial figures except for figures in financial statements.

MESSAGE FROM THE CEO



The TA program was meticulously structured to strengthen residential infrastructure and advance sustainable practices through a comprehensive approach. It encompassed capacity-building programs, community engagement initiatives, and specialized training in green building certification. These efforts were instrumental in establishing a robust framework for climate-resilient housing solutions across diverse geographical and climatic regions of India.

Dear Stakeholders,

I trust this correspondence finds you well. It is with great appreciation that I begin by extending my heartfelt gratitude to each of you for your unwavering support and trust in our endeavors. Your commitment has been pivotal in propelling our success and ensuring that we uphold our promises.

I'm delighted to report robust growth in fiscal year 2024, driven by India's economic rise and our focus on affordable housing. Leveraging government initiatives like 'Housing for All,' we've empowered countless families nationwide. IIFL Home Finance Ltd. supports first-time home buyers, especially within the EWS and LIG segments. Our AUM have grown at a 14% CAGR, reaching 35,499 crore in FY24. A significant proportion of our borrowers are women, underscoring our commitment to women's empowerment, financial inclusion, and social responsibility. We proudly contribute to the Credit Linked Subsidy Scheme (CLSS), facilitating over 1,750 crore in subsidies for more than 73,000 households, making homeownership attainable for low- and middle-income families. Additionally, we've supported over 26,500 BLC projects, disbursing nearly 700 crore under the Affordable Housing scheme of Pradhan Mantri Awas Yojana (PMAY).

Looking forward, our mission remains resolute in enhancing financial inclusion, harnessing digital advancements, and fostering sustainable growth within India's housing sector. We are poised to expand our footprint while ensuring that our initiatives align with global sustainability goals.

A significant milestone in our journey has been our collaboration with the Asian Development Bank (ADB). Through this strategic partnership, we launched a transformative initiative supported by a \$1 million technical assistance (TA) program and a \$68 million loan agreement. This initiative aimed to enhance women's access to affordable green housing in India. With 80% of the loan dedicated to women from economically disadvantaged and low-income groups, we facilitated 2,329 loans for EWS and LIG borrowers. This effort not only empowered women in achieving sustainable homeownership but also promoted the adoption of green-certified affordable housing units, underscoring our commitment to environmental sustainability and social inclusivity.

The TA program was structured to strengthen residential infrastructure and advance sustainable practices through capacity-building programs, community engagement initiatives, and specialized training in green building certification. These efforts established a robust framework for climate-resilient housing solutions across diverse regions of India. The program also conducted extensive research on innovative and cost-effective construction technologies tailored for climate resilience, culminating in a compendium of best practices to accelerate sustainable housing adoption nationwide.

Financed by the ADB-managed Urban Climate Change Resilience Trust Fund (UCCRTF), with support from The Rockefeller Foundation and the Governments of Switzerland and the United Kingdom, this initiative underscores our commitment to advancing sustainable housing solutions while addressing pressing environmental challenges. It exemplifies our proactive approach in leveraging partnerships and innovative strategies to create lasting societal and environmental impacts. Through this collaboration, we have laid the groundwork for a more inclusive and sustainable future, reinforcing our mission to provide affordable housing while promoting environmental stewardship and social equity.

As we navigate the future, we are committed to furthering our sustainable development agenda and driving positive change in the housing sector. Our focus remains on harnessing technology, fostering inclusive growth, and ensuring that every initiative we undertake contributes to a more sustainable and resilient future for all. We aim to leverage cutting-edge technologies to streamline processes, enhance efficiency, and provide innovative solutions that meet the evolving needs of our customers.

Our commitment to inclusive growth involves creating opportunities for all segments of society, particularly women and economically disadvantaged groups, to access affordable and sustainable housing. By continuing to prioritize these groups, we aim to empower more individuals and families to achieve homeownership, thereby contributing to broader social and economic development.

Ensuring that our initiatives are environmentally sustainable is also a key priority. We are dedicated to promoting green building practices, reducing our carbon footprint, and supporting the development of climate-resilient housing. Our efforts are geared towards creating a positive impact on the environment while providing safe, affordable, and sustainable homes for our customers.

Once again, I extend my sincere gratitude for your continued support and partnership. Together, we will continue to chart a path towards sustainable development and inclusive prosperity. With your collaboration, we are confident that we can achieve our vision of a more sustainable, equitable, and prosperous future for all. Thank you for being a part of this journey, and we look forward to our continued partnership in making a meaningful difference in the housing sector and beyond.

Best,
Monu Ratra

Executive Director (ED) & Chief Executive Officer (CEO)

ABOUT ASIAN DEVELOPMENT BANK



Established in the early 1960s, the Asian Development Bank (ADB) stands as a pivotal institution dedicated to fostering economic growth and cooperation across Asia and the Pacific. Central to its mission is the commitment to eradicating extreme poverty and achieving sustainable development through a multifaceted approach that encompasses a range of financial services. These include loans, technical assistance, grants, and equity investments aimed at promoting social and economic development through strategic partnerships and comprehensive support mechanisms tailored to the diverse needs of its member countries.

ADB's operational strategy revolves around several key areas to drive impactful development outcomes throughout the region. Education stands as a fundamental pillar, where ADB invests in educational infrastructure, curriculum development, and teacher training programs to enhance educational access and quality, thereby fostering human capital development and reducing poverty.

Environmental sustainability and climate change adaptation form another critical focus area for ADB. Recognizing the urgent need to address climate risks and promote sustainable resource management, ADB supports initiatives that build climate-resilient infrastructure and mitigate environmental impacts across Asia and the Pacific. These efforts aim to safeguard communities and ecosystems while ensuring long-term economic resilience.

The development of a robust financial sector is essential for economic growth and poverty alleviation. ADB actively works to strengthen financial institutions, promote inclusive finance mechanisms, and foster capital market development. These initiatives aim to improve access to financial services, especially for underserved populations, thereby enhancing economic opportunities and social inclusion. Infrastructure development plays a pivotal role in ADB's strategy, encompassing investments in transport networks, energy grids, water supply systems, and urban planning. By supporting sustainable infrastructure projects, ADB aims to enhance regional connectivity, improve access to essential services, and stimulate inclusive economic growth across member countries. Regional cooperation and integration represent another cornerstone of ADB's efforts to promote economic cooperation and integration among its member countries. These initiatives aim to reduce trade barriers, unlock synergies, and foster economic cooperation to promote shared prosperity and stability across Asia and the Pacific.

In recent years, ADB has intensified its efforts to address the housing needs of vulnerable populations, particularly low-income groups facing significant housing challenges. Recognizing the critical need for accessible and sustainable housing solutions, ADB supports initiatives that integrate green building practices and enhance housing affordability. Green-certified buildings not only mitigate environmental impacts by reducing energy consumption and carbon emissions but also offer long-term economic benefits such as lower operational costs and increased resilience to climate-related risks.

Through strategic partnerships with governments, private sectors, and development partners, ADB promotes the adoption of green building standards and technologies in the construction sector. These efforts contribute to environmental sustainability while creating employment opportunities, improving living conditions, and enhancing community resilience against natural disasters. By leveraging its financial resources, technical expertise, and policy dialogue platforms, ADB aims to enhance economic growth, reduce poverty, and strengthen institutions across Asia and the Pacific. The bank's commitment to sustainable development underscores its role as a catalyst for positive change, promoting inclusive growth and resilience in the face of global challenges such as climate change and economic disparities.

ADB's Work in Gender Equality and Women's Empowerment

Gender equality and women's empowerment form foundational principles within the Asian Development Bank's (ADB) strategic framework. ADB has committed to ensuring that at least 75% of its operations are gender-inclusive by 2030, reflecting its dedication to integrating gender perspectives across all development initiatives. This commitment extends to promoting initiatives that specifically enhance women's access to housing finance and empower them to engage in decision-making processes related to housing and community development.

In India, where the demand for women's housing loans amounts to an estimated \$32.3 billion, ADB recognizes significant barriers that hinder women's access to housing finance. These barriers include insufficient income levels and entrenched traditional gender norms that often limit women's economic opportunities and their ability to secure loans independently. Furthermore, property ownership in India remains predominantly in male hands, with women owning only a small fraction of properties, either solely or jointly, despite their increasing contribution to household incomes and economic activities.

To address these challenges, ADB has taken proactive steps to support initiatives aimed at enhancing women's economic agency and promoting their property rights. ADB's initiatives include financial assistance and technical support to promote gender-inclusive policies and practices within the housing sector. This includes advocating for policies that facilitate women's access to affordable and sustainable housing solutions, such as green-certified homes, which not only benefit the environment but also provide long-term economic advantages for households.

Moreover, ADB collaborates closely with governmental and non-governmental partners in India to implement programs that empower women economically and socially. These efforts aim to break down barriers to women's participation in housing finance by providing tailored financial products, capacity-building programs, and advocacy for legal reforms that protect women's rights to property ownership.

By leveraging its expertise and financial resources, ADB aims to foster inclusive economic growth and social development in India and across the Asia-Pacific region. The bank's commitment to promoting gender equality in housing finance aligns with broader goals of reducing poverty, enhancing resilience to climate change, and achieving sustainable development outcomes that benefit all members of society.

Asian Development Bank and IIFL Home Finance Ltd.

To address the significant challenges hindering women's access to affordable and sustainable housing in India, the Asian Development Bank (ADB) has allocated \$1 million for a Technical Assistance Partnership. This initiative is specifically designed to enhance the ecosystem that supports women in accessing green, affordable housing solutions. This forms part of a larger \$68 million loan agreement with IIFL Home Finance (IIFL HFL), aimed at increasing women's access to such housing options.

The partnership between ADB and IIFL HFL underscores a commitment to leveraging private sector involvement to promote inclusive, energy-efficient, low-carbon, and climate-resilient housing markets. By integrating green building practices into affordable housing solutions, ADB not only supports environmental sustainability but also creates opportunities for women to secure housing finance on equitable terms. This initiative is crucial in breaking down barriers that women face due to limited income and traditional gender norms that often restrict their access to financial services and property ownership.

In the words of Susan Olsen, Senior Investment Specialist, Private Sector Operations Department, Asian Development Bank,



Susan Olsen
Senior Investment Specialist,
Private Sector Operations
Department,
Asian Development Bank



We chose IIFL Home Finance to work within this sector for four reasons.

First and foremost, because of IIFL Home Finance's remarkable vision and leadership. Being the pioneer of the subject already, they established that it is possible to provide affordable housing in India – which can also be green certified.

The second reason is that IIFL Home Loans really stands out in its determination to build in-house expertise and develop a range of solutions. IIFL Home Loans' Green Value Partner team supports developers with the needed information and technical help for them to build in compliance with climate resilient standards, and get certified by India's prevalent green rating agencies such as IGBC and GRIHA.

The third reason is that IIFL Home Finance also has perfected their systems to lend, give home loans to lower, economically weaker segments at scale. Their strong portfolio quality, wider reach and deliberate focus on women borrowers makes them a great development partner for ADB.

The last reason is IIFL Home Finance's great capacity to build partnerships and share knowledge. It's unique for a private sector company to take on a mission of setting up a platform for dialogue and awareness building on green housing issues. IIFL Home Loans have taken on this challenge through the Kutumb platforms across India that brings together all the stakeholders, the developers, the policy makers, the state and the local housing boards, bringing the community and relevant stakeholders into this ecosystem.

ADB is pleased to give the funding and the technical assistance to IIFL Home Finance Ltd. and we support their efforts for them to continue their work in India in the green affordable housing journey.



Monu Ratra, CEO and ED of IIFL Home Finance, emphasized the transformative impact of ADB's funding in expanding the reach of green affordable housing across deeper markets in India. This partnership reflects a shared vision to fulfill the aspirations of Indian families, particularly women, to attain homeownership and economic stability. By providing financial resources and technical expertise, ADB and IIFL HFL aim to empower women economically and socially, thereby contributing to broader gender equality and empowerment objectives in India.

Through collaborative efforts like these, ADB continues to play a pivotal role in advancing sustainable development goals in Asia and the Pacific. By integrating green building practices, enhancing financial access, and advocating for gender-inclusive policies, ADB not only addresses housing challenges but also contributes significantly to poverty reduction and economic development in the region. Moreover, these initiatives are essential in mitigating the impacts of climate change by promoting climate-resilient housing solutions that benefit communities and ecosystems alike.

In conclusion, ADB's initiatives in housing and gender equality underscore its mission to achieve prosperous, inclusive, resilient, and sustainable communities across Asia and the Pacific. By catalyzing investments in green affordable housing and promoting women's economic empowerment, ADB continues to demonstrate leadership in fostering equitable development and addressing the challenges of our time.

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IIFL HOME FINANCE LIMITED

IIFL Home Finance Ltd. is dedicated to providing affordable home loans, empowering the EWS/LIG segments to achieve homeownership. The company champions ecofriendly building practices, promoting sustainable development. With a state-of-the-art IT infrastructure offers a seamless loan experience, streamlining the process from application to closure. The company's asset-light model, enabled by co-lending arrangements, allows expansion of their reach into deeper markets across India. IIFL Home Finance Ltd. goes beyond financing homes. They contribute to building a sustainable and inclusive future, one affordable home at a time.

IIFL Home Finance Ltd., India's leading affordable housing finance company is a subsidiary of IIFL Finance Ltd., with 79.59% shareholding, while Abu Dhabi Investment Authority acquired 20.41% stake in the company in 2022.

Who We Are

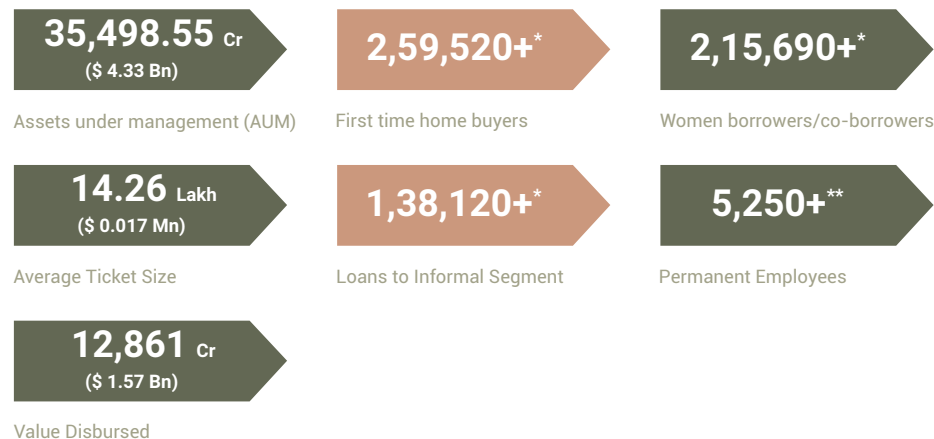
At IIFL Home Loans, our primary focus is on empowering first-time home buyers, particularly from the Economically Weaker Sections (EWS) and Lower Income Groups (LIG), across 17 states in India. We understand the unique challenges faced by these communities in securing housing, and we are committed to providing them with the support they need to achieve their dream of owning a home.

To further this mission, we have introduced various co-lending initiatives that align with the government's objective of enhancing credit availability for marginalized communities. These initiatives are designed to offer accessible interest rates, making home ownership more achievable for individuals and families who may otherwise find it difficult to secure financing.

Our extensive pan-India distribution network is a testament to our dedication to reach every corner of the country. Spanning Tier 1, 2, 3, and 4 cities and towns, our network ensures that our home loan solutions are not only available in major metropolitan areas but also in smaller cities and rural regions. This wide distribution allows us to serve a diverse customer base and bring the dream of home ownership within reach for many more people.

Through our efforts, we aim to make a significant impact on the housing sector by providing equitable access to affordable home loans, thereby contributing to the overall economic development and upliftment of marginalized communities in India.

Key Highlights



*Data as on March 31st, 2024, since inception
**Data inclusive of IIFL Sales

Our Presence

We have an extensive footprint across the country, enabling us to fulfil our commitment of 'housing for all'.

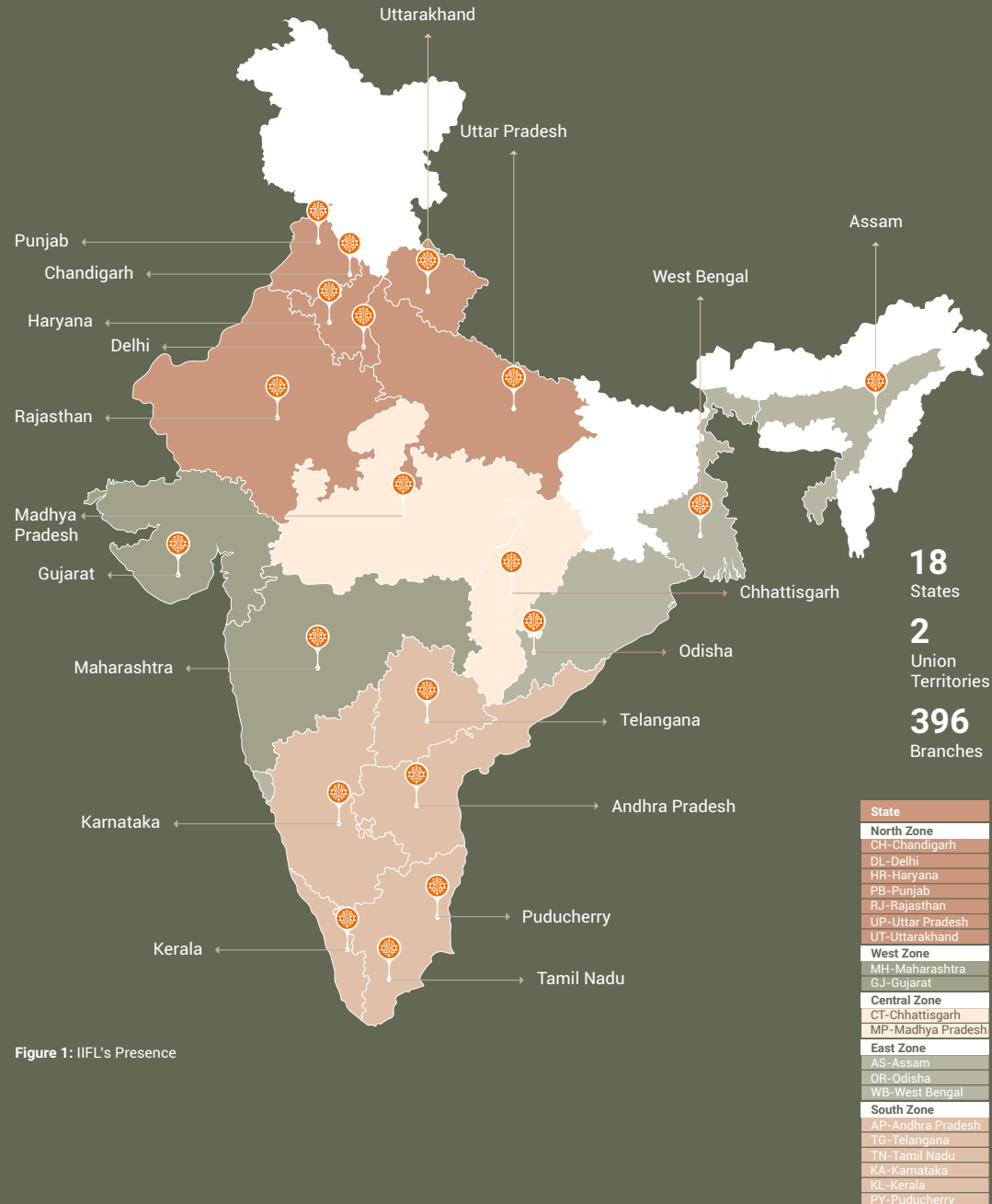


Figure 1: IIFL's Presence

Our Affordable and Accessible Products

#Sapnonkosachkarnekaseedharaasta

Home Loan

We not only offer home loan solutions for the purchase, construction and renovation of homes, we believe in creating spaces for the masses of the country. To enhance affordability and accessibility of home loans, we have implemented a streamlined process with minimal documentation and facilitate quick approvals within 30 minutes, our 'Jhatpat' solution. We recognise the importance of supporting first-time homebuyers, particularly those from the Economically Weaker Section (EWS) and Lower Income Groups (LIG). Therefore, we offer competitive interest rates and flexible repayment terms. By focusing on the needs of the underserved, we are also contributing to the nation's vision of financial inclusion and broader economic development.

2,98,160+*

Overall Customers

2,59,520+

First Time Home Buyers

2,09,650

Active Customers

₹ 15.28 Lakh
(\$ 0.018 Mn)

Average Ticket Size

73,000+

Loans to CLSS Beneficiaries

₹ 1,753 Cr
(\$ 218.75 Mn)

Credit Linked Subsidy (Under PMAY) Facilitated

1,38,120+*

Loans to People from Informal Sector

26,690+

Loans Disbursed to BLC households

₹ 694.05 Cr
(\$ 0.84 Mn)

Disbursed to Beneficiary Led Construction (BLC) and Affordable Housing in Partnership (AHP) in FY 2023-24

Secured Business Loans

Our Secured Business Loans offers financial support for small businesses against property collateral. It helps to meet working capital requirements and provides immediate financial assistance for funding business expansion, launching new products and augmenting existing infrastructure. It provides access to larger loan amounts, competitive interest rates and flexible repayment schedules.

25.54 Lakh
(\$ 0.03 Mn)

Average Ticket Size

57,490+*

MSMEs Empowered

1421.57* Cr
(\$ 173.36 Mn)

Value Disbursed

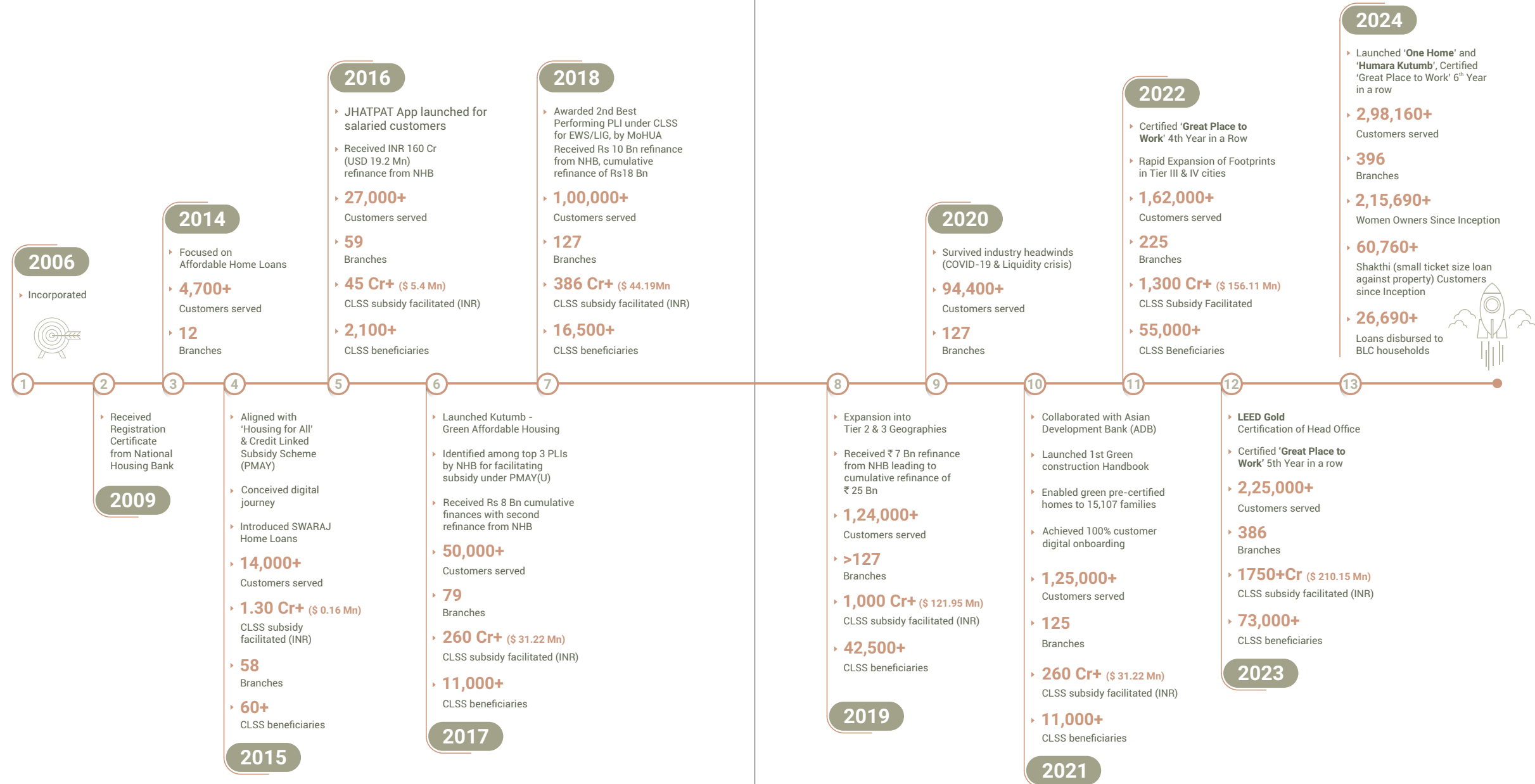
Shakthi Loan

Shakthi Loan is a specialised Loan Against Property tailored for small businesses and unorganised sectors in India, such as shopkeepers, grocers, etc. providing them with quick and easy access to funds for scaling up day-to-day operations. The loans are

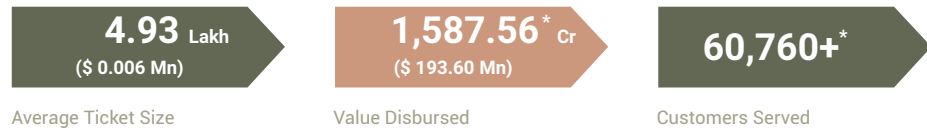
*Data as on March 31st, 2024, since inception

Our Journey

Through Milestones and Achievements



swiftly approved within 30-minutes and enables people from underserved and informal sections of society to conveniently avail credit. It aims to provide credit solutions to last-mile micro businesses such as grocery stores, vegetable vendors, small traders, salons and other businesses engaged in the unorganised sector. With lower interest rates, flexible loan repayment tenures, top-up facility and simple documentation processes, Shakthi Loans are designed to offer the power of financial inclusion to economically weaker sections of society.



Expanded Lending Services

Efficient Co-Lending Model

Our co-lending model aims to enhance access to affordable housing finance in partnership with major banks. This initiative aligns with the government's efforts to provide credit to marginalised segments, ensuring availability of home loans at competitive rates.

Home Loan for Uniformed Services

Dedicated to India's defence and paramilitary forces, this loan offers exclusive benefits such as reduced interest rates, minimal processing fees and complimentary health insurance up to H3 Lakh.

Green Value Partners

The construction industry heavily consumes non-renewable resources and contributes significantly to CO2 emissions. In India, buildings use over 30% of the country's electricity, and with two-thirds of future buildings yet to be constructed, the impact is set to increase. To combat this, IIFL Home Loans has launched Green Value Partner (GVP), focusing on green affordable housing. GVP aims to reduce environmental impact by fostering local innovations that can be scaled nationwide, promoting sustainable and affordable development for maximum impact.



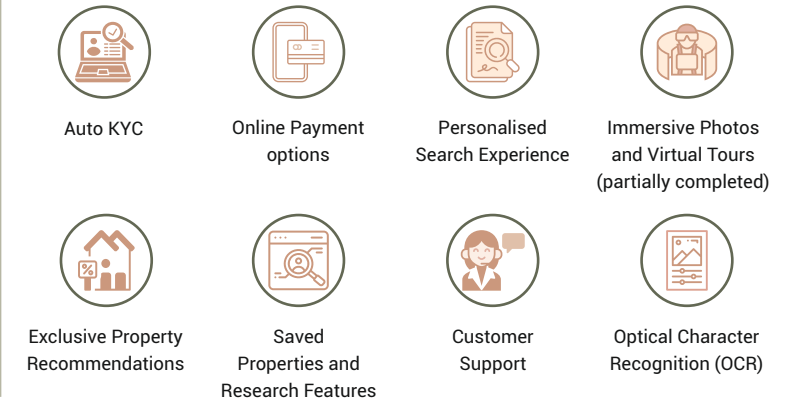
IIFL One Home

In August 2023, we introduced 'One Home,' an innovative and pioneering B2C and B2B real estate platform designed to facilitate the property journey for individuals and partners alike. This fully digitised platform enables potential buyers to list properties and participate in e-auctions efficiently and effectively. One Home empowers property seekers through its website, while also simplifying auction processes for banks and non-banking financial companies (NBFCs), facilitating the sale of their non-performing assets (NPAs).

Data as on March 31, 2024, since inception

Platform Features

One Home offers a comprehensive suite of features for both partners and customers. Key functionalities for partners include Property Management, Auction Management, Payment Management, User Access Management, and Lead Management. For customers, the platform provides:



Inception and Conceptualisation

Recognizing the need for a unified platform for e-auctions and property transactions, One Home was launched on August 16, 2023. The platform offers a seamless, end-to-end digital e-auction process, making participation, bidding, and purchasing straightforward. One Home stands out in the real estate sector by providing a fully digital solution, enabling partners to sell NPA properties efficiently.

Since its launch, One Home has achieved significant milestones. The platform has successfully facilitated hundreds of transactions, demonstrating its reliability and user-friendly interface. It has attracted numerous partners, including leading banks and financial institutions, who have leveraged the platform to streamline their property sales processes. Additionally, One Home's robust security measures and transparent bidding system have earned it a reputation for trustworthiness and efficiency in the real estate market.



E-Auction Advantage

One Home's e-auction platform provides a unique advantage by allowing users to purchase properties compliant with the SARFAESI Act at competitive prices. Benefits of the e-auction feature include:

Free of Cost Services

No Additional Transaction Costs

Multiple E-auction Property Options

Complete Paperless Process

Efficient Customer Service

Grievance Redressal

Simple and Convenient Transactions

The One Home App enhances user experience by enabling property transactions through a mobile interface.

Industry Position

One Home distinguishes itself as the only end-to-end digitised e-auction platform, offering a new-age real estate experience that allows users to select and purchase properties from any location. Unique features include:

Free of Cost Services

No Additional Transaction Costs

Multiple E-auction Property Options

Complete Paperless Process

Efficient Customer Service

Grievance Redressal

Simple and Convenient Transactions

Future Vision

One Home is `will continue to create a transparent and digitised system that allows customers to select properties with comprehensive awareness of legal titles, encumbrances, values, pending dues, surrounding developments, and infrastructure facilities. We will also assist partners in efficiently publishing, managing, and reaching a wider network with digital transparency in regulatory compliance.

ESG at IIFL HFL

At IIFL HFL, the concept of sustainability encompasses our environmental, social, and governance aspects, which collectively contribute to fostering inclusive growth. This notion considers the environment in which we operate, the community with which we engage, our human resources, who are integral to our success, and our governance structure, which provides exceptional leadership to achieve our objectives.

ESG Framework and Policy

Our integrated vision and focus on efficiency, management, and productivity has laid the path of creating value by incorporating Environmental, Social, and Governance (ESG) initiatives within our business ecosystem. Our ESG framework lays the foundation for integrating critical ESG aspects in our core business functions and operational boundary. At IIFL Home Finance, at the core of the Company, we have defined a robust ESG ecosystem as a part of our DNA. Our approach towards ESG involves strong ESG framework and policies, the measurement metrics, operations, diligent monitoring, and transparent and effective reporting. The four pillars, i.e. Integrating ESG with Business, Creating Social Impact, Enabling Human Capital, and Enriching our Risk and Lending Approach brings on board not only our employees and customers, but also the other stakeholders, our society, the environment and the immediate ecosystem in which we operate.

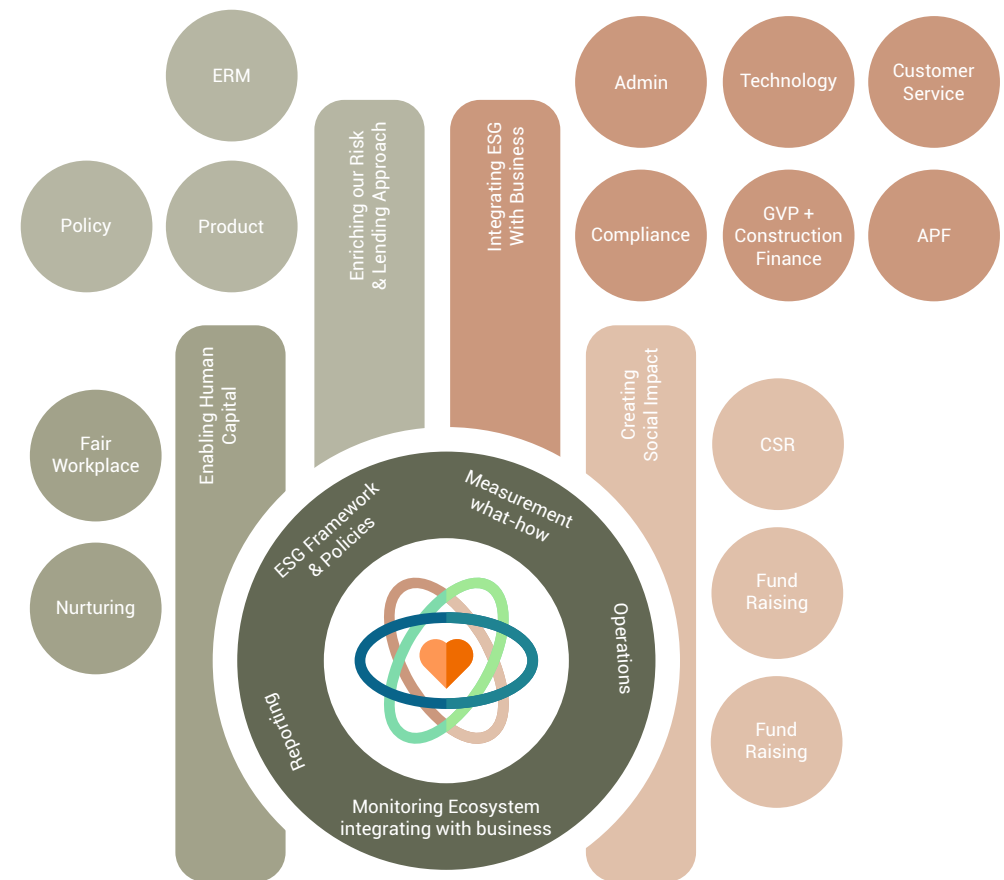


Figure 2: ESG CORE at IIFL HFL

Kutumb

IIFL HFL has embarked on a series of pioneering industry initiatives with an unwavering commitment to advancing green affordable housing in our nation. Through our esteemed knowledge platform, Kutumb, we have successfully brought together a diverse range of housing industry stakeholders. This includes developers, policymakers, architects, academicians, green rating agencies, and financial institutions, all united in our shared vision. Kutumb serves as a vibrant hub where ideas are exchanged, collaborations are forged, and innovative solutions are born. By fostering this collaborative ecosystem, we are driving transformative change and propelling the growth of green affordable housing throughout the country. Together, we are shaping the future of housing, creating sustainable communities, and ensuring a brighter tomorrow for all.



16

KUTUMB platforms

2,850+

Participants

1,050+

Developers

140+

Expert Sessions

Figure 3: Impact Kutumb



Figure 4: Kutumb 2 | Indore



Figure 5: Kutumb 3 | Pune

Disha

Represents a collection of community engagement activities that are implemented in specifically chosen EWS/LIG housing societies. The primary objective of DISHA is to inspire children and women residing in these households to embrace sustainable lifestyles. Through these activities, we aim to foster a greater understanding and appreciation for the importance of climate change mitigation, water, and energy conservation, and minimising our ecological footprints. By empowering individuals within these communities, we strive to create a positive and lasting impact on the environment and promote a sustainable future.



DISHA Smart Village is a series of community engagement events in the rural areas of Gujarat, designed to educate families in rural households with the aim of: Promoting the adoption of sustainable living practices in their day to day lives Encouraging active contributions towards climate change control and become change agent Emphasising the importance of water, energy preservation and reduction of carbon footprints To ensure the success of this initiative, IIFL HFL has partnered with 'The Social Lab' (TSL) to develop content for the workshops, while 'Gram Haat' serves as the implementation agency. The 'DISHA SMART VILLAGE' project has identified 30 villages in Gujarat, grouped into five different clusters, as the target locations.



Figure 6: Workshop on Sustainable Living Practices



Figure 7: Children planting saplings

Humara Kutumb

The ecosystem for green self built homes requires intervention across the value chain of the building and construction industry and its stakeholders. The key driver in this chain remains the customer / end customer, whose choices and knowledge dictate the direction for building materials and green measures. This activity aims to pilot a successful owner driven green home construction program , aiming to influence and inform the end consumer on best practices, for sustainable and low carbon growth. These sustainable houses will enable climate resilient shelter, water resource revival, disaster preparedness, etc.



Figure 8: Humara Kutumb Workshop in Andhra Pradesh



Figure 9: Group photo of Humara Kutumb Workshop

Building Green: Guide to Sustainable Affordable Housing

IIFL HFL has championed sustainability in housing by collaborating with renowned architect Ashok B. Lall to create the Sustainable Housing Handbook. This comprehensive guide, enriched by Lall's expertise in environmentally and socially sustainable development, offers invaluable insights into sustainable design and construction practices. Featuring a notable contribution from CDD on water efficiency, the handbook provides critical strategies for effective water management and conservation. Covering diverse topics from energy efficiency to waste management, it serves as a vital resource for developers, architects, engineers, and homeowners. The handbook also aids developers in achieving green ratings, promoting sustainable practices and paving the way for a greener, more resilient built environment.

BUILDING GREEN

IIFL Home Loans' Guide to Sustainable Affordable Housing

IIFL HOME LOAN

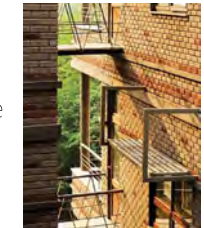


Figure 10: Sustainable Housing Handbook

Green Value Partners

The Green Value Partner (GVP) initiative at IIFL HFL was launched in response to the environmental challenges posed by the construction industry, which is a major consumer of non-renewable resources and a significant contributor to CO2 emissions. Recognizing the industry's impact, particularly its substantial electricity use, IIFL Home Loans aimed to bridge the gap between the potential for energy conservation and the lack of awareness about green building concepts among developers. GVP was created to promote green affordable housing in India, supporting sustainable practices and encouraging innovation at the local level.

Through GVP, IIFL Home Loans empowers communities to identify and implement sustainable solutions that can be replicated and scaled nationwide. This strategic initiative positions IIFL Home Loans as a catalyst for sustainable development, fostering a broader cultural shift towards environmentally friendly practices in the construction sector. By educating potential developers about green building concepts and supporting the adoption of these practices, GVP contributes to a greener, more sustainable future.

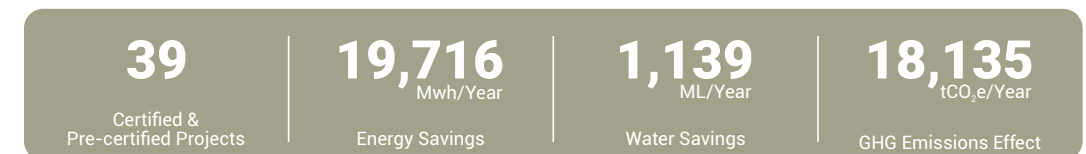
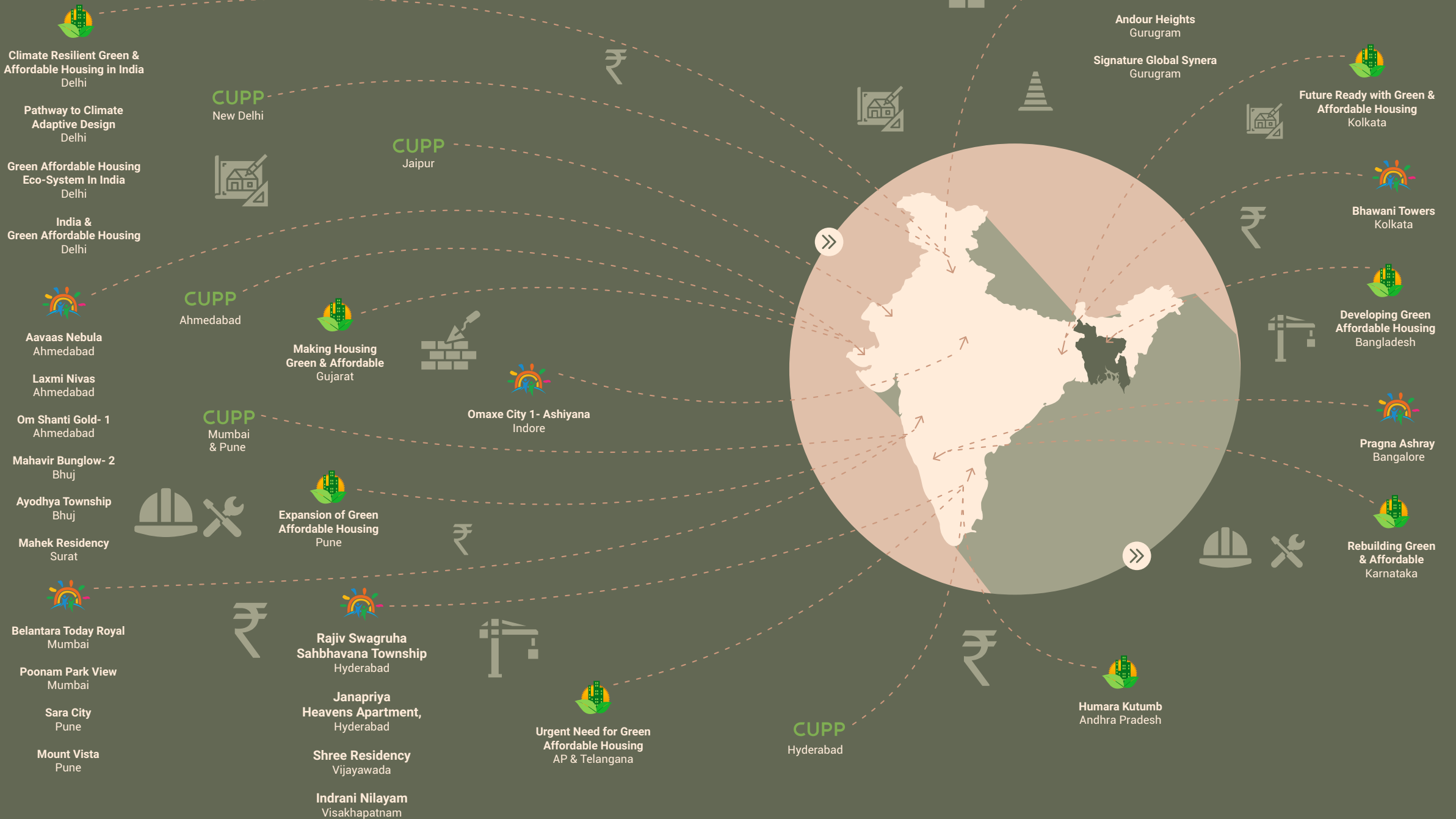


Figure 11: Impact through IIFL HFL GVPs

Sharing Knowledge, Bringing Innovation & Capacity Development



This map is a generalized illustration only for the readers' ease in understanding the locations and is not intended to be used for reference purposes. The representation of political boundaries and the names of geographical features/states do not necessarily reflect the actual position. The Company or any of its directors, officers or employees cannot be held responsible for any misuse or misinterpretation of any information or design thereof. The Company does not warrant or represent any kind in connection to its accuracy or completeness.

Rewarded for Excellence



Dun & Bradstreet India has acclaimed IIFL Home Loans as India's Leading Housing Finance Company (Mid)*



Our Integrated Annual Report 2022-23 has secured multiple certifications in the LACP VISION AWARDS*



UBS Forums Sustainability Summit and Awards 2023 Sustainable Best Initiative of the Year and Sustainability Impact



Our environment leadership in the green housing industry has been recognised by Frost and Sullivan*



3rd ESG Summit and Awards Best ESG performance in Financial Inclusion



India Sustainability Conclave and Awards 2023 Best Sustainable Initiative to Reduce Carbon Footprint

Table 1: Awards & Accolades

S.No	Category	Title of the Award	Agency
1	ESG	Greenhouse Gas Emissions Project	The Golden Globe Tigers Awards
2	ESG	Sustainable and Green Housing under 'Kutumb Initiative'	Inkspell India Content Leadership Award 2022
3	Communication	PR & Communication Excellence Awards 2023- The Kutumb Initiative	Stakes PR and Communications Excellence Awards 2023
4	Technology	Best Lending Tech of the year Award	The Corporate Titan Awards
5	Technology	Best Financial Innovation	Inkspell 7th Annual DoD 2022
6	Technology	BFSI Award for Quick Loan Approval	The Iconic Platinum Awards
7	Technology	Best Use of Mobile Technology in Financial Services	ET Ascent Business Leader of the Year
8	CSR	Successful use of CSR Activities	12 th ACEF Global Customer Engagement Forum and Awards
9	Affordable Housing	Outstanding Leader in Affordable Housing Finance	2 nd Elets NBFC100 Leader of Excellence Awards
10	Brand Campaign	Cross Channel Marketing Campaign	Inkspell 8 th Annual DoD 2023
11	HR	Great Place to Work- 2024-25	Great Place to Work

In addition to the aforementioned accolades, IIFL has garnered further recognition through a multitude of awards, detailed above in Table 1.

EXECUTIVE SUMMARY

Housing in India

Housing in India confronts a myriad of challenges that have been compounded by rapid urbanization and shifting demographics. By 2030, it is anticipated that nearly 600 million Indians will reside in urban areas, intensifying the demand for adequate and affordable housing solutions across the country. This underscores the critical necessity for inclusive and sustainable approaches that can effectively cater to diverse income segments.

Government initiatives, such as the Pradhan Mantri Awas Yojana (PMAY), launched in 2015, have emerged as pivotal interventions aimed at addressing the housing shortage in India. PMAY specifically targets three main socio-economic groups: economically weaker sections (EWS), low-income groups (LIG), and the middle-income group (MIG). Through financial assistance and incentives, PMAY has significantly bolstered the housing finance industry, with Housing Finance Companies (HFCs) reporting robust annual growth rates of 17-18% since its inception. This initiative has not only stimulated construction activities but has also improved access to affordable housing for millions of households across the country.

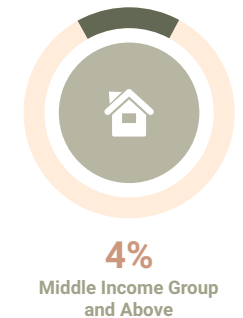
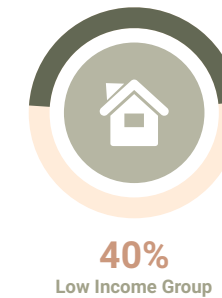
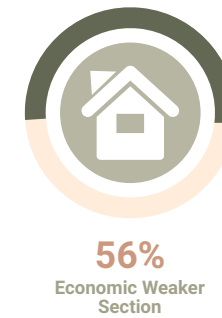


Figure 12: Urban Housing Shortage Among Socio-Economic Groups

However, despite these efforts, affordable housing remains a critical challenge across various income segments in India. The middle-income group (MIG), influenced by globalization and economic aspirations, increasingly seeks housing options that offer modern amenities and comfortable living spaces. In contrast, economically weaker sections (EWS) and low-income groups (LIG) encounter substantial barriers in accessing even basic and affordable housing options that fulfill their fundamental needs for security and stability. This glaring disparity between housing demand and supply highlights the urgent need for comprehensive policies and initiatives that can address the diverse housing requirements of India's socio-economic spectrum.

Moreover, the challenges extend beyond mere availability to include quality and sustainability. Many existing housing options fail to meet basic standards of safety, hygiene, and environmental sustainability, exacerbating health risks and contributing to environmental degradation. This underscores the imperative for integrating sustainable practices into housing development, promoting energy efficiency, resource conservation, and environmentally friendly construction materials.

Private Sector Response and Challenges

Private developers are pivotal in addressing India's housing challenges, especially during economic downturns when government initiatives may not fully meet the demand alone. Their agility and capability in swiftly providing affordable housing solutions have been instrumental in catering to the diverse housing needs of urban and semi-urban populations across the country.

Private developers fulfill a crucial role in bridging the housing gap by leveraging their expertise in construction, financing, and

Source: Estimate of the Technical Group on Urban Housing Shortage (TG-12) (2012-17) constituted by NBO, M/o Housing & Urban Poverty Alleviation

market insights. They contribute significantly to the expansion of housing stock, particularly in urban areas where the demand for housing is most acute. By introducing innovative designs and amenities, private developers not only cater to basic housing needs but also enhance the quality of life for residents.

However, despite their contributions, private sector efforts encounter formidable challenges in land acquisition and development processes. One of the primary obstacles is the complexity of land acquisition, which involves navigating through a maze of legal frameworks, bureaucratic procedures, and regulatory approvals. These complexities often lead to delays in project execution, increasing costs, and impacting the feasibility of affordable housing projects.

Corruption within the land acquisition process further complicates matters, adding to the financial burden and legal uncertainties faced by developers. Bribery and unethical practices can inflate land costs and introduce uncertainties that deter potential investors, undermining the viability of affordable housing initiatives.

Socio-political issues also play a significant role in hindering private sector efforts in land acquisition and development. Local opposition, community resistance, and conflicting interests among stakeholders can stall projects indefinitely. Such conflicts often arise due to concerns over displacement, environmental impacts, and inadequate compensation for affected communities.

Mapping regions with significant land acquisition disputes provides valuable insights into these hurdles. It helps identify areas where regulatory reforms, transparent processes, and community engagement are most urgently needed to streamline land acquisition and development procedures. By addressing these challenges, policymakers can create a more conducive environment for private developers to contribute effectively to India's housing sector, thereby fostering sustainable urban development and improving housing accessibility for all income groups.

Emerging Trends in Green Housing

Emerging Trends in Green Housing reflect a significant shift towards sustainable practices in India's housing sector, driven by increasing environmental awareness and the pursuit of cost-effective, energy-efficient solutions. This movement is gaining momentum as developers and residents alike recognize the long-term benefits of environmentally friendly housing options.

Affordable green housing is becoming increasingly popular due to its potential to reduce environmental impact while offering economic benefits through lower energy costs and improved health outcomes. These homes are designed to minimize resource consumption, utilize renewable energy sources, and incorporate eco-friendly materials that contribute to better indoor air quality and overall sustainability.

Projections for the growth of green building certifications in both urban and rural areas underscore a growing preference for sustainable living. Developers are increasingly integrating green building principles into their projects to meet the demand for environmentally responsible housing solutions. Residents, in turn, are drawn to these homes for their reduced ecological footprint and potential long-term cost savings on utilities and maintenance. The investment opportunities in the green housing sector are substantial, estimated to range between USD 35 billion and USD 50 billion by 2022. This estimation reflects the growing interest from investors and financial institutions in supporting sustainable development within India's affordable housing market. Investments in green building initiatives not only promote environmental sustainability but also align with global trends towards reducing carbon emissions and enhancing energy efficiency.

Moreover, government incentives and policies that promote green building practices further bolster the attractiveness of investing in sustainable housing projects. These policies include tax incentives, subsidies for renewable energy installations, and regulatory frameworks that encourage developers to adhere to green building standards.

In conclusion, the shift towards green housing in India represents a transformative trend in the housing sector, driven by environmental consciousness, economic benefits, and policy support. By embracing sustainable practices and investing in green building initiatives, India can foster a more resilient and environmentally responsible housing market, meeting the needs of both current and future generations while contributing positively to global efforts in combating climate change.

Women and Affordable Housing

Shifting the focus to a gendered perspective unveils the stark challenges women face within India's housing crisis. Discrimination, entrenched along lines of caste, class, religion, and gender, erects formidable barriers, particularly for women occupying lower-income brackets. Historically, Indian housing policies have failed to adequately address the multifaceted needs of women within households, often relegating them to a subordinate role within a monolithic "married unit." While initiatives such as the Pradhan Mantri Awas Yojana (PMAY) aim to foster women's homeownership, they inadequately confront the societal stigma attached to 'female-headed households' in India, perpetuating systemic inequalities.

The introduction of the Affordable Rental Housing Complexes (ARHCs) scheme represents an effort to provide dignified housing solutions for urban migrants. However, the lingering vacancies from past schemes underscore the imperative to glean insights from previous failures. A pivotal argument emerges concerning the disproportionate impact of housing locations on women. Distant housing from places of employment not only undermines their economic livelihoods but also amplifies vulnerability, particularly during commutes, exposing them to various safety risks and constraints on their time and mobility.

Security of tenure emerges as a critical issue, particularly as women are disproportionately vulnerable to forced evictions, further exacerbating their housing insecurity. Therefore, there is a pressing need for gender-disaggregated data to comprehensively understand the nuanced ways in which women experience housing instability and to inform targeted policy interventions.

Throughout the discourse, there's a resounding call for gender mainstreaming in housing policies, which entails not only addressing structural barriers but also ensuring meaningful representation of women in decision-making processes. Collaborative efforts among stakeholders, including government bodies, private enterprises, and civil society organizations, are deemed indispensable for crafting and implementing successful and inclusive housing policies that uphold the rights and dignity of all individuals, regardless of gender.

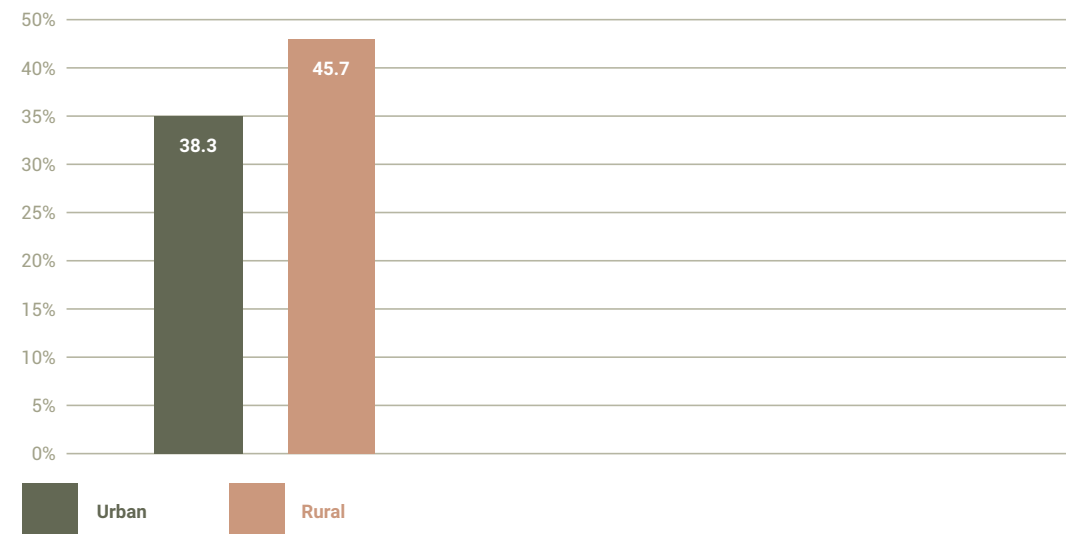


Figure 13: Women owning a house and/or land (alone or jointly with others) (%)

Source: 5th National Family Health Survey (NFHS)

India, Women and Affordable Housing: Challenges

Affordable housing in India faces a multitude of challenges and dynamics across various spheres, each of which intersects with the specific challenges women face in accessing housing. Politically, the issue of land acquisition is fraught with controversies that can disproportionately affect women, particularly those from marginalized communities. Transparent land acquisition policies could mitigate these disputes, ensuring equitable access to land for women.

Economically, fluctuations can affect the feasibility of affordable housing projects, making it challenging for women-headed households to access financing. Innovative financing models such as public-private partnerships (PPPs) can be beneficial, but they must be designed to be inclusive of women who may face barriers to accessing such financing. Spatial challenges in urban areas, including urban sprawl and insufficient infrastructure, can disproportionately impact women's access to affordable housing. Integrated urban planning with a focus on providing amenities in proximity to housing developments is essential for ensuring that women can access work, education, and healthcare without facing long commutes or safety concerns.

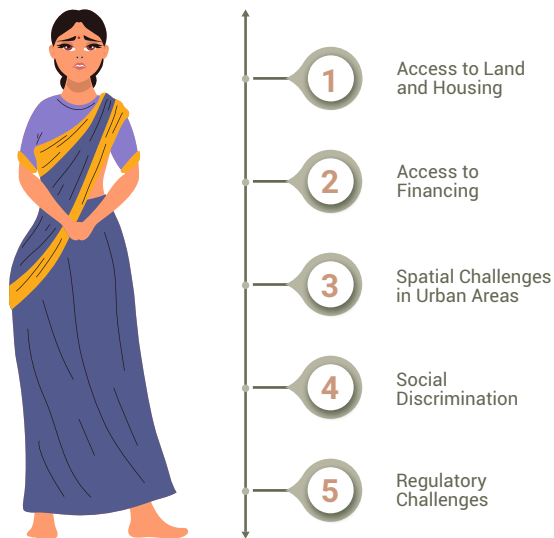


Figure 14: Challenges and Dynamics of Affordable Housing for Women in India

Ecologically, the balance between housing needs and environmental sustainability is crucial for women, who often bear the brunt of environmental degradation. Promoting green building practices can not only provide healthier living spaces but also contribute to women's well-being and empowerment. Socially, inclusivity within affordable housing communities is vital for women, who may face discrimination or exclusion based on factors like caste, class, or marital status. Designing housing complexes with communal spaces and amenities that cater to diverse communities can foster a sense of belonging and safety for women. Technologically, embracing construction technologies can enhance efficiency in housing construction, but there must be efforts to ensure that women benefit from these advancements and are not further marginalized in the construction sector.

Regulatory challenges, including compliance with building codes, can add layers of complexity to affordable housing projects, potentially increasing costs. Simplifying processes for affordable housing projects can facilitate their development and make them more accessible to women. Market dynamics play a pivotal role in determining the pricing and accessibility of affordable

housing, and there is a need to balance market forces with social objectives to ensure fair pricing and equitable access for women.

Culturally, recognizing preferences in affordable housing design is essential for fostering community identity and satisfaction, particularly for women who may have specific cultural considerations. Incorporating culturally sensitive elements into housing design can enhance the well-being and sense of belonging for women in affordable housing communities.

These challenges collectively shape the landscape of affordable housing in India, and addressing them requires a holistic and collaborative approach. Governments, private sectors, NGOs, and communities must work together to create policies and initiatives that consider the specific needs and challenges faced by women in accessing affordable housing. By overcoming these challenges, India can move closer to achieving the vision of affordable housing for all, creating sustainable, inclusive, and thriving communities for its citizens, with a particular focus on empowering women in the housing sector.

Enabling Ecosystem to Improve Access to Green Affordable Housing for Women in India: Objectives and Methodology

The discourse on affordable green housing in India reveals a complex landscape of challenges and opportunities, particularly concerning women's access to adequate and sustainable housing. As India grapples with rapid urbanization and a growing population, the need for affordable housing is undeniable. Affordable green housing not only addresses the housing shortage but also contributes to social stability, economic growth, and environmental sustainability.

However, numerous challenges must be addressed to fully realize the potential of affordable green housing, especially in the context of women's access and empowerment. These challenges range from political complexities surrounding land acquisition to legal frameworks affecting property rights, economic fluctuations impacting project feasibility, spatial challenges in urban

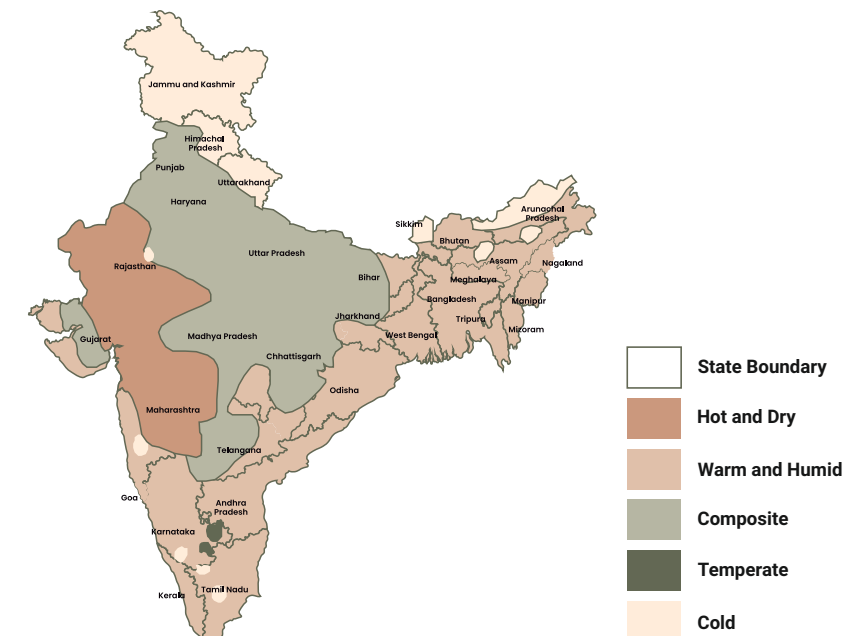


Figure 15: Climatic Zone Map of India

Source: www.climatelinks.org/resources/climate-risk-profile-india

areas, ecological sustainability, social inclusivity, technological advancements, regulatory hurdles, market dynamics, and cultural considerations in housing design.

For women, these challenges are often amplified due to societal norms, discrimination, and unequal access to resources. Women, particularly those from marginalized communities, face barriers in land ownership, access to financing, secure tenure, and inclusion within housing communities. Recognizing and addressing these gender-specific challenges is vital for creating sustainable, inclusive, and thriving communities.

A multi-faceted approach involving collaboration between governments, private sectors, NGOs, and communities is essential. Transparent land acquisition policies, streamlined property registration processes, innovative financing models, integrated urban planning, green building practices, inclusive housing design, technological advancements, simplified regulatory processes, balanced market forces, and culturally sensitive approaches are all crucial aspects.

By addressing these challenges head-on and prioritizing gender-responsive policies and initiatives, India can move closer to achieving the vision of affordable green housing for all. Empowering women in the housing sector not only improves their living conditions but also contributes to broader societal development and gender equality. In this vision of sustainable and inclusive housing, women play a central role as agents of change, fostering resilient and vibrant communities for generations to come.

Another challenge India faces because of its vast geographical expanse is the diverse climate zones and ecosystems across regions, which are subject to extreme variations in temperature, and precipitation, water availability etc. The severity of regional climate changes could impact human health and productivity, as well as essential services such as water, energy and transport infrastructure. Low income populations in India are particularly vulnerable given the high exposure of their livelihoods and homes to climate hazards, yet limited resources to protect against climate shocks. Hence, there is an urgent need to design affordable housing projects with adaptation measures to climate change that will create homes that are resilient to extreme climates in future.

The Asian Development Bank (ADB) and IIFL Home Finance Ltd. (IIFL HFL) came together through a Technical Assistance (TA) which is a pivotal effort to bolster the green building ecosystem within India's affordable housing sector. This initiative was aimed at facilitating improved access to green affordable housing for women, a key focus of the project.

THE TECHNICAL ASSISTANCE PROGRAMME

ADB provided \$1 million in technical assistance (TA) to support capacity building for IIFL Home Finance Limited as they put into effect a \$68 million loan agreement. The goal of this program was to improve women's access to affordable green housing in India, with 80% of the loan specifically allocated to women borrowers or co-borrowers in economically disadvantaged sections and low-income groups. This project was in line with India's requirement for more affordable and sustainable housing, utilizing the private sector's involvement to develop inclusive, energy-efficient, low-carbon, and climate-resilient markets.

The TA was meticulously designed to elevate the value of residential infrastructure through a multifaceted approach. It involved extensive promotional activities, engaging communities, capacity building programs, and research centered on climate resilience, gender inclusivity, and energy efficiency. Events were organized, training sessions on site risk assessment and green building certification were conducted, and tailored training materials were developed to disseminate knowledge effectively.

Moreover, a significant aspect of the TA was the research conducted on innovative and cost-effective climate-resilient construction technologies. This research aimed to identify strategies and best practices for climate-resilient housing, with a goal of creating a compendium of these approaches. Initially, the project's scope was limited to multi-family housing units constructed by developers. However, as the project progressed, the scope expanded to include self-built housing. Recognizing a gap in knowledge and resources, DIY Toolkits were developed as part of the TA. These toolkits were specifically tailored for stakeholders involved in self-built housing, including aspiring homeowners, civil work contractors, and architects/engineers/technical representatives from Housing Finance Companies (HFCs). Importantly, these DIY Toolkits were designed to cater to the diverse climatic zones across India, ensuring their applicability and effectiveness nationwide.

The technical assistance also contributed to detailed studies on building sustainable climate adapted housing as well as resource-efficient climate risk mitigating housing projects developed in a way that would meet climate adaptation standards and engage with stakeholders to increase awareness on site selection criteria, building design materials, energy efficiency processes and other features that would qualify for adaptations.

The demonstration effect of this project also contributes to building the market for and the knowledge base regarding climate adapted site selection, as well as the use of adapted construction methods to increase the supply of and demand for green affordable housing units in India. Lessons learned on building the market for affordable resilient green housing in India can then help cross-fertilize support for such models in other South Asian countries where there are market and policy guidance conducive for replication.

The TA was financed by an ADB-managed trust fund - the Urban Climate Change Resilience Trust Fund (UCCRTF), with funding from The Rockefeller Foundation and the Governments of Switzerland and the United Kingdom.



Promotion and Propagation of Green Affordable Housing

- ❖ KUTUMB (IIFL HFL's Flagship Knowledge Platform)
- ❖ Sharing Regional Experience with a Neighboring Country
- ❖ DISHA; Sustainable Living Workshops
- ❖ Study of EWS and LIG's Understanding of Sustainable Living

Capacity Building on Climate Resilient Affordable Housing, and Green Certification Process

- ❖ Design, Policy, Project Formulation and Appraisal, Site Implementation Specific Training Modules and Workshops
- ❖ DIY Toolkit for Climate Responsive Self-built Affordable Housing

Capacity Building on Climate Resilient Affordable Housing, and Green Certification Process

- ❖ Green Building Ratings; Assessment, Gaps and Improvements
- ❖ Financial Mechanism to Support Design and Operation of Climate Responsive and Resilient Affordable Housing
- ❖ Policies Recommendations and Implementation Model
- ❖ Strategies for Climate Response and Resilient
- ❖ Best Practices
- ❖ Main streaming Gender Sensitivity
- ❖ Integrating Green Lending in Affordable Housing Finance
- ❖ Unified Green Building Rating Program

Challenges

- ❖ Lack of understanding and appetite for green resilient affordable housing on the part of EWS and/or LIGs
- ❖ Low interest in developers in seeking to construct climate resilient and green certified affordable homes
- ❖ Lack of interest from state governments in actively implementing a climate adaptation measures and/or a green building policy
- ❖ Lack of required expertise and skillsets in the industry to develop innovative products

Objectives of the Technical Assistance

Promotion and Propagation of Green Affordable Housing

The Promotion & Propagation element of the collaborative project between IIFL Home Finance Limited (IIFL Home Finance) and the Asian Development Bank (ADB) represents a multifaceted and strategic approach to catalysing the adoption of Resilient & Green Affordable Housing for the Economically Weaker Section (EWS) and Low-Income Group (LIG) categories in India. This segment serves as the driving force behind raising awareness, fostering engagement, and creating a conducive ecosystem for sustainable housing practices.

❖ Strategic Awareness Campaigns

Central to this initiative is the development and execution of strategic awareness. campaigns and promotional activities. These campaigns aim to reach a wide range of stakeholders, including housing developers, regulators, government agencies, financiers, home buyers, and other key players in the affordable housing sector. Through national and global events such as 'Kutumb,' the initiative creates platforms for stakeholders to converge, share insights, and forge partnerships. These events serve as pivotal moments for knowledge exchange, showcasing best practices and inspiring action towards green and resilient housing solutions.

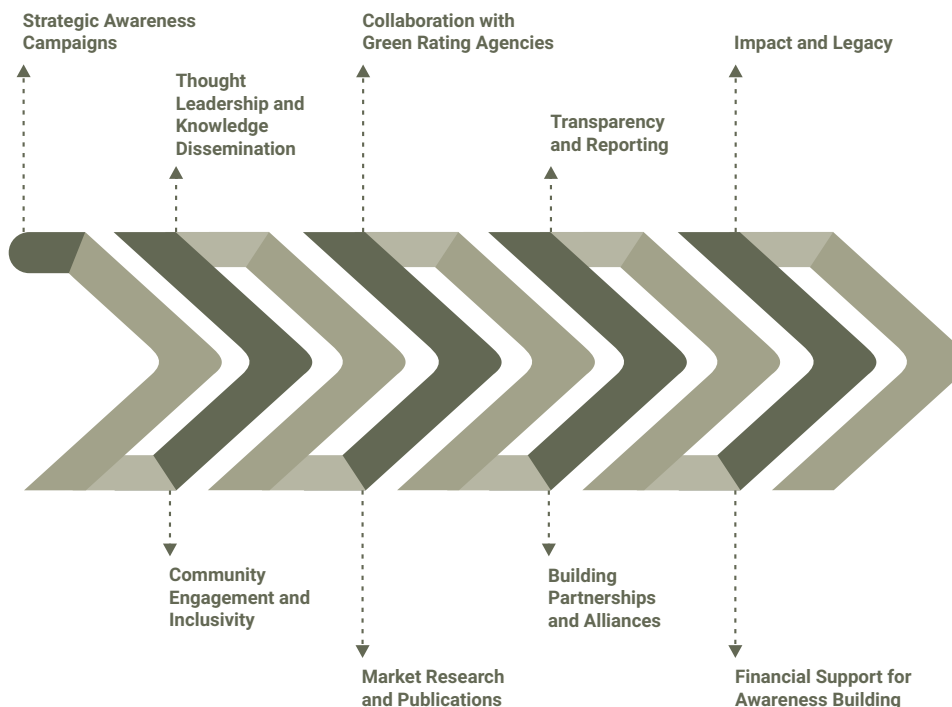


Figure 16: Promotion and Propagation of Green Affordable Housing

❖ Community Engagement and Inclusivity

The Promotion & Propagation element stands as a cornerstone in fostering vibrant community engagement, with a keen focus on potential buyers within the realm of green affordable housing, particularly targeting women and individuals from economically disadvantaged backgrounds. It underscores the critical importance of inclusivity, ensuring equitable access to the myriad benefits of sustainable housing across diverse socio-economic strata. Through an array of tailored community engagement initiatives and outreach endeavors, the project endeavors to empower potential buyers by equipping them with comprehensive insights into green housing solutions. By nurturing dialogue, raising awareness, and cultivating confidence, the initiative aims to catalyze informed decision-making processes and drive widespread adoption of sustainable housing practices.

❖ Thought Leadership and Knowledge Dissemination

In addition to events and community engagement, the project places a strong emphasis on thought leadership and knowledge dissemination. This includes the development of a 360-degree content and marketing program comprising on-ground events, online webinars, social media engagement, whitepapers, blogs, and newsletters. These mediums serve as channels to amplify the message of green affordable housing, providing valuable insights, case studies, and success stories to a wider audience. By collaborating with relevant ministries and stakeholders, the project ensures that the content is aligned with national priorities and policies.

❖ Market Research and Publications

The initiative includes comprehensive market research to assess the current awareness levels and understanding of climate-resilient green housing among potential buyers. This research serves as a baseline to identify gaps and opportunities for

improvement. The project aims to produce market research publications that not only analyze the current landscape but also provide actionable recommendations for advancing consumer understanding and demand for green affordable housing. These publications will serve as valuable resources for policymakers, industry players, and stakeholders alike.

❖ Collaboration with Green Rating Agencies

Acknowledging the significance of adhering to industry benchmarks and certifications, the project strategically partners with esteemed green rating agencies like IGBC/GRIHA. This collaborative effort guarantees alignment with evolving green building standards, ensuring consistency in messages and initiatives. Through close consultation with these agencies, tailored training materials and content are meticulously crafted, equipping stakeholders with the necessary knowledge and skills to pursue and achieve green certifications for their projects. These collaborative endeavors not only foster a deeper understanding of sustainable practices but also empower stakeholders to proactively contribute to the advancement of environmentally responsible construction practices in the industry.

❖ Building Partnerships and Alliances

Another critical aspect of the Promotion & Propagation element is the focus on building strategic partnerships and alliances. The project aims to collaborate with a diverse range of organizations, including the Ministry of Housing & Urban Affairs, Ministry of Environment, Forest and Climate Change, development finance institutions (DFIs), banks, non-governmental organizations (NGOs), and civil societies. These partnerships not only amplify the reach and impact of the project but also foster a collaborative ecosystem where stakeholders can work together towards common goals.

❖ Transparency and Reporting

Throughout the implementation of the Promotion & Propagation activities, the project maintains a transparent and accountable approach. Inception reports, progress reports at mid-point, and comprehensive completion reports will document the outcomes, lessons learned, and best practices from the promotional valuable resources for stakeholders, providing insights into effective strategies, challenges faced, and recommendations for future initiatives.

❖ Financial Support for Awareness Building

The initiative includes a component to fund promotional activities, including events, marketing campaigns, and capacity-building initiatives. The project allocates resources to support the dissemination of knowledge products, organize events such as 'Kutumb,' and conduct community engagement activities. This financial support mechanism ensures that the awareness-building efforts are sustainable and impactful.

❖ Impact and Legacy

In conclusion, the Promotion & Propagation element of the project is not just about raising awareness; it is about catalyzing a movement towards sustainable and resilient housing in India. By engaging stakeholders through strategic events, community outreach, thought leadership, and partnerships, the project aims to create a lasting impact. The ultimate goal is to shift the paradigm towards green affordable housing, where sustainability is not just a choice but a standard practice. Through transparency, collaboration, and empowerment, the project lays the foundation for a greener, more inclusive, and economically viable housing sector in India, leaving a legacy of sustainable development for generations to come.

Capacity Building for Green Affordable Housing: Bridging Knowledge Gaps for Sustainable Development

Capacity Building is pivotal in its objective to enhance the knowledge, skills, and capabilities of stakeholders across the affordable housing sector, ensuring they are well-equipped to navigate the complexities of sustainable housing practices.

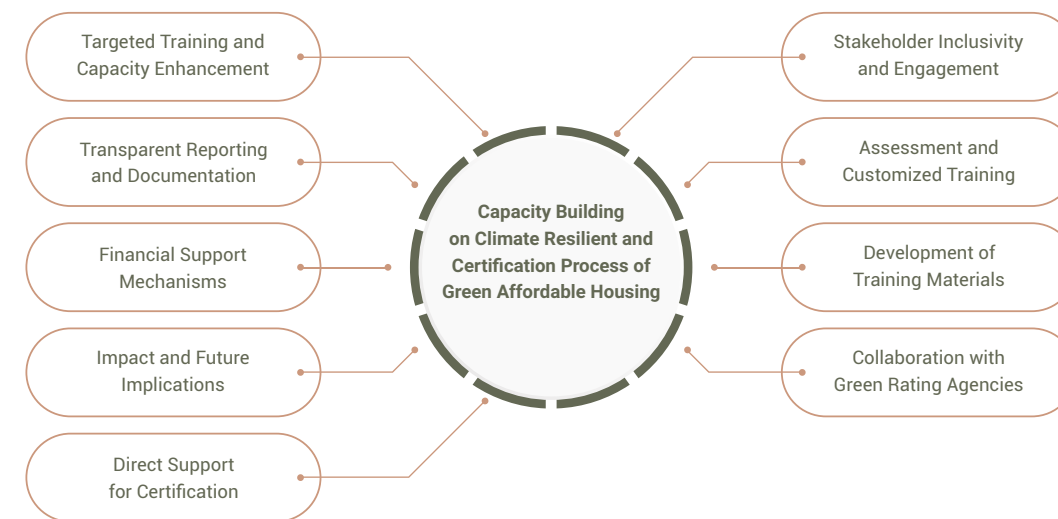


Figure 17: Objectives of Capacity Building

❖ Targeted Training and Capacity Enhancement

Central to this initiative is the objective to conduct targeted and specialized trainings, capacity-building workshops, and skill-enhancement programs. These initiatives are meticulously designed to cover critical areas such as:

- ❖ Site Risk Assessment: Equipping stakeholders with the tools and methodologies to assess and mitigate risks associated with construction sites, ensuring safety and resilience
- ❖ Climate Adaptive Design: Introducing innovative design concepts and strategies that integrate climate considerations, aiming to create housing structures that are adaptable to changing environmental conditions
- ❖ Green Building Aspects and Certification: Providing in-depth knowledge on green building principles, standards, and certification processes, enabling stakeholders to implement sustainable and eco-friendly practices in their projects

❖ Stakeholder Inclusivity and Engagement

The project recognizes the importance of engaging a diverse range of stakeholders, including housing board and development authorities, affordable housing developers, and personnel from Housing Finance Companies (HFCs), including IIFL Home Finance. By targeting these key entities, the initiative seeks to create a widespread impact, fostering a culture of sustainability and resilience across the sector.

❖ Assessment and Customized Training

An essential step in this process involves conducting assessments to understand the current levels of understanding and

expertise within the target audience. Based on these assessments, customized training sessions will be developed and delivered. These sessions will not only focus on theoretical knowledge but also emphasize practical skills and hands-on experiences. The aim is to empower stakeholders with actionable insights that they can directly apply to their roles and projects.

❖ Development of Training Materials

To support the training efforts, the project will develop a suite of comprehensive and user-friendly training materials. These materials will serve as valuable resources for stakeholders, offering guidance, best practices, and case studies. Collaboration with relevant ministries, such as the Ministry of Housing & Urban Affairs and the Ministry of Environment, Forest and Climate Change, will ensure that the training materials align with national policies and priorities.

❖ Collaboration with Green Rating Agencies

Engagement with renowned green rating agencies such as IGBC/GRIHA is a crucial aspect of the Capacity Building component. The project aims to collaborate closely with these agencies to ensure that the training messages and materials are aligned with evolving green building standards. This collaboration will also involve the development of customized training materials in consultation with the certification bodies, ensuring stakeholders are well-prepared to pursue and achieve green certifications for their projects.

❖ Direct Support for Certification

In addition to providing training, the project will offer direct support to stakeholders in obtaining individual certifications from green rating agencies. This support will include guidance throughout the certification process, assistance in meeting requirements, and resources to facilitate a smoother certification journey. By doing so, the project not only promotes the adoption of green building practices but also actively supports stakeholders in achieving recognition for their sustainable efforts.

❖ Wide-reaching Training Initiatives

The initiative sets an ambitious target of conducting training sessions for at least 35 entities across various institution types. This inclusive approach ensures that a diverse range of stakeholders, from developers to construction laborers, benefit from the capacity-building activities. By reaching a broad spectrum of individuals and organizations, the project aims to create a multiplier effect, where trained individuals become ambassadors for sustainable housing within their respective spheres of influence.

❖ Transparent Reporting and Documentation

To ensure transparency and accountability, the project will maintain a rigorous reporting mechanism. Inception reports, progress reports at mid-point, and detailed completion reports will document the journey, outcomes, and lessons learned from the training activities. These reports will not only serve as valuable records but also provide insights and recommendations for future initiatives in the realm of green affordable housing.

❖ Financial Support Mechanisms

An important aspect of the Capacity Building segment involves handling the process of reimbursing developers' expenses related to green building capacity development and associated green certification costs. This financial support mechanism aims to remove barriers to entry and incentivize stakeholders to actively engage in sustainable housing practices.

❖ Impact and Future Implications

In essence, the Capacity Building component of the project represents a significant step towards fostering a culture of sustainability, resilience and innovation within the affordable housing sector in India. By focusing on targeted trainings, collaborative initiatives with key stakeholders, and support for certification processes, the project aims to create a lasting impact. The goal is to not only improve the quality of housing but also contribute to environmental preservation, community resilience, and inclusive development. Through this initiative, stakeholders are empowered to become agents of change, driving the transformation towards greener, more sustainable, and socially inclusive housing solutions across India.

Advancing Green Affordable Housing Through Research & Innovation: a Holistic Approach to Sustainable Development

The Research & Innovation element stands as a cornerstone within the collaborative endeavour of IIFL Home Finance Limited (IIFL Home Finance) and the Asian Development Bank (ADB) under the Technical Assistance (TA) initiative. This pivotal segment is intricately crafted to explore the depths of green building ecosystems, climate adaptation strategies, and innovative solutions.



Figure 18: Key Parameters and Deliverables

❖ Assessing Green Building Programs and Codes

A primary focus of this component is to assess existing green building rating programs, codes, standards, and guidelines to determine their applicability in achieving climate-responsive, climate resilient, and gender-sensitive affordable housing in India. This assessment aims to establish a benchmark for the performance of these frameworks, identifying gaps and recommending improvements to enhance climate resilience and ease of adoption by stakeholders. By evaluating the performance of these

programs during the operational stages of affordable housing projects, economic indicators will be developed to facilitate the measurement of design and construction project performance.

❖ Mapping Decision-making Processes

In addition to program assessments, the project will map out the decision-making processes for buyers considering climate-resilient housing. This mapping aims to drive the design of actionable interventions by policymakers, builders, financiers, and other stakeholders. By understanding the factors influencing decisions related to climate-resilient housing, the project seeks to develop strategies to promote its adoption and implementation.

❖ Resource and Energy Baseline Analysis

The initiative also includes analyzing prevailing resource and energy baseline codes for their applicability to Indian affordable housing. Through this analysis, a suitable benchmark for resource and energy performance will be developed, tailored to the Indian affordable housing context. The goal is to recommend areas for improvement in existing codes and suggest actionable policy measures to enhance resource and energy efficiency in affordable housing projects.

❖ Development of Implementation Models and Policy Recommendations

Drawing from the assessments and analyses, the project will formulate implementation models and policy recommendations. These models will be based on a comprehensive understanding of green building frameworks, climate-resilient technologies, and energy performance standards. By synthesizing this information, the project aims to provide actionable guidelines for stakeholders to enhance the climate responsiveness and resilience of affordable housing projects.

❖ Innovation in Green Construction Technologies

Another critical aspect of the Research & Innovation component is the identification of cost-effective, innovative climate-resilient green construction technologies. The project will scour both domestic and global markets for technologies that can enhance the sustainability and resilience of affordable housing. Collaborating with industry partners and government agencies, the project will aim to catalyze the implementation of these technologies, potentially offering incentives to support their adoption.

❖ Unified Resilient Green Building System

Building on the identified technologies, the project will develop and publish a unified resilient green building system. This system will encompass standards tailored to the various climate zones across India. Through coordination with stakeholders including leaders, scholars, certification agencies, and government bodies, the project aims to formulate relevant policies based on innovative solutions. This unified system will serve as a blueprint for green building practices, ensuring consistency and effectiveness in climate-resilient construction.

❖ Gender-sensitive Green Housing Guidelines

Recognizing the importance of gender inclusivity, the project will also develop and publish guidelines for mainstreaming gender in green housing projects. These guidelines will address the specific considerations and needs of diverse populations, ensuring that green housing initiatives are accessible and beneficial to all. By promoting gender-sensitive approaches, the project aims to create more inclusive and equitable green housing solutions.

❖ Knowledge Dissemination and Reporting

Throughout the project, there will be a strong emphasis on knowledge dissemination. The project team will develop and upload knowledge product modules on various aspects, including climate risk assessment, green lending integration, gender-sensitive green building, and best practices in green affordable housing. These modules will be made available for public dissemination, contributing to a wider understanding and adoption of sustainable housing practices. Inception, progress, and completion reports will also be generated, documenting the outcomes, lessons learned, and policy recommendations from the project activities.

In essence, the Research & Innovation component is a comprehensive endeavor to advance the understanding, adoption, and implementation of sustainable and climate-resilient housing practices in India's affordable housing sector. By conducting thorough assessments, exploring innovative technologies, and developing actionable guidelines and policies, the project aims to create a lasting impact. Through collaboration with stakeholders and robust knowledge dissemination efforts, the project seeks to pave the way for a greener, more resilient, and inclusive affordable housing landscape in India.

Structure of this Report

Subsequent chapters of this report delve into the three elements of the Technical Assistance Program, details of the household surveys and research on the green housing ecosystem. The report is structured as follows:

Elements	Overview
1	Promotion and Propagation of Green Buildings among Industry Experts and Affordable Housing Developers
2	Capacity Building on Climate Resilient and Certification Process of Green Affordable Housing
3	Research on Climate Resilient Green Affordable Housing Certification Standards, and Innovative Technologies for Green Housing Construction
4	Objectives, Findings, Learnings, Methodology and Way Forward of all Areas

PROMOTION AND PROPAGATION



Preface By A.B. Lall



IIFL Home Finance stands at the forefront of championing Green Affordable Housing in India, with a robust presence spanning 386 branches across 16 states. Fuelled by technology-driven efficiency, the company strategically addresses the housing needs of marginalized segments, fostering a commitment to environmentally conscious practices. As a proponent of green affordable housing, IIFL collaborates closely with developers, ensuring alignment with Environmental, Social, and Governance (ESG) aspects through transparent processes.

The 'Kutumb' events, initiated in 2018 and supported by the Asian Development Bank (ADB), play a pivotal role in extending the Green Building finance message to small and medium-sized developers. Across 16 platforms engaging over 1,000 developers at various geographies, IIFL HFL aligns with Sustainable Development Goals (SDGs) and contributes to ADB's broader support for 'Green' Affordable Housing.

Key Aspects

1. Government Commitments and Sustainable Development

India's commitment to achieving net zero greenhouse gas emissions by 2070 is a cornerstone aligned with SDGs. The Ministry of Power's Eco Niwas Sanhita (ENS) plays a pivotal role in addressing climate responsiveness in Affordable Housing design, closely aligning with established Green Building Rating systems.

2. Supply Chain Dynamics and Scaling Green Affordable Housing

Under the Pradhan Mantri Awas Yojana (PMAY), individual home builders in small towns constitute 70% of beneficiaries, indicating a decentralized trend. The document underscores challenges in high-density housing, emphasizing the need for subsidies. It advocates for unlocking the full potential through small and medium-sized developers, requiring comprehensive strategies spanning policies, regulations, financing, and a sustainable supply chain.

3. Affordability and Housing Dynamics

Affordability is addressed through the promotion of group housing, emphasizing advantages such as high density, shared infrastructure, and community facilities. The document delves into crucial considerations related to land prices, Floor Space Index (FSI), building typology, processing costs, and the state of readiness.

Initiatives for Streamlining and Green Practices

1. Unified Bylaws for Affordable Housing

Recommendations include the establishment of Unified Bylaws for Affordable Housing (PMAY). These proposed bylaws enforce crucial green measures, enhancing indoor thermal comfort, reducing discomfort during extreme weather, and potentially decreasing air conditioning-related CO2 emissions by 30%.

2. State Level Special Regulations

Advocating for state-level regulations tailored to affordable housing, the document suggests adherence to unified bylaws for projects exceeding 20,000 sqm. The proposal envisions unified bylaws as a prerequisite for eligibility under PMAY.

3. Green Certification for Affordable Housing

Addressing the absence of mandatory green requirements in existing planning regulations, the document proposes a streamlined version of certifications specifically designed for affordable housing. This streamlined approach aims to simplify and reduce the costs associated with the certification process.

4. Opportunities for Developers

Emphasizing climate change resilience, the document encourages developers to focus on energy-efficient systems, water resource management, waste conversion, and the integration of rooftop solar PV. These strategies aim to enhance sustainability and bolster confidence in developers' brands.

5. Climate Change Resilience

As the challenges of climate change escalate, the document underscores the need for resilient urban development. Simple yet effective measures, such as adequate roof insulation, external window shading, and limitations on building height, can significantly reduce heat stress and energy demand for cooling. The integration of rooftop solar PV is highlighted as a crucial step toward sustainable and resilient urban growth.

This document presents a comprehensive strategy of the first area of the TA program. The forthcoming section will focus on

- I. KUTUMB platforms organized and executed at national and global level to promote awareness among housing developers, regulators, government agencies financiers, home buyers and other key stakeholders
- II. DISHA, community engagement activities with potential buyers of green affordable housing, particularly female buyers and from within the lower-income groups
- III. Market research publication on assessment of current awareness of climate resilient green housing among buyers
- IV. Other promotional activities for consumption at various platforms such as events, television, web, social media

About Gravity Concepts

Gravity Concepts stands as an exemplary force in the realm of event and experiential marketing, distinguished by its prowess in delivering mesmerizing concepts and orchestrating impactful events. Renowned for its commitment to revitalizing brands and unlocking their inherent potential, Gravity Concepts excels in forging deep emotional connections with audiences, thereby fostering heightened brand loyalty and widespread recognition. Operating within a fiercely competitive business landscape, the agency thrives by meticulously crafting seamless, engaging, and interactive experiences tailored to propel brands towards consistent growth and success.

Central to Gravity Concepts' approach is the cultivation of innovative campaigns that not only enhance brand presence but also elevate reputation and visibility to enduring heights. Specializing in crystallizing and redefining brand objectives, the agency adeptly enhances emotional connections, devises ingenious design solutions, and seamlessly integrates innovation to yield tangible and transformative outcomes. Each initiative is meticulously crafted to deliver definitive results, reflecting the agency's unwavering commitment to excellence and client satisfaction.

With a keen understanding of the diverse preferences and tastes of its clientele, Gravity Concepts prides itself on its ability to tailor events to perfection, ensuring that each experience resonates deeply with its intended audience. Recognizing the profound impact that events wield in shaping brand identities, the agency is dedicated to crafting robust, sustained, and engaging experiences that authentically showcase the unique personalities of its clients' brands.

Embodying a spirit of creativity and collaboration, Gravity Concepts boasts a rich and diverse portfolio spanning across marketing, graphics, events, art, and design. Through its partnerships with exceptional clients and involvement in a myriad of projects, the agency has consistently demonstrated its capacity for innovation and excellence, cementing its reputation as a formidable leader in the industry.

Team Structure

Leadership	► Anirudh Agarwal
Marketing Program Expert	► Charandeep Singh Nanra
Procurement Manager	► Sumit Jain ► Sameer Ranade
Public Relationship Manager	► Snehal Jadhav
Creative Designer	► Suresh Chandela

Methodology

The construction industry stands at a crossroads, grappling with significant environmental challenges that have far reaching implications for our planet's well being. As a major consumer of non renewable resources and a substantial contributor to waste generation, the industry has emerged as a critical player in the ongoing discourse on sustainability. Beyond the initial construction phase, the operational life of buildings casts a long shadow on environmental concerns. Heating and cooling alone account for a staggering 50% of energy consumption in buildings, adding urgency to the need for adopting sustainable practices throughout the entire lifecycle of structures as a blueprint for green building practices, ensuring consistency and effectiveness in

For effective impact and delivering of the first area of the TA program, IIFL HFL team did a detailed study of select regions w.r.t. status of affordable housing, local developers, assessment of the understanding of the subject, and eventually create a custom knowledge program for the audience.

With Kutumb as a platform for these select regions, developers and opinion leaders, it was imperative for IIFL HFL to also touch base and sow seeds of sustainable living and green houses amongst the retail households. While activating these households, IIFL HFL created methods of engaging with the women of the households, along with the children.

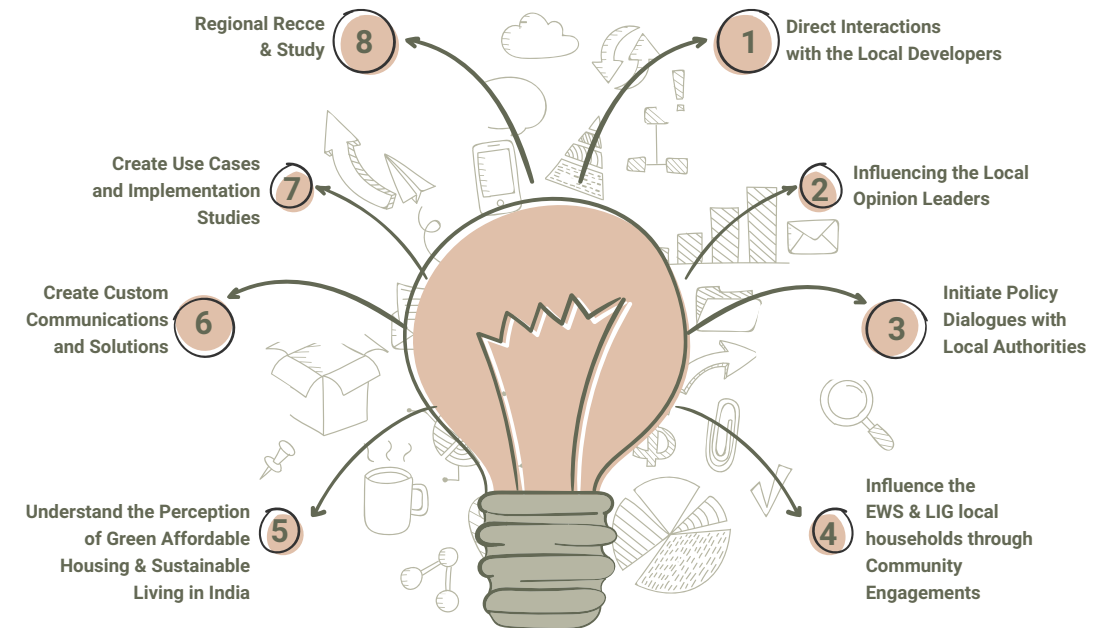


Figure 19: Key Parameters and Deliverables

Kutumb



IIFL Home Loans, in collaboration with the Asian Development Bank (ADB), launched an ambitious initiative known as Kutumb. This project aims to advance sustainable living and construction practices across India. By organizing 10 Kutumb chapters in various locations, they have created dynamic platforms for discussion and innovation within the construction industry.

Purpose and Vision

IIFL Home Loans recognizes the urgent need to address environmental degradation and climate change through sustainable living. With the Kutumb initiative, we aim to establish thought leadership, drive innovation, and inspire collective commitment to sustainable development, aligning our efforts with broader societal and environmental responsibilities.

Kutumb seeks to foster a culture of sustainability within the construction sector, promoting eco-friendly materials, energy-efficient building techniques, and sustainable design principles. By integrating these practices into home building and lending, we aim to reduce the carbon footprint of new homes and improve the quality of life for future homeowners.

We focus on educating stakeholders, including developers, builders, and homebuyers, about the long-term benefits of sustainable living. Through Kutumb, IIFL Home Loans is not only supporting the creation of sustainable homes but also contributing to a larger movement towards environmental stewardship and social responsibility. Our goal is to ensure future developments are both economically viable and environmentally sound, benefiting the community at large.



WATCH
Asian Development Bank
(ADB) & IIFL Home Finance Ltd.
Technical Assistance Partnership

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Figure 20: IIFL HFL X ADB

The Kutumb Chapters

The 10 Kutumb chapters hosted across diverse geographies have facilitated meaningful engagement among stakeholders, leaders, and experts within the construction industry. These chapters feature interactive discussions and knowledge-sharing sessions that play a crucial role in fostering collaboration, generating innovative ideas, and formulating actionable strategies to address pressing sustainability challenges.

The chapters serve as a convergence point for various industry participants, including architects, builders, policymakers, environmentalists, and financial experts. By bringing together these diverse perspectives, Kutumb creates an environment where innovative solutions can be developed and implemented. Each chapter focuses on different aspects of sustainable construction, such as green building materials, energy efficiency, waste management, and water conservation.

Impact and Outcomes:

Fostering Collaboration

By promoting dialogue and cooperation, the Kutumb chapters have encouraged the sharing of best practices and innovative solutions for sustainable construction. This collaboration has led to the creation of a network of professionals committed to advancing sustainability in the construction industry.

Thought Leadership

These events have reinforced IIFL Home Loans' position as a thought leader in the industry, driving the conversation around green and affordable housing. By leading these discussions, IIFL Home Loans has positioned itself at the forefront of sustainable development in the construction sector.

Actionable Strategies

The knowledge shared and strategies formulated during these sessions have contributed significantly to shaping a more sustainable future for the construction sector. Participants leave the chapters with concrete ideas and plans that they can implement in their own projects, driving broader industry change.

Innovation and Awareness

The initiative aims to create awareness and inspire collective action towards sustainable development, aligning with global imperatives for a more resilient built environment. By highlighting the importance of sustainability, Kutumb encourages industry stakeholders to adopt green practices and technologies.

This visionary approach, exemplified through the Kutumb platform, represents a paradigm shift in the construction industry. By fostering thought leadership and collaboration, the initiative aims to pave the way for a sustainable future where green technologies and practices become intrinsic to the construction ecosystem. This forward-looking vision benefits immediate stakeholders and contributes to the global effort to create a more sustainable and resilient built environment.

As we face significant environmental challenges, the initiative stands as a beacon, bridging the gap and illuminating the path toward a sustainable future for the construction industry and beyond. Kutumb not only addresses the immediate needs of the construction industry but also sets a long-term agenda for sustainability, ensuring that future generations inherit a healthier, more resilient environment. Through Kutumb, IIFL Home Loans and ADB are leading the charge in transforming the construction industry, demonstrating that economic development and environmental stewardship can go hand in hand.

CHAPTER I

Climate Resilient and Green Affordable Housing in India

14th December 2021

New Delhi

The objective of this Kutumb event titled 'Climate Resilient & Green Affordable Housing in India' from the above mentioned series was to sensitize the developer fraternity understand how functions such as relevant operations and maintenance in the project development lifecycle play a huge role in climate resilient housing. The panels also discussed how the available relevant policy landscape, incentives such as additional FSI, discount in development charges, rebate in property tax, etc. should encourage and promote climate resilience and affordable housing amongst the stakeholders through green building certification systems or through the Government incentives.



Lamp lighting by
Mr. S K Hota,
Mr. Nirmal Jain &
Ms. Mohua Mukherjee



Panelists discussing
'Sustainable Finance in
Affordable Housing'



Ar. Ashok B Lall
explaining the
importance of resilience
in affordable housing



Signing MoU with
Pyramid Group for facilitating
Green Certification of projects



WATCH
Kutumb New Delhi Highlights -
Climate Resilient & Green Affordable Housing
in India | Dec. '21

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Figure 21: Highlights - Climate Resilient & Green Affordable Housing in India | Dec. '21

PANEL I

Sustainable Finance in Affordable Housing

The panel focused on creating awareness about sustainability in the affordable housing sector, and emphasized the role of Development Finance Institutions (DFI) and Housing Finance Companies (HFC) in creating a scalable ecosystem. It also highlighted the importance of technical assistance provided by DFI's in sensitizing the benefits of green building to the developers as well as the end users. The rise in provision of fiscal incentives for affordable housing developers, will promote green finance, that in return will pioneer sustainable development in the affordable housing space in India in th



Figure 22: Panel 1: Sustainable Finance in Affordable Housing | Dec. '21



WATCH
Kutumb New Delhi Panel 1 -
Sustainable Finance in
Affordable Housing | Dec. '21

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"Increasing the awareness that green housing will not pinch your pocket, will pay you back in the long run"

S K Hota
MD, National Housing Bank

"We are trying to educate developers on how to make affordable houses, which are still sustainable and Sustainability here means in terms of resources, which are environmentally friendly"

Nirmal Jain
Founder & chairman, IIFL Group



"Sustainable and affordable housing are extremely critical to move towards the sustainability goals"

Priya sunder
Senior Investment Officer,
Asian Development Bank



"In countries like India, a Technical Assistance towards green and affordable housing can be really catalytic, helping all the stakeholders, to achieve specific goals. We, as a society are really in this momentum clearly"

Diane Jegam
Directrice Regionale PROPARCO
Asie du sud chez Proparco



"Affordable housing is no longer a taboo, it's a place where you can live with honor, happiness and hygiene. Waves of change are incoming"

Monu Ratra
ED & CEO, IIFL Home Finance Ltd.



PANEL II

Importance of Climate Resilience in Affordable Housing

The session emphasized on the benefits of climate resilience design in affordable housing to developers and end consumers of these housing. It focused on the importance of sustainability and how design interventions can lead to affordable green housing. Also, it highlighted the incentives offered to green housing, not only through rating systems and Government policies, but also from the operations and the maintenance point of view.

"Affordability and sustainability are co-related. If you move in the direction of sustainability with the right design decisions, you will move in the direction of affordability also"

Ar. Ashok B Lall
Principal Architect, Ashok B. Lall Architects



"Climate resilience has an impact on people, planet & the environment. So, it is particularly important to the vulnerable populations, as to how they are protected against weather disasters and how quickly can they recover from it to restore their livelihood"

Mohua Mukherjee
Economist & Green Finance Professional,
Independent Director, IIFL Home Finance Ltd.



"Building industry accounts for 22% of the global GHG emissions, and by 2050 this is expected to grow to 70%. Hence, it is important to have green building ecosystem in place."

Dr. Sejal Patel
Professor & Chair,
Faculty of Planning, CEPT



"At Signature Global Group, we have a clear mission to build green affordable housing only"

Ravi Aggarwal
Co-founder & MD,
Signature Global Group of Companies



"If we really want to keep our temperature well below 2 deg Celsius, we must invest in innovating on how we build our cities, how we produce goods & how we move. Construction & housing industry is contributing close to about 38 million of CO2 emissions globally."

Diane Jegam
Directrice Regionale PROPARCO
Asie du sud chez Proparco



Figure 23: Panel 2: Importance of Climate Resilience in Affordable Housing | Dec. 21



WATCH
Kutumb New Delhi Panel 2 -
Importance of Climate Resilience in
Affordable Housing | Dec. '21

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100+
Participants

30+
Developers

10+
Experts



Figure 24: Impact : Kutumb I

CHAPTER II

Green Gujarat: Making Housing Affordable and Sustainable

5th April 2022

Bhuj - Surat - Ahmedabad

The second edition of Kutumb, organized in collaboration with the Asian Development Bank (ADB), zeroed in on the theme 'Green Gujarat: Making Housing Affordable and Sustainable.' This instalment primarily focused on advancing discussions and initiatives aimed at promoting affordable and sustainable housing solutions within the state of Gujarat. Through a blend of physical and virtual sessions, Kutumb continues its mission of fostering knowledge-sharing and collaboration to drive positive change in India's housing landscape.



Lochan Sehra
IAS - Municipal
Commissioner,
Ahmedabad



Sandeep Virmani
IAS - Municipal Commissioner,
Ahmedabad



Yamal Vyas
Director,
National Housing Bank



Priya sunder
CFA, Senior Investment
Officer Asian
Development Bank



**Saswat
Bandyopadhyay**
Project, CEPT University
& project Director, CRDF



Monu Ratna
ED & CEO,
IIFL Home Finance Ltd.



Smruti Jukur
Urbanist, Architect & Urban
Planner, SPARC and SDI



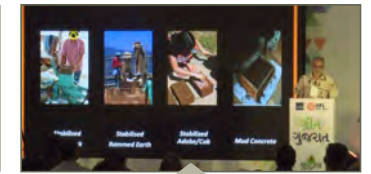
Figure 25: Impact: Kutumb Chapter II

Objectives of 'Green Gujarat: Making Housing Sustainable and Affordable' was:

- ❖ to sensitize the local developer fraternity about green buildings and rating
- ❖ understand how functions such as operations and maintenance in the project development lifecycle play a huge role in climate resilient housing
- ❖ how the available relevant policy landscape and incentives such as additional FSI, discount in development charges, rebate in property tax, etc. should encourage, and promote climate resilience and affordable housing amongst the stakeholders through green building certification systems



Panelists discussing
'Financing Green
Affordable Housing'



Mr. Sandeep Virmani
explaining the importance
of Burnt Brick / cc Block
to Stabilized Mud
Technologies



Lamp lighting by
CEO Monu Ratna



Figure 26: Watch the live streaming of kutumb 'Green Gujarat'



WATCH
Kutumb Gujarat -
Highlights | April '22

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PANEL I

Green Housing Made Easy and Affordable

The session imparted knowledge on existing green building techniques in housing, and its easy implementation and cost effectiveness. It helped the audience understand the design strategies that contribute to building resiliency and safeguarding the property against natural calamities such as earthquake and flooding. Also, it highlighted the government policies and initiatives available in the state to promote green affordable housing.

Moderated by Mr. Monu Ratra (Executive Director and CEO, IIFL Home Finance Ltd.), the first panel featured the expert insights of Mr. Lochan Sehra (Commissioner, Ahmedabad Municipal Corporation), Mr. Sandeep Virmani (Director, Hunnarshala Foundation), Mr. Saswat Bandyopadhyay (Project Director, CEPT), and Ms. Smruti Jukur (Program Leader, Society for the Promotion of Area Resource Centres - SPARC).

The building sector in India is growing at a rapid pace and contributes immensely to the growth of the economy. The increase in construction activities caters to about 40% of the total pollution produced which is alarming. Green construction practices such as use of the stabilized earth blocks (CSEB) or construction and demolition blocks in the structure, shallow domes and jack arches to reduce the RCC amount in the building, helps not only to reduce the pollution by 60-70% but also in controlling the cost. The Government of India is taking initiatives to promote Green & Affordable Housing in Gujarat, some of the initiatives being:



- ❖ Subsidies given to housing society that have rainwater harvesting system
- ❖ 10% property tax rebate to all residential buildings that install solar rooftop system
- ❖ Redemption of vehicle tax for Electric vehicles, etc.



WATCH
Kutumb 'Green Gujarat',
April 2022: Panel 1 | Green Housing
Made Easy & Affordable

Scan or
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Figure 27: Highlights - Kutumb 'Green Gujarat', April 2022: Panel 1 | Green Housing Made Easy & Affordable

As per NITI Ayog, more than 60% of the urbanization is yet to happen in Gujarat, which can be done by providing proper green and affordable housing solutions further encouraging the green building certification across Gujarat.



"Gujaratis number one in implementation of PMAY by having policy regime in 2015 before execution. The two main policies were slum redevelopment policy and provisions of affordable housing zone in cities"

- Lochan Sehra

"We can reduce the cost of construction by 25% to 30% and pollution by 60-70% by incorporating innovative design strategies like use of stabilized earth blocks (CSEB) and shallow domes or filler slabs."

- Sandeep Virmani



"Ahmedabad is considered a world heritage city due to its traditional form of urban planning and the way of constructing houses, i.e the pol housing."

- Saswat Bandyopadhyay

"It is important to encourage the right mindset and empower actions to promote building a sustainable ecosystem"

-Smruti Jukur



PANEL II

Financing Green Affordable Housing

The session emphasized on the cost benefits of green buildings through the home finance experts and the way IIFL HFL's Green Value Partners can support the developers in the process. the panel also stressed on the financial benefits and incentives that can be availed by building green. Moderated by Mr. Ajay Jasiwal (Head, Compliance, IIFL Home Finance Ltd.), the second panel featured the expert insights of Mr. Yamal Vyas (Director, National Housing Bank), Mr. Monu Ratra (Executive Director and CEO, IIFL Home Finance Ltd.) and Ms. Priya Sunder (Senior Investment Officer, Asian Development Bank).

Green housing projects are not only beneficial to society but are also a great propagation for business. Green bonds from the global markets are provided to developers at almost 25-30% cheaper rates. Technology also plays a vital role in financing green and affordable housing. Digitization of documents by Home Finance companies, such as IIFL Home Finance, has led to cost optimization, increased customer satisfaction, and made getting finances faster. Asian Development Bank (ADB), in collaboration with IIFL HFL, has started a Technical Assistance (TA) facility to sensitize the developers about green buildings and rating, its importance and its implementation in housing sector in India. Through investments given in this program, ADB and IIFL HFL aim to address the three United Nations Sustainable Development Goals, which are, elimination of poverty, gender equality and ' climate change.



"Home financing should ensure a lower interest rate and ease of paperwork to help home buyers achieve their dream of owning a home and feeling settled"

-Lochan Sehra



"Affordable Housing as a segment is a development-oriented sector in India and green Affordable Housing directly link to the Climate change goal of the SDGs."

-Priya Sunder



"Technology plays a vital role in financing Green and Affordable housing. Both Public and Private sectors need to come together to promote Green and affordable housing"

-Monu Ratra



WATCH
Kutumb 'Green Gujarat',
April 2022: Panel 2 | Financing
Green Affordable Housing

Scan or
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Figure 28: Kutumb 'Green Gujarat', April 2022: Panel 2 | Financing Green Affordable Housing

CHAPTER III

Andhra Pradesh and Telangana: Urgent Need for Green Affordable Housing

13th May, 2022

Hyderabad, Vijaywada, Rajahmundry

The Kutumb event titled 'Andhra Pradesh & Telangana: Urgent Need for Green Affordable Housing' marked the third installment in the collaborative efforts between ADB and IIFL HFL Technical Assistance series. This event was specifically designed to catalyze a transformation within the affordable housing sector in Andhra Pradesh and Telangana. Its primary objective was to cultivate a sustainability-oriented mindset among local developers by equipping them with essential knowledge about sustainable construction practices, green certification processes, and available financing options.

Hosted in Hyderabad, the event was strategically supplemented with live streaming sessions in key cities like Vijaywada, Rajahmundry, and Nellore, ensuring widespread accessibility and participation. Throughout the event, green experts engaged with

258
Participants

183
Developers

14
Women

6
Experts

Figure 29: Impact: Kutumb Chapter III



WATCH
Kutumb AP_TL - Live | Urgent
Need for Green Affordable Housing
| May '22 - IIFL Home Loans

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Figure 30: Live streaming of kutumb 'Urgent Need for Green Affordable Housing'

GREEN BUILDING MASTERS

SESSION I : Building Climate Resilient Green Housing



Ar. Ashok B Lall
Principal Architect,
Ashok B. Lall Architects

SESSION II : How to get Green Housing



S Karthikeyan
Principal,
Counsellor, CII - IGBC

SESSION III : What are the Financing Options Available



Priya Sunder
Senior Investment
Officer, ADB



Monu Ratra
ED & CEO,
IIFL Home Finance Ltd.

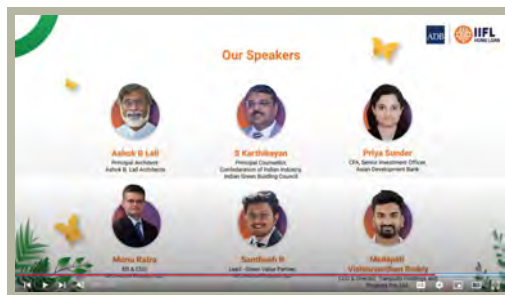
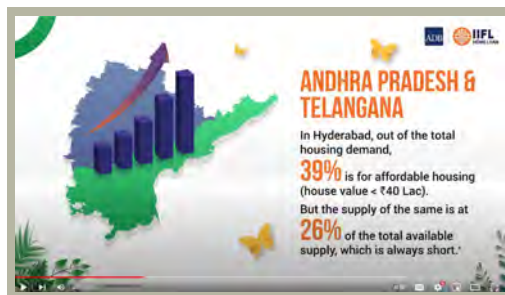
SESSION IV : Building Green Saves Cost and Energy



**Medapati
Vishnuvardhan
Reddy**
CEO & Director,
Tranquillo Holdings
and Projects Pvt. Ltd

attendees to delve into the unique challenges faced by developers in the region concerning housing construction. These discussions provided valuable insights into the local context, enabling stakeholders to identify tailored solutions and strategies to overcome obstacles and drive sustainable development in the affordable housing sector.

By fostering dialogue, knowledge exchange, and collaboration among stakeholders, the Kutumb event effectively served as a catalyst for change, laying the foundation for a more environmentally conscious and socially inclusive approach to affordable housing development in Andhra Pradesh and Telangana.



WATCH
Kutumb AP_TL - Green Affordable Housing
Need In Andhra Pradesh & Telangana |
#2 Overview | May '22

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Figure 31: Overview- 'Urgent Need for Green Affordable Housing'

PANEL I

Building Climate Resilient Green Buildings



"Proper planning at the design stage is critical to developing sustainable affordable housing efficiently."

Ar. Ashok B Lall
Principal Architect, Ashok B. Lall Architects

The first panel, led by Mr. Ashok B Lall, Principal Architect at Ashok B. Lall Architects, delved into design strategies for green and climate-resilient housing. Insights were shared on addressing the growing demand for affordable housing while navigating challenges in design, including mitigating carbon dioxide emissions in high-rise buildings. With urbanization accelerating, available land for construction is dwindling and becoming costlier. Individual housing solutions are insufficient, necessitating the rise of collective living in group housing societies. Key to affordable housing is cost-effective design that enhances occupant comfort while minimizing environmental impact, achievable through meticulous planning from the outset. Some of the key highlights:

- ❖ Low-rise and mid-rise buildings with maximum of 7 floors are more economical and affordable as they reduce the consumption of steel and concrete in comparison to typical high rises
- ❖ Approximately 60-70% of what of building material consumed for construction is steel and concrete, so it is important to make the design of building structure economical, intelligent and sustainable
- ❖ The efficient use of steel and concrete will also reduce pollution through reduction of Carbon dioxide emissions
- ❖ With efficient building envelope design using AAC blocks, roof insulation, and proper planning to get adequate daylight and ventilation inside, the usage of air-conditioners can be reduced to an extent to a noticeable reduction in energy consumption

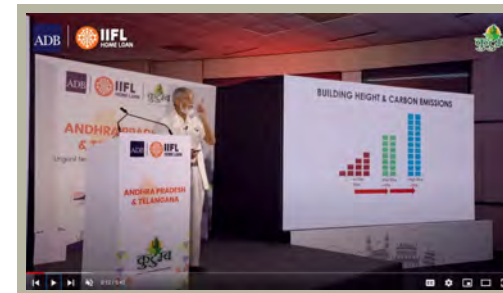
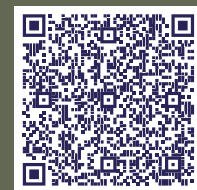


Figure 32: Panel I- Building Climate Resilient Green Buildings



WATCH
Kutumb AP_TL -
Guide To Green Affordable Housing |
ft. Mr. Ashok B. Lall | Jun. '22

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PANEL II

How to Get Green Certification?

The second panel, led by Mr. S Karthikeyan, Principal Counsellor at CII-IGBC, focused on the imperative of green buildings and the pivotal role of certification agencies in the affordable housing sector. Insights were shared on the comprehensive benefits of green building certification for both occupants and developers, emphasizing cost reduction, resource efficiency, and enhanced quality of life. Currently, India boasts nearly 8 billion square feet of green projects, reflecting a significant shift towards sustainability. This transition is propelled by the green built environment movement, positioning India as the world's second-largest green building market. Originating in the commercial sector, the green buildings movement has rapidly extended its reach to the residential segment. Key highlights include:

- ❖ Green buildings benefit first-time homeowners by reducing their energy and water bills and improving the indoor environment, which in turn uplifts the overall quality of their lives
- ❖ The green rating systems provide a holistic approach to integrate and implement sustainable design strategies, right from the design stage
- ❖ The ratings provide overall guidance required at every stage of construction along with monitoring the benefits in all the aspects of construction from energy, water & resource efficiency to the homeowners' comfort and well-being
- ❖ If sustainable design and construction practices are incorporated in the project right from the beginning, the overall cost of construction reduces.



Figure 33: Panel II - 'How to Get Green Certification'

PANEL III

What are the Financial Options Available?

The third panel featured the insights of Mr. Monu Ratra, ED & CEO, IIFL Home Finance Ltd. and Priya Sunder Senior Investment Officer, ADB. The session revolved around construction finance and the financing options available for the developers. It also emphasized on climate change being one of the biggest challenges that the construction industry is facing and how it is as an opportunity to promote green financing



"With the increasing housing demands in the states of AP and Telangana, green methods would surely help us to build affordable and sustainable housing."

Monu Ratra
ED & CEO, IIFL Home Finance Ltd.

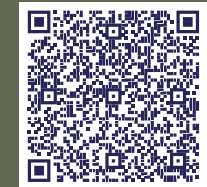
- ❖ The construction sector is seeing a moment of change. With energy based raw material supply for construction cost going up, the need of the hour is for developers to produce innovative solutions. These solutions would help tackle the high costs involved in construction
- ❖ Interesting trends are evolving around the world, even developers are issuing green bonds and raising money from international investors, the benchmark that the construction industry must aim for

"Green Buildings are the future and they offer a better value proposition to home buyers."

Priya Sunder
Senior Investment Officer, ADB



Figure 34: Panel III - 'Available Financing Options'



WATCH
Kutumb AP_TL Panel 2 -
Ways to finance affordable Eco-
Friendly housing | Jun. '22

Scan or
Click Here

- ❖ The session with Priya Sundar highlighted how Asian Development Bank (ADB) identifies India as a key market. IIFL Home Finance, being ADB's first partner for construction finance assistance in India
- ❖ Within India the focus remains infrastructure, health, education while affordable housing being the priority. ADB's agenda in India is to be aligned with Pradhan Mantri Awas Yojana (PMAY) housing schemes
- ❖ The session highlighted how every country and institution right now is focused on sustainability, with Green Bond market growing at a very fast pace, the developers can benefit from the global green building funds flow too
- ❖ The green buildings for developers help them build a brand, it differentiates them in the market, because of a better value proposition

PANEL IV

Building Green Saves Cost and Energy



"With the help of IIFL Home Loans Green Value Partners we got access to tools that helped us understand how to build green and sustainable. We then got in touch with IGBC and got design of the project what it is today. Building green helps us save costs, for example if you are using low flow fixtures that reduce the amount of water that's used in your project. Over the time it is a huge added benefit for your customers because it's reducing your cost, reducing your water usage and it's definitely much more green."

Medapati Vishnuvardhan Reddy
CEO & Director Tranquillo Holdings and Projects Pvt. Ltd.

6 Easy steps to achieve Green Certification with IIFL's GREEN VALUE PARTNER

CONCEPTION TO CERTIFICATION

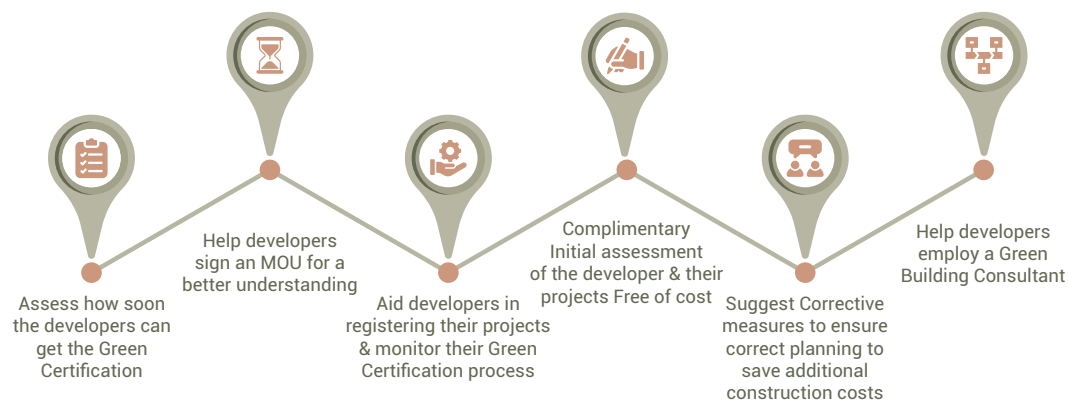


Figure 35: 6 Easy steps to achieve Green Certification with IIFL's GVP

CHAPTER IV

Developer's Workshop on Pathway to Climate Adaptive Housing

23rd - 24th August, 2022

New Delhi

An innovative 'National Kutumb' event themed 'Pathway to Climate Adaptive Design,' aimed to assess the practical viability of green solutions in select affordable housing upcoming projects. Notable attendees included Mr. Monu Ratna (ED & CEO, IIFL HFL), Ashok B Lall (Principal Architect, Ashok B Lall Architects), Medapatti Vishnuvardhan Reddy (CEO & Director, Tranquillo Holdings), Bhavya Shetty (CEO & Director, PG Shetty Constructions), and experts like Gurneet Singh, Zeenat Niazi, and Sachin Sharma.

The workshop aimed to validate the practical viability of green solutions in affordable housing. The event featured discussions on two diverse affordable housing projects: 'Project Aura' by Tranquillo Holdings in Hyderabad and 'Project Avani' by PG Shetty Constructions in Mysuru. The Avani project team provided valuable suggestions, advocating for incentivizing affordable housing through strategic land allocation, streamlined statutory clearances, and government incentives for both builders and end-users, emphasizing reduced GST and property tax for private developers in line with government projects.

The event also witnessed audience from organisations such as Environmental Design Solutions, IGBC, Development Alternatives, and Knight Frank India as well.



Figure 36: Developer's Climate Adaptive Housing Workshop



Medapati Vishnuvardhan Reddy
CEO & Director, Tranquillo Holdings
and Projects Pvt. Ltd



Bhavya Shetty
PG Shetty Constructions



Figure 37: Project Avani

The project Avani is an affordable housing with a vision to provide a better lifestyle to the middle-income group of Mysuru by giving them a sense of ownership as majority of the home buyers are first hand buyers. The project focuses on community well-being with minimal resource keeping and sustainability as the core of their design process.



Figure 38: Project Auro

Project Auro targets middle or upper middle-class group and the cost of one flat starts at 42 lakhs of saleable area where residents get a maximum subsidy amount of 2.5 to 3 lakh per household.



Figure 39: Process of the workshop



Figure 40: Suggestions in an existing project by the Mentor Ashok B Lall



Figure 41: Suggestions in a future project by the Mentor Ashok B Lall



Figure 42: Bhavya Shetty and Team discussing Project PG Shetty Construction



Figure 43: Builder team presentation and discussion with mentor and experts during National Kutumb event



Other Experts



Gurmeet Singh
Director Environmental
Design Solutions



Zeenat Niazih
Vice President,
Development Alternatives



Sachin Sharma
(IGBC Western UP Chapter)
Project Director, Wave Infratech,

Challenges

Coordination in Sustainability Integration:

Coordinating various stakeholders in incorporating sustainability into construction poses challenges

Balancing Immediate Goals with Long-Term Sustainability:

Striking a balance between immediate construction needs and long-term sustainability is a complex task

Implementation Hurdles for Prefab Construction:

Challenges may arise in the widespread implementation of prefab construction methods

Learnings

Collaborative Insights:

The event fostered collaboration, providing a platform for stakeholders to share insights on sustainable practices

Prioritizing Long-Term Sustainability:

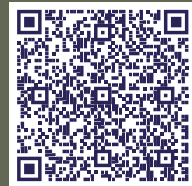
Emphasis on considering long-term sustainability during construction informs future project approaches

Practical Implementation:

Recognition that some solutions are immediately implementable while others require planning underscores the practicality of discussed measures

Innovation in Sustainability:

Acknowledgment of Electric Vehicles (EVs) as a future sustainability component highlights the importance of innovation in upcoming projects



WATCH
Kutumb New Delhi - 5 Elements of
Construction at Development Alternatives ft.
Ashok B. Lall | Aug 22

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Figure 44: Highlights - 5 Elements of Construction at Development Alternatives ft. Ashok B. Lall | Aug 22

CHAPTER V

Future Ready with Green and Sustainable Housing

13th May, 2022

Kolkata

In Kolkata, the housing landscape presents a complex array of challenges, including shortages, congestion, and substandard quality, all of which profoundly impact the provision of essential services like water, sanitation, and sewerage. With approximately 31.35% of the city's population residing in slums, the situation is dire, with many individuals and families enduring unsafe and unhygienic living conditions, further exacerbated by disparities in access to basic civic amenities. Despite concerted efforts, governmental policies have struggled to adequately address these pressing issues, particularly in light of the continuous influx of labor migrants, which contributes to the city's rapid urban expansion and exacerbates housing challenges.

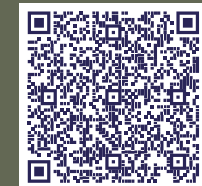
In response to this urgent need for action, IIFL Home Finance Ltd. and the Asian Development Bank partnered to launch the 'Kutumb: Future Ready with Green And Sustainable Housing in Kolkata' initiative. This collaborative effort represents a pioneering endeavor aimed at promoting the widespread adoption of green and sustainable housing practices throughout Kolkata. Through

168
Participants

132
Developers

5
Experts

Figure 45: Impact: Kutumb Chapter V



WATCH
Kutumb Kolkata - Financing Options
for Developers | Keynote by
Priya Sunder | Sept. '22

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Figure 46: Financing Options for Developers

GREEN MASTERS

SESSION I : Gender Responsive Affordable Housing



Prof. Preetha R Sajin
Director of School of
Planning & Development,
Sushant University

SESSION II : Financing Options Available for Developers



Priya Sunder
Senior Investment
Officer, ADB

SESSION III : Building Green Saves Cost & Energy



Ayushman Jain
Director, Siddha Group

comprehensive stakeholder engagement initiatives, the initiative seeks to deepen the understanding of green design principles, rating systems, and financing mechanisms essential for driving sustainable urban development in the city.

By fostering dialogue, facilitating knowledge exchange, and enhancing capacity building among stakeholders, the initiative aspires to catalyze positive transformations within Kolkata's housing landscape. Its overarching objective is to steer the city towards a future characterized by equity, resilience, and environmental responsibility, where every resident has access to safe, affordable, and sustainable housing options that contribute to a higher quality of life for all.



Figure 47: Funding options for Developers | Keynote by Bobby Thomas



WATCH
Kutumb Kolkata - Funding options
for Developers | Keynote by
Bobby Thomas | Sept. '22

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SESSION I

Gender Responsiveness in Affordable Housing

Despite concerted efforts through various affordable housing schemes, a significant 17.4% of households in India still find themselves residing in slums, underscoring enduring housing challenges that persist despite governmental interventions. The ambitious targets set by schemes like the Pradhan Mantri Awas Yojana (PMAY) remain largely unfulfilled, with a staggering 11 million housing units lying vacant, indicating a gap between policy objectives and on-ground realities. Vacancies are not isolated to PMAY alone; other schemes such as the Indira Awas Yojna and Rajiv Awas Yojna also grapple with high vacancy rates, highlighting systemic issues in housing delivery that demand comprehensive solutions.

This housing predicament disproportionately affects women, with housing designs often neglecting their specific needs and empowerment, perpetuating gender disparities. Prof. Preetha Ravisree Sajin's session emphasized the pivotal role of gender-sensitive design in addressing these deficiencies within India's affordable housing sector, advocating for housing solutions that prioritize women's safety, privacy, and agency. Despite affordability and size being primary considerations in housing schemes, profit-driven trends have led to the erosion of cultural and social values in housing development post-independence, necessitating a reevaluation of priorities.

Nevertheless, there are promising initiatives like Kudumbashree in Kerala, which showcase the transformative potential of empowering women in decision-making processes. By actively involving communities and prioritizing the enhancement of overall

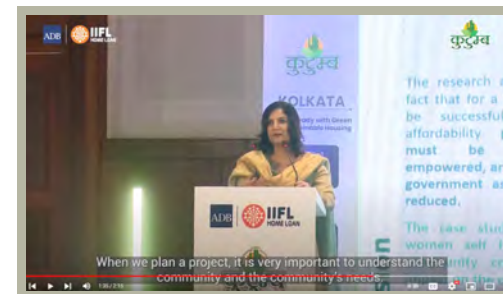


Figure 48: What is Affordable Housing | Keynote by Preetha Ravisree Sajin

quality of life, such initiatives can pave the way for more inclusive and sustainable housing solutions. These efforts not only uplift marginalized communities but also foster holistic societal development, addressing the multifaceted challenges inherent in India's housing landscape. In summary, while strides have been made, a concerted and multifaceted approach is imperative to truly tackle India's persistent housing issues and ensure equitable access to safe and dignified housing for all segments of society.



WATCH
Kutumb Kolkata - What is
Affordable Housing | Keynote by
Preetha Ravisree Sajin | Sept. '22

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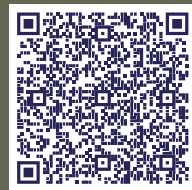
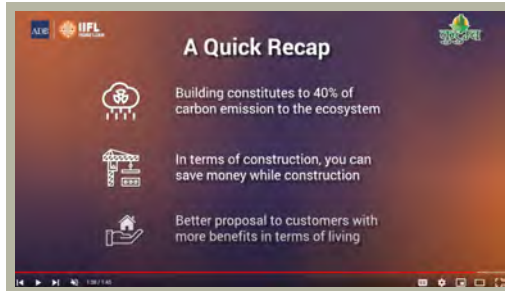
SESSION II

Financing Options Available for Developers

In an insightful session, teams from the Asian Development Bank (ADB) and IIFL Home Loans discussed the availability of green finance options for developers, emphasizing the potential for reduced Return on Investment (ROI) through sustainable construction practices. Priya Sunder, Senior Investment Officer at ADB, and Bobby Thomas, National Business Manager at IIFL Home Finance Ltd., outlined various avenues for project finance.

ADB's strategic focus on financing affordable housing for Economically Weaker Sections (EWS) and Low-Income Groups (LIG) aligns with global commitments such as the Paris Agreement. This includes a strong emphasis on promoting green building practices that not only benefit the environment but also contribute to long-term cost savings and sustainability. Developers seeking to implement such practices can access construction finance at a reduced ROI, thanks to the collaboration between ADB and IIFL HFL.

Moreover, IIFL HFL's technical support and guidance throughout the green certification process make it easier for developers to navigate the complexities of sustainable construction.



WATCH
Kutumb Kolkata -
Cost Efficiency of Green Buildings |
Keynote by Ajay Jaiswal | Sept. ' 22

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Figure 49: Cost Efficiency of Green Buildings | Keynote by Ajay Jaiswal

SESSION III

Building Green Saves Cost & Energy

The panel discussion between Santhosh Ramkumar, GVP Lead, and Ayushman Jain, Director of Siddha Group, centered on the theme 'Building Green Saves Cost & Energy'. Ayushman Jain, representing Siddha Group as one of the founding members of IGBC (Indian Green Building Council), shared insightful experiences and perspectives on the journey towards green certification in their projects.

Ayushman Jain highlighted the driving force behind Siddha Group's initiative to go green, citing a positive learning experience from their green certification journey. He emphasized the satisfaction of contributing towards mitigating negative impacts on the

environment. The discussion then shifted towards the benefits of green certification for both the company and the buyers. Ayushman Jain emphasized that green certification enhances the brand name and improves project saleability. Buyers benefit from reduced operation and maintenance costs, making the projects more attractive to end-users. He also shared specific green design features implemented by Siddha Group, such as preserving topsoil for landscaping, using fly ash in concrete, and treating wastewater for reuse in various applications like irrigation and cleaning.

Regarding challenges faced during the green certification process, Ayushman Jain noted that the process itself isn't overly challenging. Siddha Group collaborated with green building consultants from the project's inception, providing guidance throughout completion. The additional capital cost required for implementing green design strategies is offset by incentives like additional Floor Area Ratio (FAR) and reimbursement options.



WATCH
Kutumb Kolkata - Certification for
Green Building Project | Keynote by
Santhosh Ramkumar | Sept ' 22

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Figure 50: Certification for Green Building Project | Keynote by Santhosh Ramkumar | Sept ' 22

CHAPTER VI

Rebuilding Green and Affordable Karnataka

13th October, 2022

Bengaluru, Mysuru

In Bengaluru, a remarkable 50% of large residential complexes have prioritized energy and resource efficiency, contributing to pollution reduction through the adoption of green architecture principles. However, the widespread use of concrete in construction poses challenges such as heightened flood risks. Recognizing the need to address these issues, IIFL Home Finance Limited (HFL) and the Asian Development Bank (ADB) have collaborated to present Kutumb 'Rebuilding Green and Affordable Karnataka' in Bengaluru and Mysuru. This initiative aims to advance the cause of green affordable housing by engaging stakeholders in discussions surrounding design, rating systems, and financing options. By facilitating dialogue and knowledge exchange among industry players, policymakers, and community representatives, the session seeks to catalyze the adoption of environmentally sustainable and economically viable housing solutions. Through collective efforts, the goal is to create a more resilient and inclusive urban housing landscape in Karnataka, aligning with broader sustainability objectives while addressing pressing socio-economic challenges.



WATCH
Kutumb Karnataka -
Rebuilding Green & Affordable
Karnataka | Highlight | Oct. '22

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Figure 51: Rebuilding Green and Affordable Karnataka

114
Participants

77
Developers

5
Experts

Figure 52: Impact: Kutumb Chapter VI

GREEN MASTERS

SESSION I
Designing Climate Resilient Affordable Housing

Ar. Chitra Vishwanath
Principal Architect and Managing Director of BIOME
Environmental Solutions

SESSION II:
Green affordable housing expectation from the
buyer's perspective

Mr. Ar. Ashok B. Lall
principal architect of A B Lall architects

SESSION III:
Financing Green Affordable Housing

Mr. Saumadip Dey
Senior Investment Officer, Asian Development Bank
Mr. Bobby Thomas
National Business Manager, Construction Finance,
IIFL Home Finance Ltd.

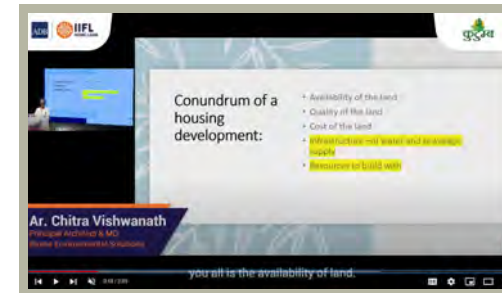
SESSION IV:
GVP session in coordination with developer

Mr. Somashekar Shetty
Chairman & MD of PG Shetty Group

SESSION I

Designing Climate Resilient Affordable Housing

The event's first session featured Ar. Chitra Vishwanath, Principal Architect and Managing Director of BIOME Environmental Solutions. With over two decades of experience, she is a renowned expert in ecology and sustainable built practices. Ar. Chitra Vishwanath's work emphasizes harmony with the natural environment, utilizing passive design strategies for energy efficiency.



WATCH
Kutumb Karnataka - Designing Climate
Resilient Housing | Keynote by
Chitra Vishwanath | Oct. '22

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Figure 53: Designing Climate Resilient Housing | Keynote by Chitra Vishwanath

Through BIOME, she has led projects showcasing the practical application of sustainable design in residential complexes, institutions, and public spaces. Her session provided valuable insights into sustainable architecture, inspiring attendees to consider environmental impact in their projects. Ar. Chitra Vishwanath's expertise and advocacy for eco-conscious design have made her a significant figure in promoting sustainable architecture, bridging the gap between architecture and environmental responsibility.

SESSION II

Green Affordable Housing Expectations from the Buyer's Perspective- 'Swastha Jivan - Swastha Paryavaran'

During the session, Mr. Ar. Ashok B. Lall elucidated the fundamental expectations of homebuyers, shedding light on their evolving preferences and priorities. Emphasizing health, comfort, and affordability, buyers are increasingly prioritizing parameters such as sanitation, safety, sustainability, esteem, and self-fulfillment when considering a home purchase. These considerations underscore the holistic well-being of homeowners, illustrating that affordability represents just one facet of a home's overall value proposition.

Mr. Lall's insights underscore the importance of creating spaces that not only fulfill basic needs but also enhance the overall quality of life for residents. By prioritizing health and safety features, incorporating sustainable design elements, and fostering a sense of community and belonging, housing developers can meet the diverse and evolving needs of modern homebuyers. Moreover, recognizing the significance of affordability alongside other crucial factors, such as comfort and sustainability, is essential for ensuring that housing solutions are accessible and equitable for all segments of society. In essence, Mr. Lall's discourse highlights the imperative for the housing industry to adopt a holistic approach that prioritizes the well-being and satisfaction of homeowners, thereby contributing to the creation of thriving and sustainable communities.

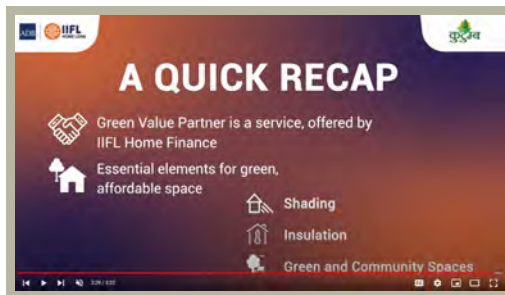


Figure 54: Buyer's Perspective On Green Housing | Keynote by Ashok B. Lall | Oct. '22



WATCH
Kutumb Karnataka -
Buyer's Perspective On Green Housing |
Keynote by Ashok B. Lall | Oct. '22

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SESSION III

Financing Green Affordable Housing

During the panel session, Mr. Saumadip Dey, Senior Investment Officer at the Asian Development Bank (ADB), and Mr. Bobby Thomas, National Business Manager at IIFL Home Finance Ltd. (HFL), provided invaluable insights into project finance options, enriching attendees' understanding of the intricate landscape of funding mechanisms for sustainable housing initiatives.

Mr. Dey's perspective from the ADB lens illuminated funding opportunities specifically tailored for sustainable projects, shedding light on avenues that are often overlooked in conventional financing discussions. He emphasized the importance of leveraging innovative financial instruments and mechanisms to support sustainable housing projects, aligning with ADB's commitment to promoting environmentally sustainable development. By highlighting funding opportunities available through ADB and other sources, Mr. Dey provided attendees with a deeper understanding of the various financing options conducive to sustainable initiatives.

On the other hand, Mr. Bobby Thomas delved into the financing mechanisms facilitated by IIFL Home Finance Ltd., offering a nuanced perspective on the intricacies of construction finance. Drawing from his experience, Mr. Thomas provided practical insights into navigating the complex terrain of project financing, particularly in the context of sustainable housing initiatives. He outlined the various financial products and services offered by IIFL Home Finance Ltd., tailored to meet the diverse needs of

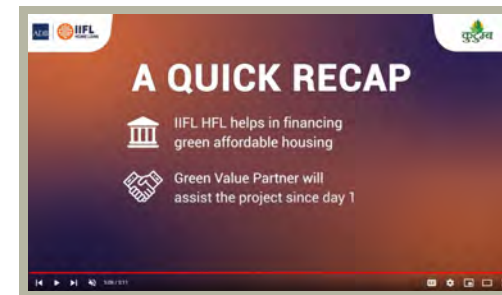


Figure 55: Financing Green & Affordable Housing | Keynote by Saumadip Dey



WATCH
Kutumb Karnataka -
Financing Green & Affordable Housing |
Keynote by Saumadip Dey | Oct. '22

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developers and investors in the housing sector. The combined expertise of Mr. Dey and Mr. Thomas not only broadened the understanding of project financing but also emphasized the importance of tailored approaches for sustainable projects. By elucidating the diverse avenues for accessing funds and providing insights into navigating financial landscapes, the panel discussion empowered attendees with the knowledge necessary to effectively pursue and execute sustainable projects in the housing sector. Their insights underscored the critical role of financial innovation and collaboration in driving forward sustainable development agendas, ultimately contributing to the creation of resilient and environmentally conscious communities.



WATCH
Kutumb Karnataka -
Rebuilding Green & Affordable Housing |
Keynote by Somashekar Shetty | Oct. '22

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Figure 56: Financing Green & Affordable Housing | Keynote by Saumadip Dey

SESSION IV

GVP Session in Coordination with Developer

An engaging interactive session centered on the significance of green building features and certification for affordable housing projects was orchestrated through a collaboration with Mr. Somashekar Shetty, Chairman & MD of the PG Shetty Group, a distinguished developer renowned for its commitment to sustainability. This session, strategically focusing on developers' perspectives, meticulously elucidated the manifold benefits and practicality of integrating green practices into housing projects. Attendees were enlightened on how incorporating green elements not only amplifies sustainability but also augments marketability and enhances resident well-being, all while fostering a sense of environmental stewardship. The collaboration with Mr. Shetty injected a crucial industry perspective into the discourse, offering a firsthand account of real-world experiences and the challenges entailed in implementing green building measures within the affordable housing sector. By weaving practical insights into the fabric of the session, attendees were equipped with actionable knowledge, enabling them to navigate the complexities of integrating sustainable elements into their housing projects effectively. This partnership epitomized a collaborative ethos aimed at propelling sustainability within the real estate sector. Through the synergy between industry experts and stakeholders, the session not only raised awareness but also catalyzed tangible actions towards a more sustainable future in affordable housing development.

CHAPTER VII

Expansion of Green Affordable Housing

18th November, 2022

Pune

The Kutumb chapter delved deeply into Maharashtra's commendable green building initiatives, with a particular focus on Pune district, which stands out with its remarkable tally of 107 green projects. Despite Pune's reputation as India's second-best city to reside in, a considerable segment of the population finds itself dwelling in informal settlements, underscoring the pressing need for accessible housing solutions. The event, titled 'Expansion of Green Affordable Housing,' served as a poignant platform to illuminate the glaring disparity between the burgeoning demand for housing and the inadequate supply, especially concerning low-income groups.

84
Participants

44
Developers

7
Experts

Figure 57: Impact: Kutumb Chapter VII

GREEN MASTERS



Jaiprakash Shroff
Chairman, IGBC Pune
Chapter & Managing Director &
Chairman, ShroffGroup



Dr. Poorva Keskar
Director
VK:environmental



Ar. Ashok B Lall
Principal,
A B Lall Architects.



Monu Ratra
ED & CEO,
IIFL Home Finance Ltd



Priya Sunder
Senior Investment Officer,
Asian Development Bank



Neha Kumar
India Programme Manager,
Climate Bonds Initiative



Rupesh Agarwal
Managing Director,
SARA Group

Furthermore, it provided a spotlight on Maharashtra's trailblazing endeavors in climate action planning, ambitiously aiming for net-zero emissions by 2050. These efforts underscored the state's proactive stance towards climate resilience and sustainable development. In essence, the event proved to be a rich repository of insights into the intricate socioeconomic dynamics, prevalent housing challenges, and innovative climate resilience strategies prevalent in Maharashtra. By shedding light on these multifaceted aspects, it not only heightened awareness but also fostered a deeper understanding of the concerted efforts required to address the housing crisis and steer the state towards a more sustainable and resilient future.

PANEL I

Designing Climate Resilient Affordable Housing

By integrating climate-resilient strategies from the early stages of building design, communities can significantly reduce their vulnerability to a range of environmental challenges, including extreme weather events and other climate-related risks. This proactive approach not only enhances the safety and comfort of residents but also contributes to the overall sustainability of the community.

The panellists shared insights into various design elements and techniques that can be incorporated into affordable housing projects to enhance their resilience. These may include proper orientation of buildings to maximize natural light and ventilation, use of appropriate building materials to withstand local climatic conditions, and integration of green spaces for improved thermal comfort and reduced heat island effect.



“

The 3 key no cost factors a developer should consider to build a climate resilient structure are "INSULATE, VENTILATE & SHADE."

Ar. Ashok B Lall

”



“

In climate resilient buildings, green and sustainable measures have to be adopted at the right time to avoid over costing at the later stage.

Poorva Kesar

”



WATCH
Kutumb Pune - Designing
Climate Resilient Affordable Housing ft.
Dr. Poorva Kesar | Nov. '22

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Figure 58: Designing Climate Resilient Affordable Housing ft. Dr. Poorva Kesar | Nov. '22

PANEL II

Financing Green Affordable Housing

The panel discussion offered a deep dive into the intricate dynamics of green buildings within the finance ecosystem, presenting an exhaustive examination of the role played by green finance, green bonds, and climate bonds. Throughout the discourse, the panelists delved into the myriad benefits associated with concessional developer and retail loans, complemented by an insightful exploration of the potential and accessibility of climate bonds in today's market landscape. By advocating for the widespread adoption of these sophisticated financial instruments, the panel aimed to spark a broad-based embrace of sustainable building practices across the real estate sector.

Their insights illuminated the far-reaching impact of integrating green principles into building design, underscoring how such initiatives not only significantly bolster environmental conservation efforts but also yield substantial financial returns for developers and investors alike. Through avenues like green finance and bonds, developers are empowered to access preferential loan terms, thereby attracting investors keen on aligning their portfolios with sustainable investment opportunities. Additionally, the panel underscored how climate bonds present an additional financing avenue for sustainable projects, while concurrently advancing broader climate mitigation objectives.



WATCH
Kutumb Pune - Financing
Green Affordable Housing ft.
Priya Sunder & Neha Kumar | Nov. '22

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Figure 59: Financing Green Affordable Housing ft. Priya Sunder & Neha Kumar

In essence, the panel discussion emphasized that the adoption of green building practices represents a mutually reinforcing endeavor, fostering both environmental sustainability and financial resilience within the real estate sector. By championing the adoption of these sophisticated financial tools, the discussion sought to catalyze a paradigm shift towards more sustainable and resilient building practices, ultimately laying the foundation for a greener, more prosperous, and environmentally conscious future.



WATCH
Kutumb Pune - Financing
Green Affordable Housing ft.
Priya Sunder & Neha Kumar | Nov. '22

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Figure 60: Financing Green Affordable Housing ft. Priya Sunder & Neha Kumar | Nov. '22



PANEL III

In Conversation with Sara Group

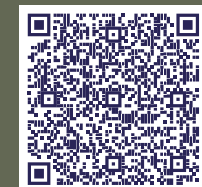
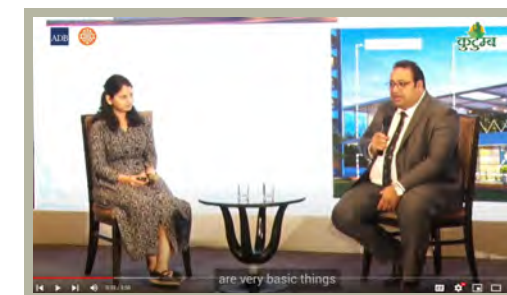
The session, featuring Green Value Partner at IIFL, and Rupesh Agarwal, Managing Director, SARA group, provided an insightful dialogue on the importance of green building measures from a developer's perspective. The discussion centered on the feasibility and benefits of integrating green certification into affordable housing projects.

IIFL GVP shared valuable insights into the tangible advantages of green building practices for developers. These include reduced operational costs, enhanced marketability of properties, and increased tenant satisfaction. She emphasized that green certifications, such as LEED or GRIHA, not only validate a project's sustainability but also attract potential investors and homebuyers who prioritize eco-friendly living spaces.

The SARA group developer contributed their experiences and challenges in implementing green building measures in the affordable housing sector. They highlighted the positive impact on the environment and community, stressing the potential for long-term cost savings and enhanced property values.

Throughout the session, practical aspects of incorporating green features were discussed, such as energy-efficient lighting, water-saving fixtures, and the use of sustainable materials. The speakers also underscored the importance of stakeholder engagement and education in promoting sustainable practices within the development sector.

Overall, the session provided a comprehensive understanding of the benefits, challenges, and practical considerations of green building initiatives in affordable housing. It highlighted developers' pivotal role in advancing sustainability and demonstrated how green certifications can serve as valuable tools for achieving environmental, social, and economic objectives in the real estate industry.



WATCH
Kutumb Pune - In conversation
with SARA Group ft. Rupesh Agarwal |
Nov. '22

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Figure 61: In conversation with SARA Group ft. Rupesh Agarwal

“Tomorrow if you need funding, why not start investing today!”
Rupesh Agarwal

CHAPTER VIII

Green Affordable Ecosystem in India

2nd December, 2022

New Delhi

Kutumb Chapter 8 explored the evolving landscape of green affordable housing in India, focusing on the theme of "Green Affordable Ecosystem." The event underscored the fragmented policy framework and emphasized the urgent need for convergence among existing policies at state and local levels. Discussions revolved around promoting "green affordable" housing solutions, dispelling misconceptions about their viability, and highlighting the multifaceted benefits they offer. Key themes included the promotion of green affordable housing, the critical role of continuous capacity building interventions, and the importance of research and innovation in construction technologies. Insights into the qualitative strategies of green certification agencies were also shared. Through diverse perspectives and collaborative efforts, the event illuminated pathways towards a greener, more accessible housing future in India.

72
 Participants

25
 Developers

18
 Experts

Figure 62: Impact: Kutumb VIII

PANEL I

Policy Recommendations for Mainstreaming Green Affordable Housing in India



Monu Ratna
ED & CEO, IIFL Home Finance Ltd.



S. Sridhar
Chairman, IIFL Home Finance Ltd. | Ex-MD - NHB



Sean Kidney
CEO, Climate Bonds Initiative



Shri Rahul Bhawe
Executive Director, National Housing Bank

PANEL II

Need of Promotion and Continuous Capacity Building Interventions for Improved Access to Green Affordable Housing



Susan Olsen
Unit Head, Private Sector Financial Institutions Division
ADB



Autif Sayyed
Project Lead - Green Buildings
South Asia, IFC - World Bank Group



Dr. Ashok Kumar
Ex. Scientist (Energy Efficient Building Technologies & Head - ACSIR



Sanjay Seth
Senior Director, Sustainable Habitat Division, The Energy & Resources Institute (TERI) | CEO, GRIHA Council



Mohua Mukherjee
Energy Economist & Project Finance Specialist | Independent Director, IIFL Home Finance Ltd.



Abhay Bakre
Director General, Bureau of Energy Efficiency

PANEL III

Research and Innovation in Construction Technologies for Green Affordable Housing



Ar. Ashok B Lal
Principal Architect, A B Lal Architects



Rajan Rawal
Senior Advisor, Center for Advanced Research in Building Science and Energy (CARBSE) | CRDF Professor, CEPT University



Prof. Shaleen Singhal
Dean, Research & Partnerships, TERI SAS



Ar. Chitra Vishwanath
Senior Architect & MD, Biome Environmental Solutions



Figure 63: Highlights - Green Affordable Housing Eco-System in India | Dec. '22

PANEL I

Policy Recommendations for Mainstreaming Green Affordable Housing in India

The panel discussion shed light on the existing policy landscape for green affordable housing in India, highlighting the fragmented nature of current policies and the need for convergence to improve access to such housing.

Existing policies include Affordable Housing Policies and Regulations at the state and local levels, and policies from the Ministry of Finance addressing housing affordability. In terms of green building policies, there are national codes such as the National Building Code and Energy Conservation Building Code, along with rating systems like GRIHA, IGBC, and EDGE. Some state and local regulations provide incentives for green building ratings, such as additional Floor Space Index (FSI), property tax rebates, and discounts in development charges.

The panel emphasized the importance of establishing convergence among these various policies and frameworks to unlock the immense potential for improving access to green affordable housing in India. By bringing together relevant influencers, the



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Kutumb New Delhi
Highlights - Green Affordable Housing
Eco-System in India | Dec. '22

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session aimed to address this gap and discuss strategies for effective convergence.



WATCH
Kutumb New Delhi Panel 1 & 2 -
Policy Recommendations for
Green Affordable Housing | Dec. '22

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Figure 64: Policy Recommendations for Green Affordable Housing | Dec. '22

PANEL II

Need of Promotion and Continuous Capacity Building Interventions for Improved Access to Green Affordable Housing

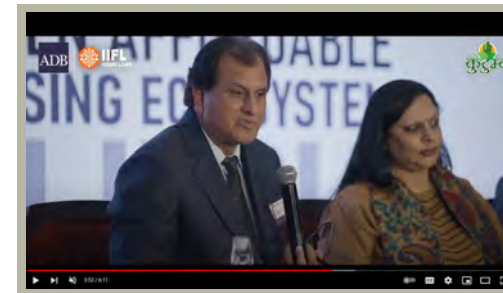
This panel focused on the need for promotion and continuous capacity building interventions to improve access to green affordable housing, particularly in the context of initiatives like Pradhan Mantri Awas Yojana – Urban (PMAY-U) and the Swachh Bharat Mission in India. PMAY-U emerged as one of the largest housing schemes globally, extending beyond central initiatives to be widely adopted at the state and local levels.

The Swachh Bharat Mission similarly gained popularity at the household level, resulting in significant improvements in health, hygiene, and overall quality of life, showcasing the impact of effective promotion and propagation of such initiatives.

The session emphasized the critical role of promotion and propagation in ensuring the effective implementation of gender-inclusive green affordable housing. It highlighted the multifaceted benefits of green affordable housing, not only providing access to housing but also enabling individuals to lead healthy, secure, productive, and dignified lives. Green housing is recognized as a durable asset that facilitates savings and access to credit.

India's ambitious goals, such as achieving net-zero emissions by 2070 and meeting 50% of its electricity requirements from renewable sources by 2030, underscore the importance of transitioning to green buildings. The Indian residential sector currently accounts for 22% of electricity use, a figure expected to increase to 39% by 2047. However, there is a prevalent misconception in the industry that green housing is expensive and lacks a viable business case.

The session identified knowledge gaps across the housing industry value chain, including awareness of green building design and technology, relevant policies, and the business case for green affordable housing.



WATCH
Kutumb New Delhi Panel 1 & 2 -
Policy Recommendations for
Green Affordable Housing | Dec. '22

Scan or
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Figure 65: Policy Recommendations for Green Affordable Housing | Dec. '22

Furthermore, the panel highlighted the need to sensitize the industry about women's roles in the construction sector and as key decision-makers in home ownership. Capacity development programs developed by organizations like the Asian Development Bank (ADB) were discussed, alongside the broader need for such programs across all stakeholders in the housing sector.

The session aimed to address these gaps and advocate for the promotion of green affordable housing as a sustainable and viable solution for India's future housing needs.

PANEL III

Research & Innovation in Construction Technologies for Green Affordable Housing

The panel discussion highlighted key insights regarding green certification agencies' approach to affordable housing. It was noted that these agencies tend to emphasize qualitative strategies over quantitative ones in the affordable housing segment. For instance, there is often no mandate or measurement for a minimum reduction in building energy consumption.

This lack of quantifiable metrics extends to the operational efficiency of buildings, particularly in the residential sector. Instead of considering factors like the degradation of operational efficiency in installed equipment, operational efficiencies are calculated at a standard rate.

The session aimed to provide participants with an understanding of the latest available technologies and the importance of dedicated research and focus in the affordable housing sector. It emphasized the need for a more nuanced approach to construction technology and strategies, ensuring that they are utilized effectively and at the right time.

CHAPTER IX

India and Green Affordable Housing

28th November, 2023

New Delhi

Kutumb Chapter 10 signifies a resolute commitment to revolutionize the housing paradigm in India, advocating for sustainability and affordability as core tenets. Over the course of two transformative years, in collaboration with the esteemed Asian Development Bank (ADB), this initiative has charted new territories, pioneering innovative solutions and inclusive strategies to address the multifaceted challenges entrenched within the housing sector. The poignant conclusion of this journey, marked by a reflective closing ceremony on November 28th, 2023, served as a poignant moment for introspection and celebration alike. It provided a poignant platform to acknowledge and applaud the remarkable strides achieved through the collective endeavors of key stakeholders, influential policymakers, and dedicated practitioners in the field. This reflective juncture underscored the profound impact of collaborative synergy in propelling forward tangible progress and nurturing a culture of sustainable development within India's dynamic housing ecosystem.

Background

As urbanization and population growth place unprecedented demands on housing infrastructure, the Kutumb initiative, fortified by the collaborative expertise of ADB, emerged as a beacon of change. Chapter 10 marked the culmination of a comprehensive program dedicated to not only bridging the housing deficit but also steering the narrative towards environmentally conscious, green housing solutions. The collective pursuit of sustainable urban development and the realization of affordable housing as a fundamental right for every citizen have been the guiding principles steering the course of Kutumb.



WATCH
Indian & Green Affordable Housing -
Kutumb 2023, New Delhi |
IIFL Home Loans X ADB

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Figure 66: India and Green Affordable Housing- Event Highlights

Opening Remarks

The event commenced with a warm welcome from Mr. Hoe Yun Jeong, Deputy Country Director of ADB, expressing gratitude for the attendees and acknowledging the collaborative efforts that shaped the Kutumb initiative. Mr. Monu Ratra, Executive Director & CEO of IIFL Home Finance Ltd, provided insights into the transformative journey over the past two years.

PANEL I

Green Housing Profitability and Affordability – Current Policies and Reforms



Dr. Sejal Patel
Professor &
Program Chair,
Master of Urban
Housing at CEPT
University



Neha Kumar
Head, South Asia
Programme,
Climate Bonds
Initiative

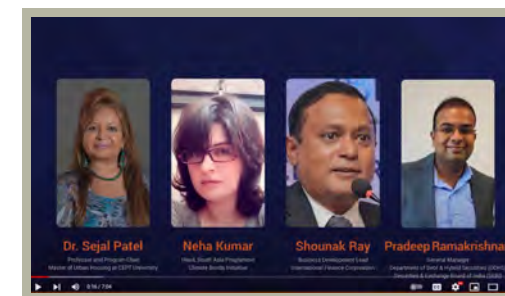


Pradeep Ramakrishnan
General Manager,
Department of Debt &
Hybrid Securities
(DDHS) | (SEBI)



Shounak Ray
Business Development
Lead, International
Finance Corporation

The panel discussion on green affordable housing in India addressed the multifaceted landscape of policies and initiatives aimed at fostering sustainable housing. Dr. Sejal highlighted the broad spectrum of housing in India, emphasizing the need for policy convergence in the fragmented and multi-sectoral policy landscape. The focus was on making affordable housing and green building policies more cohesive to maximize benefits and ensure visibility and profitability.



WATCH
Green Housing Current Policies &
Reforms | Kutumb 2023, New Delhi |
IIFL Home Loans X ADB

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Figure 67: Green Housing Current Policies & Reforms | Kutumb 2023, New Delhi | IIFL Home Loans X ADB

PANEL II

Green Affordable Housing and Climate Emergencies- Sustainable Design and Green Construction Techniques



Ashok Kumar
Deputy Director
General, Bureau of
Energy Efficiency (BEE),
Ministry of Power



Ashok B Lall
Founder and Principal
Architect, Ashok B Lall
Architects



Shailesh Kumar Agrawal
ED, Building Materials
& Technology Promotion
Council (BMTPC)



Ravi Chaudhary
Head Technical,
IIFL Home Loans

Understanding the challenges in India's affordable housing, the Light House Projects exemplify sustainable construction. Green Buildings (GB) and Rating Agencies (GBRA) play vital roles, emphasizing intent-based criteria. The panel stressed a shift to performance-based assessments. Challenges include the absence of robust monitoring for actual performance. Essentials propose municipal mandates and eligibility for loans, addressing the imperative need for a paradigm shift in India's affordable housing landscape.



Figure 68: Green Affordable Housing and Climate Emergencies



WATCH
Green Affordable Housing Landscape
In India | Kutumb 2023, New Delhi |
IIFL Home Loans X ADB

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PANEL III

Green Affordable Housing Landscape in India- Green Lending, Refinance, Support to HFCs & Developers



Ekta Mehra
Senior Specialist
KfW



Gagan Sidhu
Director
Centre of Energy
Finance, CEEW



Mohua Mukherjee
Senior Research Fellow
of Oxford Institute
of Energy Studies,
Independent Director,
IIFL HFL



Monu Ratra
Executive Director & CEO,
IIFL Home Finance Ltd.



Ajay Jaiswal
Chief Operating Officer
IIFL Home Finance Ltd.

The panel discussion delved into the pressing need to address training requirements in climate finance, recognizing the diverse array of stakeholders involved, from urban bodies to architects and lenders. They emphasized the necessity of tailored training programs to meet the specific needs of each group, highlighting the importance of equipping them with the knowledge and skills required to effectively navigate the complexities of climate finance. A key aspect highlighted during the discussion was the critical role of robust monitoring

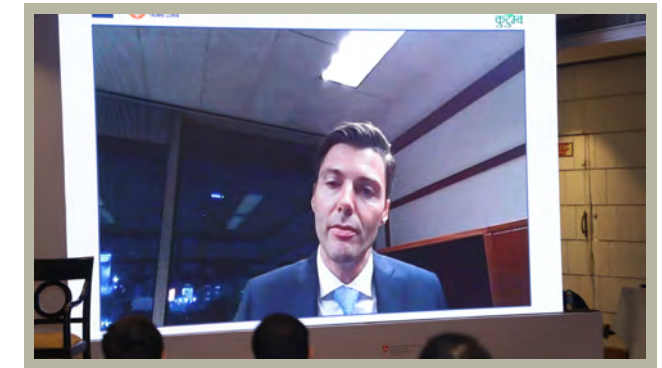


Figure 69: Dr. Mischa Lentz, Senior Urban Development Specialist, Asian Development Bank, Addressing the Audience



Figure 70: Hoe Yun Jeong, Deputy Country Director, Asian Development Bank Addressing the Audience

mechanisms in ensuring the credibility and effectiveness of climate finance initiatives. The panelists identified existing gaps in enforcement and follow-up procedures, stressing the need for enhanced accountability and oversight to maximize the impact of climate finance investments.

Moreover, the panel underscored the broad scope of training required across different sectors, including urban governance, architectural design, engineering, and financial management. They emphasized the need for adaptation of international best practices to suit India's unique socio-economic and environmental context, recognizing that successful climate initiatives hinge on the capacity of stakeholders to implement them effectively.

In conclusion, the panelists emphasized that comprehensive training initiatives are essential to bridge existing capacity-building gaps and foster the successful implementation of climate finance initiatives and sustainable infrastructure projects across India.

CHAPTER X

Developing Green Affordable Housing in Bangladesh; Sharing Regional Experiences

13th December 2022

Dhaka, Bangladesh

State of Housing in Bangladesh

Bangladesh is a densely populated developing country where most of the people live in rural areas. After independence (1971) the urbanization of the country increased largely than those of previous years and it is increasing gradually.

Today, about 28 percent of the nation's population is urban and the urban sector contributes to over 70 percent of national GDP (BBS 2011). According to Project Information Document (PID) of Pro-Poor Slums Integration Project, this shift has got pace into rapid migration to urban areas; urban centers have sustained population growth rates of 4-5 percent over the past decade, as compared with national averages of 2-3 percent.

Rapid urbanization, coupled with limited financial and physical capacity, has put significant strain on cities and towns of Bangladesh. Around one million new people arrive in urban areas annually in Bangladesh, and the lack of adequate planning and development of cities has resulted in an inability to accommodate this influx of migrants, most notably in terms of the provision of adequate shelter.

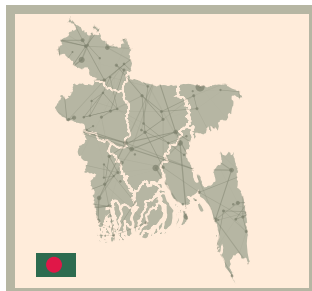


Figure 71: State of Housing in Bangladesh

Rapid migration to urban areas has led to unprecedented pressure on urban infrastructure and services, most notably on housing. The inadequacy of housing, particularly for the urban poor in municipalities has contributed to the explosion of urban slums and informal settlements in Bangladesh.

Many of the migrated urban inhabitants have little choice but to find accommodation in the urban slums and informal settlements due to lack of affordable housing in the formal housing sector.

Population in Bangladesh

Dhaka is growing at an exponential rate, with an estimated population of 166 million as reported in the 2020 Housing report, is one of the most densely populated countries in South Asia. Population growth is skewed towards urban areas and urban population has doubled in less than two decades from 31 million in 2000 to 68.8 million in 2020. Currently, urban population comprises of almost 39.4% of the total population. Half of Bangladesh population is expected to live in urban areas by 2030. This will result in increasing slums and densely populated homes that pose a serious risk to urban planning, inefficient resource management and compromise on public health.

Sources: <https://www.flickr.com/photos/omarfarukbd/17013833678/>

Populations and Urbanisation Projections

(in millions)

Bangladesh's population is expected to increase by about 18% between 2018 and 2050 and become more urbanised, as Bangladesh aspires to be a developed country by 2041.

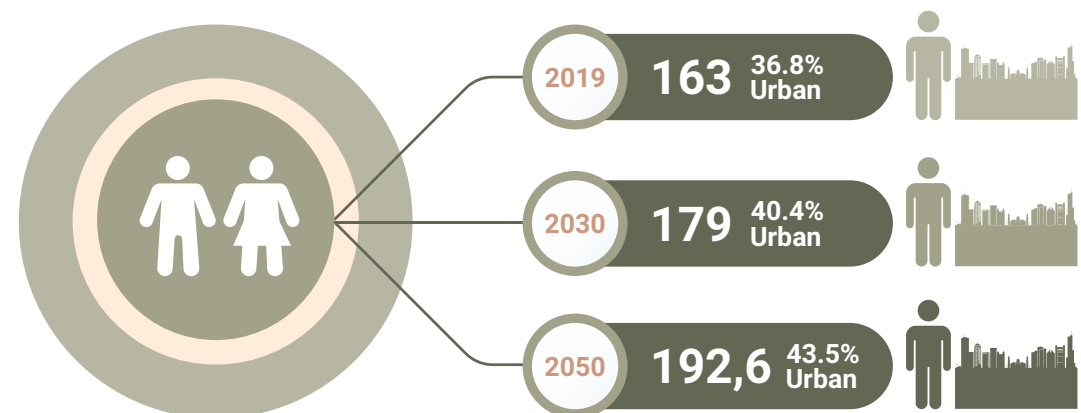


Figure 72: Population and Urbanisation Projections, Bangladesh

Demand Supply Gap in Housing Units

According to an assessment by IFC of the housing sector in Bangladesh, approximately 11.9 million urban households reside in informal housing. Existing demand for urban affordable housing is 6 million units, which is estimated to increase to 10.5 million units by 2030. In contrast, the supply was only 17,000 in 2019, thus indicating a supply gap of 93%.

Steps Taken by the Government to Cater to the Demand Supply Gap:

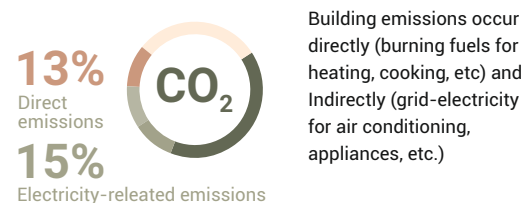
Bangladesh has launched a plan to house all the country's homeless population that will benefit over 800,000 homeless and destitute families and is being touted as the world's largest housing for the poor. A total of 885,622 homeless and destitute families across the country will benefit from the mega housing project – Ashrayan. Three phases of this projects were to be completed by 2020.



Building Sector

Emissions from energy used to build, heat and cool buildings

Building emissions make up 13% of total direct CO₂ emissions and 15% of electricity-related CO₂ emissions.



Sources: The World Bank, 2019; United Nations, 2018



COMPATIBILITY

Global emissions from buildings need to be halved by 2030, and be 80-85% below 2010 levels by 2050, mostly through increased efficiency, reduced energy demand and electrification in conjunction with complete decarbonisation of the power sector.

Status of Decarbonisation

Building Emissions per Capita

(incl. indirect emissions)



0.16
tCO₂/capita

Building emissions:
5-year trend
(2014-2019)



+37.3%

Building-related emissions per capita reflect climatic conditions and also the high ratio of square footage per person. Bangladesh's building-related emissions per capita are increasing at a very high rate of 37.3% (2014-2019), but from a low base.

Contribution of Bangladesh in GHG Emissions

As part of the global initiative, Bangladesh is updating the NDC incorporating additional sectors following IPCC guidelines. The updated NDC covers Energy, Industrial Processes and Product Use (IPPU), Agriculture, Forestry and other Land use (AFOLU) and Waste.

For the NDC update, 2012 has been considered as the base year following the Third National Communication of Bangladesh, which details a comprehensive national GHG emission inventory for 2012.

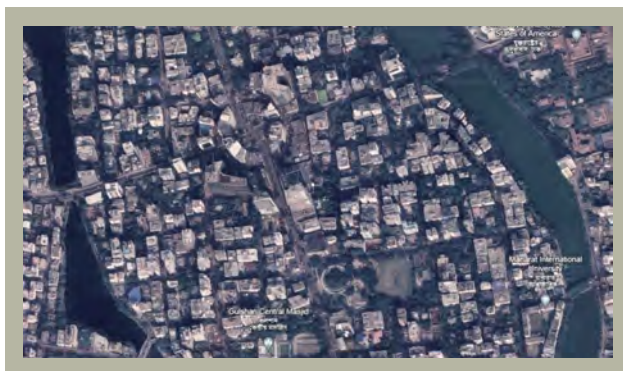


Figure 73: An aerial view of portion of Dhaka. PC:

Table 2: GHG Emission in Base Year (2012)

UNFCCC Sector	Sub-Sector	GHG Emission	
		Base year 2012	
		Million Ton Co ₂ e	In Percentage
Energy	Power	20.98	12.41
	Transport	16.77	9.92
	Industry (energy)	16.47	9.74
	Other energy sub sectors:		
	Households	16.67	9.86
	Commercial	0.45	0.27
	Agriculture	2.73	1.61
	Brick Kilns	11.73	6.94
	Fugitive	4.37	2.58
	F Gases	2.92	1.73t
Total Energy		93.09	55.07
IPPU	Cement and Fertilizer	5.61	3.32
AFOLU	Agriculture and Livestock	45.87	27.13
	Forestry	0.37	0.22
Total AFOLU		46.24	27.35
Waste	Municipal Solid Waste & wastewater	24.11	14.26
Total Emission		169.05	

Table 3: GHG Emission Reduction Scenario

UNFCCC Sector	Sub-sector	GHG Emission Scenario		GHG Reduction by Mitigation (2030)							
		BAU 2030		Unconditional			Conditional			Combined	
		MtCO ₂ e	In %	MtCO ₂ e	Reduction MtCO ₂ e	In %	MtCO ₂ e	Reduction MtCO ₂ e	In %	Reduction MtCO ₂ e	In %
Energy	Power	95.14	23.24	87.13	8.01	29.06	51.4	35.73	57.72	43.74	48.9
	Transport	36.28	8.86	32.89	3.39	12.30	26.56	6.33	10.23	9.72	10.86
	Industry (energy)	101.99	24.91	95.33	6.66	24.17	94.31	1.02	1.65	7.68	8.58
	Other energy sub sectors:										
	Households	30.41	7.43	28.78	1.63	5.91	24.77	4.01	6.46	5.64	6.3
	Commercial	3.35	0.82	2.94	0.41	1.49	2.51	0.43	0.69	0.84	0.94
	Agriculture	10.16	2.48	9.37	0.79	2.87	10.13	0.03	0.05	0.82	0.92
	Brick Kilns	23.98	5.86	20.7	3.28	11.90	12.82	7.88	12.73	11.16	12.47
	Fugitive	8.31	2.03	8.31			4.03	4.28	6.91	4.28	4.78
	F Gases	2.92	0.71	0.78	2.14	7.76	0.03	0.75	1.21	2.89	3.23
Total Energy		312.54	76.34	286.23	26.31	95.46	226.56	59.71	96.46	85.98	96.1

Table 4: GHG Emission Reduction Scenario

UNFCCC Sector	Sub-sector	GHG Emission Scenario		GHG Reduction by Mitigation (2030)							
		BAU 2030		Unconditional			Conditional			Combined	
		MtCO ₂ e	In %	MtCO ₂ e	Reduction MtCO ₂ e	In %	MtCO ₂ e	Reduction MtCO ₂ e	In %	Reduction MtCO ₂ e	In %
IPPU	Cement & Fertilizer	10.97	2.68	10.97			10.97				
AFOLU	Agriculture & Livestock	54.64	13.35	54	0.64	2.32	53.6	0.4	0.65	1.04	1.16
	Forestry	0.37	0.09	0.37			0.37				
Total AFOLU		55.01	13.44	54.37	0.64	2.32	53.97	0.4	0.65	1.68	1.16
Waste	MSW & wastewater	30.89	7.55	30.28	0.61	2.21	28.44	1.84	2.97	2.45	2.74
Total Emission		409.41		381.85			319.94				
Total Reduction					27.56	6.73		61.9	15.12	89.47	21.85

Note: INDC (2015) proposed 12 MtCO₂e (5%) reduction in unconditional and a further 24 MtCO₂e (10%) reduction in conditional scenario

Note: NDC (2020) proposed 27.56 MtCO₂e (6.73%) reduction in unconditional and an additional 61.91 MtCO₂e (15.12%) reduction in conditional scenario.

Other Initiatives by Bangladesh Government

National Action Plan for Clean Cooking, 2020-2030

- ❖ Focused predominantly on the removal of existing financing barriers by enabling access to capital by SMEs, promoting access to climate funds, leveraging government funds to finance women-led businesses in the sector and lobbying for additional financing options from international donors at low rates
- ❖ About 4.5 million improved cook stoves have been distributed already

Long-term vision for the nation and set possible capacity targets for the country's solar energy initiative. This outline the broader strategies required to achieve those targets

National Solar Energy Roadmap, 2021-2041

Energy Efficiency & Conservation Master Plan Upto 2030

Under this comprehensive plan, the government aims to lower energy intensity (national primary energy consumption per unit of GDP) in 2030 by 20% compared to the 2013 level. A total of 95 million toe (113 billion m³ of gas equivalent) is expected to be saved during the period

Forest & Carbon Inventories & Tree Plantation

- ❖ Bangladesh Forest Department conducted a National Forest Inventory (NFI) from 2016 to 2019, assessing forest resources, carbon stock, and local dependency
- ❖ The government developed Forest Reference Levels (FRL) and Forest Reference Emission Levels (FREL), submitting them to the UNFCCC, and formulated the Bangladesh National REDD+ Strategy (BNR) to mitigate carbon emissions from the forestry sector

- ❖ NAP-SLCPs, developed with support from the Climate and Clean Air Coalition in February 2012, aim to reduce Short-Lived Climate Pollutants (SLCPs)
- ❖ The SLCP Plan incorporates eleven priority mitigation measures, targeting primary black carbon and major methane sources. Full implementation is projected to decrease black carbon emissions by 40% and methane emissions by 17% in 2030 compared to a business-as-usual scenario

Bangladesh National Action Plan for Reducing Short Lived-climate Pollutants

Renewable Energy Initiatives (Solar Alliance with Others, Solar Plan for Future)

- ❖ Bangladesh has installed over 6 million solar home systems (SHSs), benefiting around 18 million people (11% of the population)
- ❖ Approximately 66 MW of power is generated through rooftop solar panels, with 2,226 solar irrigation systems installed nationwide. Additionally, a government refinancing scheme supports alternative energy generation projects, including small-scale solar and microgrids, to improve energy access in off-grid areas

Ashrayan: Shelter for the Homeless and Landless

- ❖ 4,42,608 families have been rehabilitated in 22,640 barracks and 0.26 million houses
- ❖ The project also focuses on mitigation through implementing 1.58 million tree plantations, rainwater harvesting, Solar Home System based alternate power sources, improved cook stoves etc.

Table 5: National Adaptation Strategies

Document name	Publication year	Fields of action (sectors)													M&E process
		Agriculture	Biodiversity	Coastal areas & fishing	Education & research	Energy & industry	Finance & insurance	Forestry	Health	Infrastructure	Tourism	Transport	Urbanism	Water	
National Adaptation Programme of Action	2005; 2009	●	●	●				●	●					●	
Bangladesh Climate Change Strategy and Action Plan	2009	●		●	●	●		●	●	●		●	●	●	
Bangladesh Delta Plan 2100	2018	●		●	●			●		●		●	●	●	

Energy-related CO₂ Emissions by Sector

Annual CO₂ emissions from fuel combustion (MtCO₂/year)

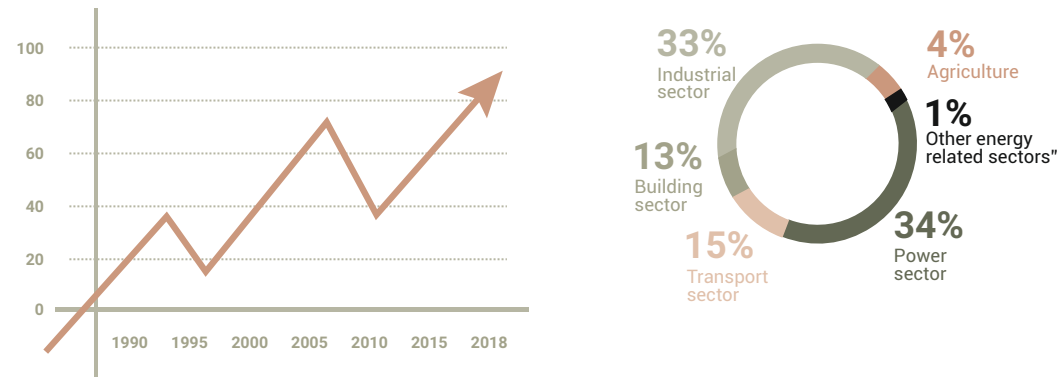


Figure 74: Energy-related CO Emissions by Sector

*Other energy-related sectors' covers energy-related Co₂ emissions from extracting and processing fossil fuels. Due to rounding, some graphs may sum to slightly above or below 100%.

The largest driver of overall GHG emissions are Co₂ emissions from fuel combustion. Energy-related CO₂ emissions increased by 556% from 1990 to 2019. In 2019, the electricity sector at 34%-was the largest contributor of total Co₂ emissions followed by industry and transport with 33% and 15% respectively. These three sectors have grown most rapidly since 1990.

Policy Assessment

Medium

Renewable Energy in the Power Sector

The stated aim of Bangladesh's Renewable Energy Policy (2008) is to increase the percentage of renewable energy in the energy mix to 10%. The policy includes instruments such as tax exemptions for the production of renewable energy equipment and project investors, commercial lending and a micro-credit support system for purchases of equipment in rural areas. The 2020 target was not achieved, and a new renewable energy policy is now being developed. The Eighth Five-Year-Plan (2020-2025) aims to have 'aggressive efforts in the generation of solar and wind power. The National Solar Action Plan has guidelines for a decentralised generation system with solar, solar power-based irrigation and net metering facilities.

Coal Phase-out in the Power Sector

The Eighth Five-Year-Plan (2020-2025) acknowledged that the reliance on imported coal (and natural gas) has put an unsustainable financial strain on the country and the power system.

Bangladesh's earlier plans to build new coal power plants (17 GW) have been rolled back as, among other factors, the high price of imported coal during the pandemic rendered these projects no longer cost effective. In early 2021, the country's power secretary announced that the country would abandon nine planned coal plant construction projects, with a combined power capacity of 7,461 MW.

Low

<<<

References:

- ♦ own evaluation based on Bangladesh Planning Commission, 2020, Gerretsen, 2021 Global Coal Plant Tracker, 2021
- ♦ own evaluation based on Ministry of Power, Energy, and Mineral Resources, 2008, Bangladesh Planning Commission, 2020: Islam, 2021

Source: Enerdata, 2020



Figure 75: Rural Settings in Bangladesh

Bangladesh is one of the most vulnerable countries to climate change in the world. With rising threats of climate change in coastal areas and limited income opportunities in rural areas, around 20 million people are expected to migrate, many of them to cities. Such massive rural-urban migration will put huge pressure on already stretched urban infrastructure with congested roads, inadequate sanitation and acute housing deficits in urban areas.

With the current housing prices being far above the reach of general people, and that the country is struggling to provide adequate housing at a pace that matches its rapid urban growth.

India, the neighboring country, is the second most populated country in the world with a sixth of the world's population. According to official estimates, India's population standing at over 1.40 billion. As a part of the continuous efforts of the Indian Government to fulfill the housing needs of rural and urban poor, Pradhan Mantri Awaas Yojana was launched by Prime Minister Narendra Modi in June 2015 with an aim to provide affordable housing. IIFL Home Finance Ltd., India's one of the leading Housing Finance Companies, with a special focus on affordable housing and home loans, took a step further and aligned its effort towards green affordable housing, and promoting sustainable ways of living.

Asian Development Bank (ADB) and IIFL Home Finance Ltd. (IIFL HFL), have collaborated to promote green affordable housing in India, amongst the developer fraternity, educate the stakeholders on the technical aspect, initiate policy dialogues and instigate the retail buyers to adopt sustainable healthy ways of living. Of many such initiatives, **KUTUMB (means home, family)** is one platform where all the stakeholders such as policy makers, government bodies, regulators, PLIs, developers, designers, architects, academia, researchers, etc. come together and have a dialogue.

ADB and IIFL HFL created Kutumb platform in Bangladesh with an objective to bring further and share the experience, learnings, findings and suggestions to the relevant stakeholders.

- Land Availability & Price
- Awareness, Demand & Supply
- Financing Options Available
- Urban Planning & Supporting Infrastructure
- Affordable Housing
- Focus on Sustainable & Green Housing
- Design & Construction Techniques
- Available Policies & Green Certification



Figure 76: Urban Settings in Bangladesh

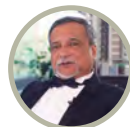
The Bangladesh Kutumb event provided an enlightening comparison of housing challenges and sustainable solutions between India and Bangladesh. It served as a platform for cross-border knowledge exchange and highlighted the importance of global cooperation in finding effective, sustainable solutions to housing issues. This international collaboration was not only about sharing knowledge but also about fostering new insights and paving the way for a more inclusive and sustainable future in the construction and housing sectors of both countries.



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Learnings

Kutumb's collaboration with ADB in organizing ten impactful events has yielded profound insights for the green affordable housing sector. Delving into key areas such as affordability, location strategies, and climate resilience, these learnings underscore the imperative shift towards sustainable and economically viable urban development.



1. Affordability

Group housing or collective housing, offers several advantages. The dwelling unit sizes being small, simple walk-up low/mid-rise apartment systems give a high density of dwelling units per hectare of land. Land parcels close to existing civic services and social infrastructure become affordable. Town and city expansion remains compact. Homes share the costs and benefits of shared utility infrastructure, community facilities and open recreational spaces. Water supply, electricity, security, hygiene and waste management are assured at the collective level.

1.1 Location and Land Price

Land price is a critical component of affordability. In the open land markets, land parcels for housing located within or close to towns and cities are expensive. The larger the city, the higher the price. Generally, commute time to work longer than 45 minutes and its travel costs are not sustainable for low-income families. Developers look for land within this limit. The land price within this range is progressively getting unaffordable in the Metros. Near the second and third tier cities, where there is a growing need for EWS and LIG housing, land is still affordable. In order to promote affordable housing in urban areas for the EWS and LIG, a policy for providing land at affordable costs is necessary. This may be in the form of reserved price land lots or a PPP model.

1.2 FSI and Land Price

The market price of land is a function of its locational advantage/disadvantage, the permitted land-use and the permitted FSI. It is seen that the price of land tends to rise proportionately to the permissible FSI. The higher the permissible FSI, the more expensive the land. Land aggregators profiteer from accumulating land in anticipation of urban growth and permission to build. They profit hugely from an increase in the permitted FSI.

In speculative land markets, the presumed benefit of raising the permissible FSI, therefore, does not get transferred to the buyer. For EWS and LIG, subsidy would be required to reach the threshold of affordability.

1.3 Building Typology

Increase in FSI beyond 1.5, forces buildings to be taller than four to five storeys. The higher the FSI, the taller the building. The developer is drawn to exploit the full permitted FSI to maximise profits. The taller the building, the higher the cost of construction, operation and maintenance.

The construction cost of eight storey high buildings is approximately 12% higher than four/five storey high buildings. This difference increases as the building gets taller.

The maintenance and operation cost of eight storey high buildings is approximately 50% higher than four/five storey high buildings. This difference increases as the building gets taller. This cost is a critical aspect of affordability for EWS.

As buildings get taller beyond five storeys (G+4), they become unaffordable for EWS and less affordable for LIG.

Developers focussing on providing homes for EWS and LIG confirm this observation and prefer to develop four/five storeys tall projects.

1.4 G+4 is Economical, Affordable and Readily Scalable

In urban and suburban areas, new housing for EWS and LIG will need to be low-rise (G+4) and high-density group housing. Existing individual homes on individual plots will also transform to G+3. This pattern of housing will be the most economical and affordable. This pattern, being relatively simple to construct, also enables multiple local entrepreneurs – contractors and builders – to readily undertake the construction.

It is instructive that for these types of buildings, builders are not resorting to monolithic concrete construction as it offers no cost advantage. They also recognise that monolithic concrete external walls will result in overheating of dwelling units.

The technology, material and skill resources for simple low-rise or mid-rise buildings will generally be available locally. It is in this context that capacity building programmes for incorporating AFFORDABLE green design and construction will be most impactful.

1.5 Processing Costs

In Affordable Housing, profit margins are slim and the market is price-sensitive. In many municipalities and ULBs, building plan approval and developers' reports can take up to one year after land has been purchased. This constitutes a significant cost. Approvals have to be sought from diverse authorities for a single project.

In order to access concessional green finance, green building certification by a third party is required. This comes at an additional service fee. Even if this process is facilitated by the home loan financing company, the hidden costs of the time devoted by the developer's organisation pinches. It is more stressful for the small developer.

Small and medium size developers look forward to:

- ❖ Single window simplified approval for PMAY Affordable Housing
- ❖ Unified building by-laws to be laid down for PMAY Affordable Housing
- ❖ The essential Green Features pre-requisites to be included in the PMAY building by-laws so that further green certification is not deemed necessary to access green finance

2. State of Readiness

2.1 Extra Costs

There remains a perception among developers that 'green' means more cost. However, those developers who have gone for green certification have seen that the 'extra' costs are marginal and can be compensated by more economical design. The most significant opportunity for the economy is in the intensity of steel consumption (kgs/sqm of floor area).

For large projects, the most complex and costly 'green' requirement is the on-site treatment and recycling of waste and sewerage water. This is mandatory under Environmental Clearance required for large projects.

For construction of tall buildings, there is a progressive trend toward monolithic concrete construction. This is preferred as a time saving and labour-saving system of construction, compared to conventional systems of RCC frame and infill masonry.

2.2 Growing Popular Awareness

Developers do sense that there is a growing awareness, especially amongst the younger generations, of the benefits of healthy lifestyles. Citizens desire and value younger generations, of the benefits of healthy lifestyles. Citizens desire and value comfort, cleanliness and hygiene. They seek respite from the noise, dust and polluted air of cities. Residents value greenery around their homes and enjoy tending plants and gardens. They need an assured supply of clean water. However, only a few developers consider these attributes to be an integral aspect of their business or value propositions.

2.3 Popular Preferences and Vaastu

In the order of priorities that determine a home buyers' choice – location of the project, cost and size of the dwelling unit naturally take precedence. As we approach the middle class aspirant, conformity of the dwelling unit plan to traditional Vaastu becomes a pre-requisite. This is particularly prevalent in Karnataka, Andhra and Telangana, where Vaastu compliance is cited at the top of the developer's sales literature.

The adherence to Vaastu is ritualistic and a matter of implicit belief to protect well-being and future prospects for the home-owner's family. It is not understood as a science about the pragmatic concerns for thermal comfort, light,

ventilation etc. Ironically, each dwelling unit within a multi-family block of flats is imagined to occupy its independent cosmic space as if it is a family home on its own plot of land. This adherence often compromises the basic concern for thermal comfort, light, ventilation. Developers readily acknowledge this contradiction. This set is followed by the trustworthiness and reliability of the builder and the apparent quality of construction. Hardware, sanitary fixtures, windows and walling material are the elements of competition amongst developers.

2.4 Public Appreciation of Green as Beneficial

Green lifestyles and green buildings have been bandied about as slogans for over a decade. The general public connects to slogans, such as 'greenery', 'no to plastics', and the romance of traditional earth and bamboo construction, etc. There is poor appreciation of the role, the design and construction of the home can play in keeping the home cool and comfortable, taking advantage of diffuse daylight and ventilation. Even less is the understanding of how the design of the external spaces surrounding the buildings can modify the microclimate and make the outdoors liveable.

Even those few developers who espouse green design do not convey an understanding of green features to see how they benefit comfort, health and wellbeing of the prospective home buyer. This is a serious gap in public appreciation of Green as beneficial.

2.5 'Green Homes' Campaign for Consumer Led Demand

It is a serious matter that most developers and their building designers do not correlate the attributes of green design, for example – shading windows, cross ventilation, controlled daylighting, with the health and well-being of residents. Rather, green certification is seen as a passport to finance and other fiscal incentives that are offered by the State or ULBs.

This pathological state of the culture of developers and designers requires correction and transformation. An extensive campaign for a well-informed consumer who can make specific demands to the developer is urgently required. The regimes of incentives that do not translate into benefits directly enjoyed by the home owners only perpetuate a real estate culture where environmental and social responsibility are seen to negate economic advance.

The essential provisions in design and construction for addressing the protection of health and wellbeing in the face of Climate Change must be mandated in the rules and regulations. It is now established that these need not cost more if integrated into design. And the consumer must be informed about how these provisions in the design and construction of their home promote their wellbeing and health and will protect them from the stresses of Global Warming, pollution and water scarcity. These provisions become a demand from the informed consumer as this is now seen as a fundamental right.

3. Streamlining Project Approval

3.1 Unified Bylaws for Affordable Housing

It has been suggested above that there can be a set of Unified Bylaws for Affordable Housing (PMAY) which mandate the essential green measures in design and construction. These need to address the following aspects:

- ❖ Insulation (U Value) of roof
- ❖ SRI of roofing finish
- ❖ Insulation of (U Value) of external walls

- ❖ The U values may be adjusted according to the Climatic Zone
- ❖ External shading arrangement for windows facing Westwards and Eastwards. The above measures make the most significant improvement to indoor thermal comfort. They extend the duration of comfort hours and reduce the intensity of discomfort during extreme weather. They are an essential resilience measure to combat heat stress during heat waves. Most significantly, they would reduce the latent demand for air conditioning and its CO2 emissions by up to 30%
- ❖ Maximum reinforcement steel intensity (kgs of steel per sqm of carpet area). Reinforcement steel intensity may be adjusted according to the Earthquake Intensity Zone. Controlling the consumption of steel by selection of building type and height of buildings is the single most effective measure for reducing the carbon intensity of construction. For multi-storey buildings, reinforcement steel or structural steel accounts for approximately 50% of the embodied energy intensity (EEI) of building construction. The greater the height of the building, the greater its EEI on account of the structural dependence on steel

This contributory cause to Climate Change has hitherto gone unattended. It must be attended to urgently.

3.2 State Level Special Regulations for Affordable Housing

At the state level, specialized regulations for affordable housing are essential to address unique local challenges and ensure targeted support for marginalized communities. These regulations can facilitate streamlined processes, incentivize developers, and prioritize the allocation of resources towards meeting the housing needs of low-income individuals and families.

3.3 State Level Environmental Clearance

Large projects of greater than 20,000 sqm of built up area require Environmental Clearance (EC) from the designated State Level Authority. It would be necessary to ensure that the Unified by-laws for affordable housing are aligned with the regulations and assessment for EC.

3.4 Green Prerequisites for PMAY Eligibility

It is strongly recommended here that the Unified By-laws for Affordable Housing be made a pre-requisite for eligibility under PMAY.

4. Green Certification for Affordable Housing

It is contended here that it is on account of the absence of mandatory green performance requirement in the present planning regulations and building bylaws that green certification by the rating agencies such as GRIHA, IGBC and EDGE, is being resorted to. These bylaws, in the case of affordable housing, do not need to be as extensive and comprehensive across a wide range of parameters that form the basis of the green certification systems. The most important ones, as discussed above, need to be mandated and be included in Unified bylaws for Affordable Housing. This will constitute Green Certification.

5. Opportunities for Developers

As we confront Climate Change and rising temperatures, energy-efficient cooling systems will be needed. Better management of water resources and management and conversion of waste to resources will need to be assured. Developers have been of the view that in affordable housing, it is common for the water treatment and recycling plants to fall apart after they hand over to the Residents' Welfare Association (RWA). Policy has to anticipate remedies for this situation.

Deeper discussion with developers and designers regarding the long-term maintenance and operations of the services infrastructure and the upkeep of buildings brought out some business opportunities for developers.

5.1 Subsidiary Companies for O&M

Developers may be encouraged to have subsidiary companies that can be contracted for operation and maintenance of infrastructure and buildings. This will ensure that the companies have a seamless take over from the execution team with a full understanding of all systems, their operations and preventive maintenance and monitoring. Such support to RWAs will enhance long term sustainability and build confidence in the developers' brand.

5.2 Bulk Purchase of 0.75 TR Window ACs and Fans

It is seen that in LIG homes, air conditioners are being installed to cope with the hot season. This is inevitable as air conditioners become affordable for increasing numbers of households. This is an opportunity for developers to get the advantage of bulk purchase to access energy-efficient air conditioners. Research indicates that 0.75 TR capacity units is all that is required. Arrangements such as the one with EESL for lamps can be instituted in order to transfer this benefit to homeowners.

The current practice is to leave the electrical fixtures such as fans, lights and geysers to be bought and installed by the homeowner. The same arrangement can be extended to electric devices to achieve energy efficiency.

5.3 Bulk Purchase of Evaporative Coolers

For Hot-dry and Composite Climates, evaporative coolers offer the most energy efficient cooling during the hot-dry peak of summer. New products which can be fitted below window sills are now on offer. These can also be bulk purchased.

Designers do need to integrate into the unit designs, the installation of the coolers and air conditioners so as not to compromise the light, ventilation and view.

5.4 The Potential for Solar PV

The most beneficial potential of low-rise buildings is in the integration of rooftop Solar PV. Approximately 85% of the annual electricity demand of the low-rise residential building can be met by a grid-connected rooftop system. This is consistent with the Solar Cities mission and a rapid route toward low-carbon/toward net-zero urban development.

6. Climate Change Resilience

Climate Change is staring us in the face. City after city is experiencing increasing duration and intensity of heat waves. Extreme weather events have been experienced by citizens across India.

Even as we provide affordable homes for the EWS and LIG sections of our society, it will be these citizens who will suffer the brunt of Climate Change.

The present trends of planning, design and construction for affordable housing continue to largely ignore the need for resilience against Global Warming. Absence of adequate roof insulation, no arrangement for external shading of windows against the unwanted sun, inadequate ventilation, and the adoption of monolithic concrete construction for external walls will only heighten heat stress and cause a runaway demand for cooling of homes.

The small and medium size developer of affordable housing and governmental agencies will be the key players in the task of meeting the mounting housing shortages. Policies and regulations need to be strategically rationalised to enable their quick

transition into green design and construction.

This paper suggests simple and effective measures which can be instituted today for urban housing to improve our citizens' health and wellbeing. They would also reduce the energy demand for cooling by 30 to 35%.

It is equally important to limit EWS and LIG housing to low-rise buildings up to five stories in height. This keeps construction, operation and maintenance costs in the affordable range, while at the same time curtailing the steel intensity of buildings and thereby reducing the CO2 emissions on account of construction.

The most beneficial potential of low-rise buildings is in the integration of rooftop Solar PV.

The suggested measures in this paper are the first step toward sustainable and resilient urban growth while reducing the carbon intensity of urban development.

Leading the Change in Sustainable Living

In response to the pressing need for sustainable development within the construction industry, IIFL Home Loans has positioned itself as a beacon of thought leadership. Recognizing the substantial environmental footprint of the construction sector, IIFL Home Loans has embarked on an ambitious initiative known as the Kutumb platform. This platform serves as a dynamic meeting ground for industry experts, bringing together a diverse range of stakeholders to collectively address the multifaceted challenges spanning the entire building life cycle.

Kutumb, as conceptualized by IIFL Home Loans, goes beyond conventional industry collaboration. It is designed to foster a sense of unity among stakeholders, creating a shared understanding of both the challenges and opportunities within the construction sector. Operating as a catalyst for change, Kutumb promotes dialogue and knowledge exchange among experts, developers, and industry leaders. This collaborative approach is pivotal in devising holistic solutions that extend beyond the immediate concerns of construction to address the broader implications of sustainable living.

The Kutumb platform is not merely a series of discussions; it represents a concerted effort to redefine the standards and practices of the construction industry. By addressing critical issues such as resource efficiency, environmental impact, and long-term sustainability, Kutumb aims to transform how buildings are designed, constructed, and maintained. This initiative underscores the importance of integrating sustainable practices into every phase of the building life cycle, from planning and design to construction and operations.

Way Forward: Humara Kutumb- Taking Sustainability to the Grassroots



Building on the success of the flagship Kutumb initiative, IIFL Home Loans has launched Humara Kutumb, marking Phase II of our objectives. This phase shifts from high-level discussions to direct community engagement, emphasizing a grassroots approach to creating affordable and sustainable housing. The goal of Humara Kutumb is to assist communities in building eco-friendly homes, applying insights from the Kutumb sessions.

Humara Kutumb embodies a hands-on approach to sustainability. By engaging directly with communities, IIFL Home Loans empowers local populations with knowledge, tools, and resources to construct eco-friendly homes. This includes education on sustainable building practices, access to green materials, and financial support for economically weaker sections (EWS) and lower income groups (LIG).

Our initiative collaborates with local leaders, builders, and residents through workshops, training sessions, and community

projects to promote sustainable construction. Humara Kutumb underscores IIFL Home Loans' commitment to turning sustainability goals into real-world outcomes, fostering a culture of sustainability at the grassroots level and making a significant impact on the construction sector and broader environmental stewardship.

This initiative involves a comprehensive strategy that includes:

Owner Driven Homes and Socio-cultural Modelling

- ❖ Our approach to sustainability is two-fold: structurally, we adopt a "sustainable" model, while functionally, "community engagement" plays a pivotal role
- ❖ The core objective is the integration of social, ecological, and climate sustainability elements. This involves a holistic consideration of materials chosen for homes, with a focus on positively impacting ambient air quality, community health, and minimizing the overall environmental footprint
- ❖ Key strategies include the use of sustainable materials such as fly ash bricks, leveraging construction exposure through an owner-based approach, implementing low flow water systems for resource conservation, incorporating space saving construction techniques, and utilizing cool roofing for improved heat management

Facilitation of Homeowners:	The program aims to equip homeowners with the knowledge and skills necessary to adopt materials and technologies aligned with the sustainability goals of the program
Multiplier Effect in Local Communities	Through interventions that demonstrate the feasibility and benefits of sustainable practices, we aim to foster replication and scalability
Capacity Building	A critical aspect of Phase 2 is the establishment regional ecosystems. This includes development of trained masons, contractors, and material entrepreneurs who can contribute to sustainable practices within their communities
Knowledge Creation, Dissemination	Houseowners capacitated with technical information of best practices to have sustainable houses which live longer and can withstand climate stress will be created

DISHA: Sustainable Living Workshops



DISHA is a pioneering community engagement initiative that transcends conventional approaches by intersecting environmental stewardship, social empowerment, and affordable housing. Conceived through a strategic collaboration between IIFL Home Finance Ltd. (IIFL HFL) and the Asian Development Bank (ADB) Technical Assistance Program, DISHA represents a transformative endeavor aimed at catalyzing sustainable and affordable housing practices, particularly for economically weaker sections (EWS) and low-income group (LIG) households. By promoting eco-friendly construction methods, advocating for green building technologies, and fostering community empowerment, DISHA aims to create a holistic model that not only provides affordable housing but also ensures environmental sustainability and social upliftment.

Vision & Mission

At its core, DISHA embodies a vision of holistic development, recognizing the intrinsic link between environmental sustainability, social empowerment, and economic resilience. By engaging communities in educational activities, promoting sustainable living practices, and fostering women's leadership, DISHA aims to empower individuals and communities to become stewards of their own sustainable futures.

DISHA's comprehensive approach encompasses a diverse range of impactful initiatives, each meticulously crafted to address the unique needs and challenges faced by communities across India. From interactive seed bomb activities for children to empowering workshops for women on sustainable living practices, DISHA has emerged as a catalyst for change, igniting a passion for environmental conservation and social empowerment.

This report delves deep into the multifaceted methodology, impactful initiatives, geographical reach, and invaluable learnings from DISHA's transformative journey. Through rigorous needs assessments, collaborative planning with stakeholders, and the development of tailored educational content, DISHA has laid a solid foundation for sustainable development. The impact of DISHA is not only evident in its geographic reach across 13 cities and 20 select RWAs in India but also in the tangible outcomes observed in communities.

From testimonials of participants expressing gratitude for newfound knowledge to the adoption of sustainable practices in daily life, DISHA has left an indelible mark on the lives of those it has touched.

As we navigate through DISHA's impactful initiatives, innovative methodology, and far-reaching impact, we gain insights into the power of community-driven initiatives. The project's success stories, challenges faced, and lessons learned serve as a roadmap for future endeavours in sustainable development. By exploring DISHA's methodology, impactful initiatives, community engagement strategies, and plans for the future, we gain a deeper understanding of how grassroots initiatives can pave the way for a more sustainable, equitable, and empowered society for all.



Figure 77: Art Competition for Children on Save Electricity

Methodology

DISHA uses a holistic methodology for community engagement, focusing on environmental, social, and economic sustainability. Its success relies on rigorous needs assessment, collaborative planning, tailored curriculum development, strategic participant recruitment, interactive training, ongoing assessment, and feedback mechanisms.

Needs Assessment

- ❖ DISHA's approach to community engagement targets environmental, social, and economic sustainability. Its success stems from thorough needs assessment via surveys, interviews, and focus groups, enabling the understanding of educational gaps and community-specific challenges
- ❖ DISHA conducts demographic and environmental data analysis alongside qualitative assessments to customize programs and interventions. This data-driven approach complements its comprehensive methodology for community engagement

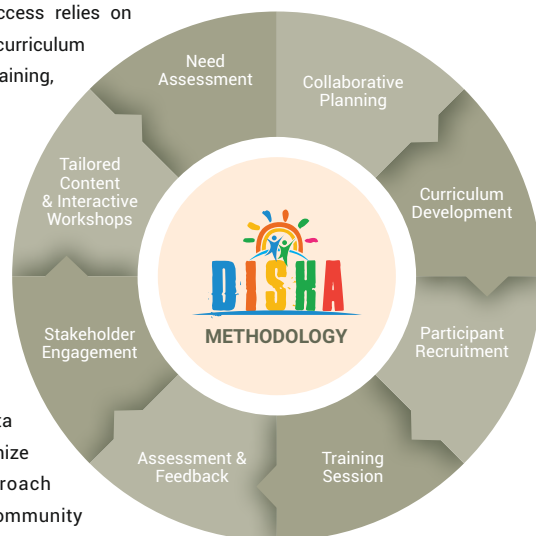


Figure 78: DishA: Methodology

Collaborative Planning

- ❖ Establishment of a Multi-Stakeholder Steering Committee: A multi-stakeholder steering committee was established, bringing together representatives from ADB, local NGOs, government bodies, and community leaders. This collaborative approach ensured diverse perspectives and expertise were integrated into program planning
- ❖ Planning Workshops: DISHA conducted planning workshops with stakeholders to define clear program goals, objectives, and expected outcomes. These workshops served as platforms for discussions on community needs, resource allocation, and strategy development

Curriculum Development

- ❖ Culturally Sensitive Curriculum: DISHA's curriculum was crafted to be culturally sensitive and contextually relevant to the communities it serves. Subject matter experts and community leaders were engaged in the development process to ensure the content resonated with participants
- ❖ Interactive Elements: The curriculum included interactive elements such as group activities, discussions, and practical demonstrations. This interactive approach enhanced participant engagement and understanding, making the learning process more effective

Participant Recruitment

- ❖ Strategic Outreach Strategies: To maximize community participation, DISHA implemented strategic outreach strategies. These included collaboration with local leaders, community announcements, and leveraging existing networks to promote the program
- ❖ Promotion of Benefits: Participants were informed about the benefits of participating in DISHA workshops, such as gaining valuable knowledge on sustainable living practices, access to resources, and opportunities for community engagement.

Training Sessions

- ❖ Engaging Workshops: DISHA organized engaging workshops in identified Residential Welfare Associations (RWAs) and communities. These workshops covered a range of topics including health, hygiene, financial literacy, and environmental sustainability
- ❖ Practical Demonstrations: Practical demonstrations were integrated into the training sessions to provide hands-on learning experiences. Participants were able to see and practice sustainable techniques such as composting, rainwater harvesting, and energy-efficient practices

Assessment and Feedback

- ❖ DISHA conducted pre and post-training assessments to gauge knowledge enhancement, aiding in workshop effectiveness evaluation and identifying areas for improvement
- ❖ A participant feedback mechanism was established to gather real-time insights on program effectiveness, enabling continuous adjustments and enhancements for the initiative's improvement

Tailoring Content for Diverse Audiences

- ❖ DISHA prioritized customized content for Low-Income Group (LIG) and Economically Weaker Section (EWS) communities, tailoring the curriculum to address their specific needs and challenges
- ❖ Emphasizing adaptability, DISHA's methodology ensured that content and approach could be tailored to each RWA society's unique characteristics, effectively engaging participants and ensuring relevance to their daily lives

Interactive Workshop Formats

- ❖ Effectiveness of Interactive Workshops: DISHA found that interactive workshop formats were highly effective in knowledge transfer and community engagement. Activities such as group discussions, role-plays, and hands-on exercises enhanced participant understanding and involvement
- ❖ Participatory Approach: The methodology emphasized a participatory approach, where participants were encouraged to actively engage in the learning process. This not only improved retention of information but also fostered a sense of ownership and responsibility towards sustainable practices

Continued Stakeholder Collaboration

- ❖ Importance of Stakeholder Engagement: DISHA's methodology highlighted the importance of ongoing collaboration with local stakeholders. By involving community leaders, NGOs, and government bodies in the planning and execution of the initiative, DISHA ensured its sustainability and relevance
- ❖ Community Involvement: Stakeholders were actively engaged in decision-making processes, ensuring that the initiative reflected the needs and aspirations of the communities it served. This collaborative approach-built trust and commitment among participants

Impact and Geographic Reach

- ❖ DISHA's impact extends far beyond its initial objectives, leaving a lasting imprint on communities across 13 cities in India. By engaging with diverse demographics, the initiative has showcased its adaptability and effectiveness in addressing the unique needs of each locality. Here are some key facets of DISHA's impact:

Empowering Communities

- ❖ Through workshops and interactive sessions, DISHA has empowered participants with essential knowledge on sustainable living practices, health, hygiene, and financial literacy. Participants now have a deeper understanding of the importance of environmental conservation and its impact on their lives
- ❖ The initiative has catalysed a remarkable shift in behaviour among participants. They have embraced sustainable practices such as water and electricity conservation, waste management, and responsible resource usage
- ❖ DISHA's equipping women with the tools and knowledge to lead sustainable lifestyles, the initiative has empowered them as change agents within their households and communities



Environmental Impact

- ❖ The Seed Bomb Activity for Children has led to the planting of native saplings, resulting in the greening of immediate surroundings. This not only enhances the aesthetic appeal of the areas but also contributes to biodiversity and ecosystem health
- ❖ By promoting sustainable practices such as energy efficiency and waste reduction, DISHA has contributed to a reduction in the carbon footprint of participating communities. This has tangible benefits for the environment, mitigating the impact of climate change



Cultivating a Sense of Ownership

- ❖ DISHA's Seed Bomb Activity engages participants in a hands-on experience of seed planting, fostering a direct connection with nature. By participating in this activity, individuals not only learn about the importance of environmental stewardship but also develop a sense of ownership and responsibility towards the plants they have planted
- ❖ Through ongoing monitoring of the planted seeds, DISHA instills a sense of accountability among participants, particularly children. As they witness the growth and development of the saplings they have planted, children develop a deep sense of pride and commitment to nurturing their environment, viewing themselves as custodians responsible for the well-being of the plants and the ecosystem as a whole



Community Engagement and Collaboration

- ❖ DISHA's collaborative approach, involving local NGOs, government bodies, and community representatives, has fostered a sense of ownership and collaboration. Stakeholders are actively engaged in the planning, execution, and evaluation of the initiative, ensuring its sustainability
- ❖ The initiative has strengthened social bonds within communities. Participants now have a platform to connect, share ideas, and collectively work towards a common goal of sustainability



Testimonials and Positive Reception

- ❖ Gratitude and Commitment: Testimonials from participants echo a sentiment of gratitude for the awareness created by DISHA. Many express a renewed commitment to adopting sustainable practices in their daily lives
- ❖ Lifestyle Changes: Participants have shared stories of how DISHA workshops have inspired them to make significant lifestyle changes. From reducing water wastage to composting kitchen waste, individuals are actively incorporating sustainable habits into their routines



Geographic Reach

- ❖ DISHA's workshops and activities have reached a diverse range of communities across 13 cities in India. This geographical spread showcases the initiative's adaptability and effectiveness in engaging with different cultures, languages, and socioeconomic backgrounds
- ❖ The versatility of DISHA's approach is evident in its ability to resonate with both urban and rural communities. Whether in bustling city centers or remote villages, the initiative has left a positive impact on all who have participated



Table 6: Disha Workshops - Geographic Reach

Date	Project Name	Total Footfall	Sustainable Living Workshops (Attendees)	Drawing Competition (Attendees)	Plantation Drive (Attendees)
11 th December 2021	Migsun Roof, Ghaziabad	40	12	25	18
12 th December 2021	Omaxe City 1 - Ashiyana, Indore	70	18	35	20
16 th January 2021	Aavaas Nebula, Ahmedabad	45	15	20	15
23 rd January 2022	Om Shanti Gold-1, Ahmedabad	40	15	20	10
22 nd January 2022	Laxmi Nivas, Ahmedabad	55	20	25	15
12 th February 2022	Mahavir Bunglow -2, Bhuj	78	50	38	40
13 th February 2022	Ayodhya Town Ship, Bhuj	36	36	28	12
13 th February 2022	Mahek Residency, Surat	67	61	48	33
17 th April 2022	Rajiv Swagruha	78	36	22	74
1 st May 2022	Janapriya Heavens	59	59	22	26
7 th May 2022	Shree Residency, Vijayawada	41	42	22	22
8 th May 2022	Indrani Nilayam, Visakapatnam	20	20	7	19
13 th August 2022	Andour Heights, Gurugram	39	39	24	24
14 th August 2022	Signature Global Synera, Gurugram	42	42	34	34
11 th September 2022	Bhawani Towers, Kolkata	32	32	14	14
25 th September 2022	Pragna Ashray, Bangalore	32	32	12	19
2 nd October 2022	Belantara Today Royal, Mumbai	27	27	16	22
2 nd October 2022	Poonam Park View, Mumbai	36	36	18	24
12 th November 2022	Sara City, Pune	93	33	65	72
13 th November 2022	Mount Vista, Pune	26	17	11	11
Total		956	642	506	524

Learnings and Way Forward

- ❖ The DISHA initiative has embarked on a transformative journey, marked by valuable insights and learnings that not only shape its future trajectory but also contribute to the broader landscape of community-based sustainable development initiatives. Through its dedicated efforts, DISHA has unearthed significant observations and applications, paving the way for a more impactful and inclusive approach to community development
- ❖ One of the paramount learnings from DISHA's implementation has been the importance of tailoring content for diverse audiences. Recognizing the unique needs of Low-Income Group (LIG) and Economically Weaker Section (EWS) communities within Residential Welfare Association (RWA) societies, customization of content emerged as a crucial factor for engagement and relevance. Moving forward, DISHA will continue to refine its content, ensuring it resonates with the specific needs and contexts of each community it serves
- ❖ Interactive workshop formats have proven highly effective in facilitating knowledge transfer and community engagement. The emphasis on participatory activities has not only enhanced participant understanding but also fostered a sense of ownership and involvement within the communities. Therefore, future workshops under DISHA will continue to prioritize interactive formats, promoting active participation and ensuring more effective learning outcomes

The success of DISHA has also hinged on its flexibility and adaptability. The ability to tailor content and approaches to each RWA society's unique characteristics has been instrumental in achieving its objectives. This principle will continue to guide the project, highlighting the importance of remaining responsive to evolving community needs and circumstances.

Collaboration has been a cornerstone of DISHA's success, with partnerships with local stakeholders and community involvement playing pivotal roles. By emphasizing ongoing community engagement, DISHA ensures the sustainability and relevance of its initiatives. Strengthening partnerships with local NGOs, government bodies, and community leaders will remain a priority, fostering collaborative efforts towards sustainable living.

The scalability and replicability demonstrated by the initiative offer promising opportunities for broader impact. The adaptability of DISHA's model to different settings underscores its potential for replication. As DISHA moves forward, documenting best practices and lessons learned will be crucial, creating a blueprint for similar initiatives in other regions.

Another key learning has been the significance of building on community strengths. Leveraging local resources and knowledge has not only enhanced sustainability but has also empowered communities to drive their own development. DISHA will continue to prioritize identifying and amplifying these strengths for long-term success.

Regular impact assessments and reflections have been integral to DISHA's improvement over time. This commitment to measuring impact ensures that the initiative remains on track to achieve its objectives. Ongoing monitoring and evaluation will continue to be central to DISHA's approach, facilitating continuous improvement in future programs.

Looking ahead, the path forward for DISHA involves a strategic roadmap that integrates these valuable learnings:

- ❖ Firstly, a thorough assessment of the initiative's current impact will be conducted, evaluating its effectiveness in achieving goals and identifying areas for improvement. This assessment will inform the development of a comprehensive roadmap for the future, defining clear objectives, key performance indicators (KPIs), and a timeline for implementation
- ❖ Content refinement and customization will remain a priority, with a fresh needs assessment in target communities to understand evolving challenges and aspirations. The content of workshops will be tailored to address specific needs, ensuring continued relevance and resonance. Integration of emerging trends in health, finance, sustainability, and energy will be ongoing to keep the content contemporary and impactful
- ❖ Strengthening community engagement and collaboration will be at the forefront of DISHA's strategy. This will involve enhanced collaboration with local stakeholders, including community leaders, NGOs, and government bodies. The community will continue to be actively involved in planning, execution, and evaluation. Long-term partnerships with public

and private organizations will also be explored to secure resources and support for sustained impact

- ❖ Integration of technology will play a vital role in DISHA's future. Exploring digital learning platforms to supplement workshops and implementing data analytics for tracking progress and impact will enhance effectiveness. Capacity-building programs for trainers and community leadership development will ensure that DISHA's impact continues to grow
- ❖ A replicable model for DISHA will be developed, drawing on documented best practices and lessons learned. This model will be adaptable to different cultural, social, and economic contexts, facilitating expansion into new regions. Continuous monitoring and evaluation will be integral, with regular impact assessments and a feedback mechanism for real-time adjustments
- ❖ To ensure long-term sustainability and impact, income generation initiatives will be integrated into DISHA, empowering participants economically. Community-led projects aligned with sustainability principles will be encouraged, supported by DISHA to implement projects related to health, water, energy, and finance
- ❖ Public awareness and advocacy efforts will be expanded, with a comprehensive communication strategy to raise awareness about DISHA. Sharing success stories, impact metrics, and ongoing activities through various channels, including social media, will amplify the initiative's reach. Advocacy for policy support at local and regional levels will also be pursued to create an enabling environment for community education initiatives
- ❖ Documentation and knowledge sharing will continue to be prioritized, with detailed case studies and a repository of resources created. Workshops and webinars will be organized to share insights and best practices with other organizations and community development practitioners, fostering a culture of collaborative learning
- ❖ In conclusion, the DISHA initiative stands at a pivotal moment, armed with invaluable learnings and a clear path forward. By embracing adaptability, stakeholder engagement, interactive learning methodologies, and a deep understanding of community dynamics, DISHA is poised to not only sustain its current impact but also expand its reach and effectiveness in creating sustainable habitats and empowered communities. As DISHA continues its journey, it embodies the spirit of community-driven development, ensuring that every step forward is a step towards a brighter and more sustainable future for all

Conclusion

Leveraging insights gained from the ADB collaboration, the extension of Disha reinforces the project's positive impact on knowledge levels and community engagement. The detailed report underscores the initiative's effectiveness in addressing educational gaps and fostering positive change, contributing to the organization's broader commitment to social responsibility and sustainable development.

The way forward for Disha involves a holistic and strategic approach that leverages the learnings from Phase I. By continuously adapting to evolving community needs, embracing technology, fostering collaborations, and prioritizing sustainability, the initiative can become a beacon for effective community education and empowerment. Regular assessments, documentation, and knowledge sharing will be instrumental in ensuring the long-term success and positive impact of the project.

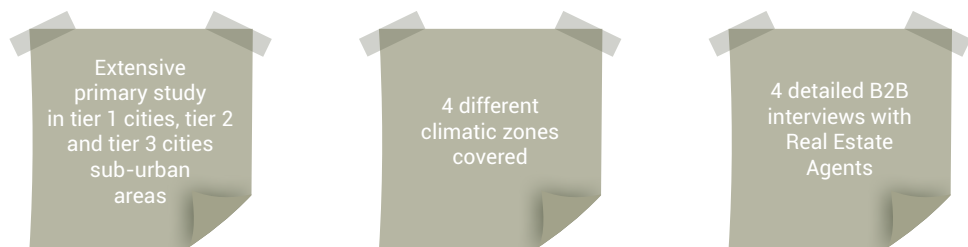
The journey of Disha represents a dynamic and adaptive approach to community education. From its collaborative inception with the Asian Development Bank, the project's evolution reflects the organization's commitment to sustainable living and the empowerment of diverse communities.

Understanding the Knowledge and Perception of Sustainable Living in EWS and LIG Households

As a part of the TA, IIFL HFL and the consultant engaged with Benori Knowledge Partners to understand 'Knowledge and Perception of the EWS and LIG households of the country. The study aims at understanding the awareness and perception of new homeowners and prospective buyers in EWS and LIG segments about sustainable housing. It focuses on four climatic zones in India – hot, dry & composite, hot & dry, warm & humid, and composite.

Further, the objective of the study was to assess:

- ❖ Awareness level, knowledge, and perception of energy saving, water conservation, and other ecological components essential for sustainable development of the country among homeowners and prospective buyers
- ❖ Satisfaction level with current accommodation
- ❖ Importance of sustainability and openness to idea of buying a sustainable home while making a purchase decision



B2C Surveys

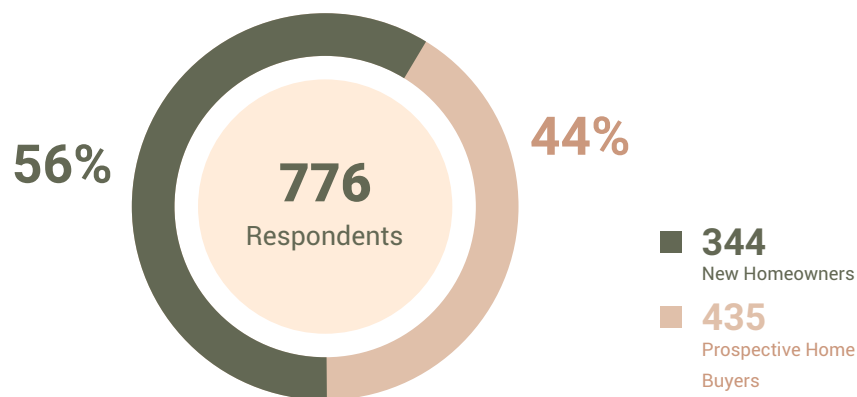


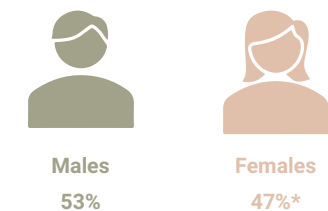
Figure 79: Study Methodology

Note* -

1. New homeowners refer to those respondents who have purchased their home during the last 4 years
2. Prospective buyers are those respondents who are planning to purchase a house in the next 1-2 years

Table 7: Respondent's Demographics

State	Climatic Zones	%
Rajasthan	Hot, dry and composite	12%
Gujarat	Hot and dry	12%
Maharashtra	Warm and humid	16%
Karnataka		11%
Andhra Pradesh		10%
Telangana	Composite	11%
Haryana		11%
MP, UP and Punjab		17%



N=776

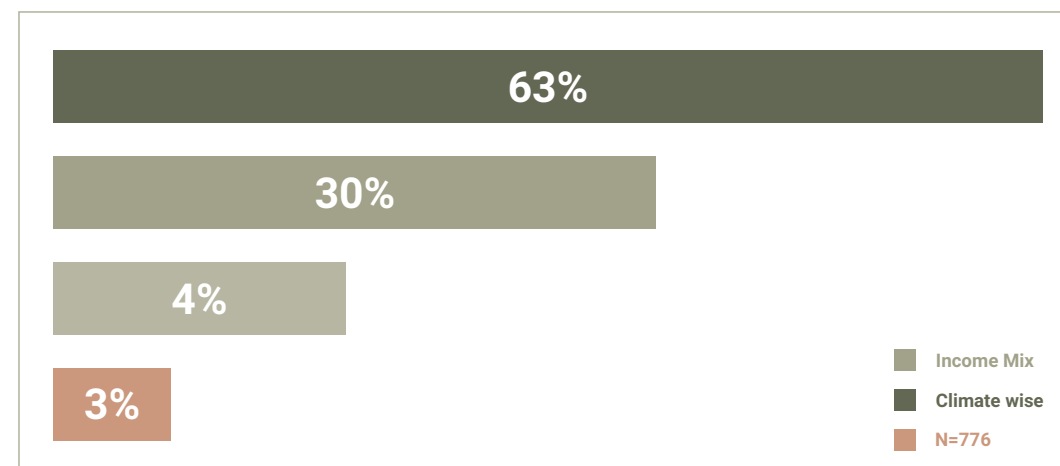
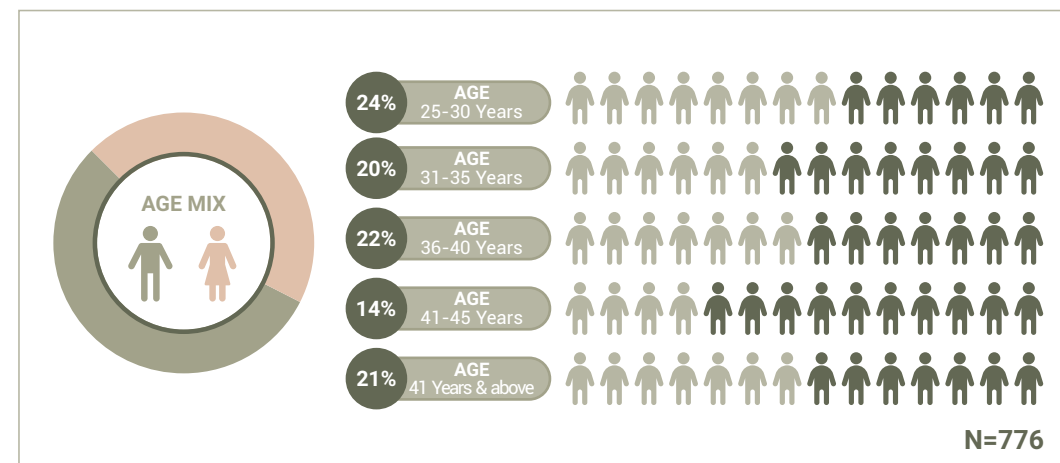


Figure 80: Respondents Demographics

Note* - Female representation is at lower side after incorporation of IIFL HFL data

Men have traditionally been the main decision-makers when buying or renting a house. On the other hand, women play an important role in beautifying and maintaining the home. However, with women becoming more independent, there has been a rise in them playing a crucial role while buying a property.

According to our survey, ~35% of women seem to participate in decisions regarding buying or renting a house.

Chief Wage Earner	You		90%	5%
	Spouse		1%	58%
	Both		9%	36%

Decision Maker	You		74%	4%
	Spouse		2%	56%
	Both		24%	40%

N=776

N=364

Survey Findings

Sustainable housing aims to meet the housing needs of the larger community by creating better social conditions and minimising the environmental impact of the life cycle. This study explores various challenges and opportunities in designing such systems in the Indian scenario.

Satisfaction & Challenges with Current Accommodation

- ❖ More than 50% of the respondents surveyed are dissatisfied with their current accommodation
- ❖ New homeowners who purchased a home in the last 1-2 years expressed less satisfaction with their current home than those who purchased a home in the last 2-4 years. The main reason for this dissatisfaction among recent homeowners is more consciousness and awareness around the concept of sustainability
- ❖ Shortage of clean water and proper ventilation are the prime concerns faced by new homeowners and prospective buyers

Awareness & Implementation of Sustainable Living

- ❖ 43% of respondents are aware of sustainability
- ❖ Majority (73%) have only heard about the concept, while 27% are fully aware through friends, relatives, and social media
- ❖ Awareness among females is lower compared to men
- ❖ Despite increasing awareness, over half of respondents are not implementing sustainable practices in their daily routines

Openness to Adopt Sustainable Homes/ Initiatives

- ❖ All respondents prefer sustainable homes with features like natural ventilation and ample sunlight, but only 6% are willing to increase their budget
- ❖ Key barriers to sustainability in the Indian housing sector include limited availability, lack of knowledge, and high installation costs
- ❖ Green buildings have substantial potential if made affordable for all income groups, with increasing demand from environmentally conscious consumers. Government schemes and subsidies further encourage the adoption of sustainable homes

Over
55%
of the new homeowners are satisfied with their current accommodation as compared to
41%
of the prospective buyers

- ❖ Over 50% of the respondents surveyed are dissatisfied with their current accommodation
- ❖ Out of which, people living in hot & dry (65%) areas expressed more dissatisfaction, followed by respondents living in warm & humid areas (52%)
- ❖ New homeowners who purchased a home in the last 1-2 years expressed less satisfaction with their current home than those who purchased a home in the last 2-4 years
- ❖ This is likely because recent homeowners are more conscious/aware of sustainability than those who purchased their homes 3-4 years ago

Level of Satisfaction with Current Accommodation



Current Accommodation

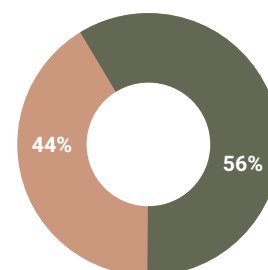


Figure 81: Current Accommodation

■ Prospective buyers
■ New homeowners

Level of Satisfaction with Respect to Buyers

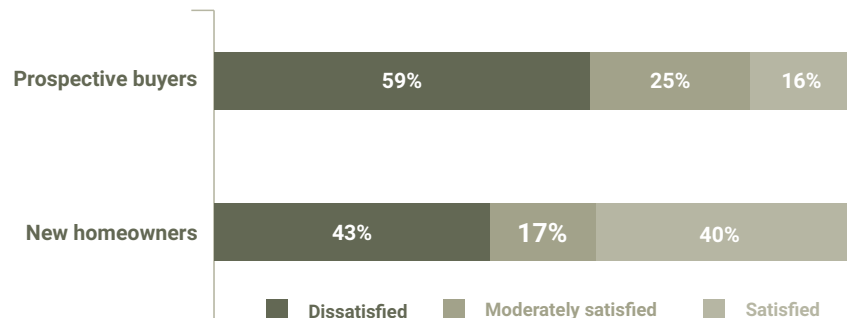


Figure 82: Level of Satisfaction with Respect to Buyers

Shortage of clean water and proper ventilation
are the prime concerns faced by dissatisfied new homeowners and prospective buyers

Top Challenges with Current Accommodation

- ❖ In India, many homes are still primitive and are not built to withstand adverse climatic conditions
- ❖ Also, sanitary conditions in the LIG and EWS category homes are poor, especially in the suburbs
- ❖ Homeowners and potential buyers face similar challenges with their current homes



Shortage of clean water
70%



Not enough sunlight
44%



Not enough ventilation
63%



Old construction/
damp walls
40%



Uncomfortable heat or cold
54%

N=568

Table 8: Top 3 Challenges with Current Accommodations as per Climatic Zones

Challenges	Rank 1	Rank 2	Rank 3
Warm & humid	Shortage of clean water (76%)	Not enough ventilation (69%)	Uncomfortable heat or cold (51%)
Hot, dry & composite	Shortage of clean water (65%)	Uncomfortable heat or cold (64%)	Not enough ventilation (49%)
Hot & dry	Not enough ventilation (71%)	Shortage of clean water (70%)	Uncomfortable heat or cold (67%)
Composite	Shortage of clean water (64%)	Not enough ventilation (59%)	Uncomfortable heat or cold (48%)

Good ventilation, cool indoor spaces, adequate sun exposure, and a potable water supply
are ranked as the top expectations of homeowners/buyers

Source: Primary inputs, <https://www.financialexpress.com/money/millennials-driving-realty-growth-in-tier-2-3-cities-2505696/>

Table 9: Challenges Faced by New Homeowners and Prospective Buyers with Respect to Climate

Challenges	Warm & humid	Hot, dry & composite	Hot & dry	Composite
Unhygienic surroundings and poor maintenance	30%	36%	26%	31%
Noisy surroundings	7%	6%	8%	10%
Not enough sunlight	47%	33%	44%	44%
Not enough ventilation	69%	49%	71%	59%
Becomes too hot indoors	36%	38%	55%	36%
Flooding	1%	1%	1%	3%
Shortage of clean water	76%	65%	70%	64%
Uncomfortable heat or cold	51%	64%	67%	48%
Frequent power cuts	10%	17%	11%	15%
Old construction and damp walls	38%	46%	36%	41%
Polluted air	25%	17%	8%	16%
Poor waste management	27%	26%	16%	25%

Table 10: Expectations from the new Home Bought/plan to Buy in Terms of Living Standards

Expectations	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5
Pucca construction	5%	12%	32%	37%	14%
Usage of energy-saving techniques (low electricity bills)	4%	2%	53%	26%	15%
Good source of day light in rooms	4%	3%	15%	31%	48%
Good ventilation and cool interiors	4%	3%	13%	27%	53%
Safety in case of fire	5%	4%	35%	34%	22%
Safety in case of earthquake	6%	4%	23%	47%	20%
Protection from heat	5%	4%	24%	43%	25%
No dampness or leakages Waterproof interior	5%	5%	35%	33%	22%
Modern kitchen and toilet arrangements	5%	35%	24%	19%	17%
Piped cooking gas	9%	44%	17%	16%	14%
Safe and hygienic surroundings	4%	4%	50%	22%	20%
Assured clean water supply	5%	5%	13%	15%	62%
Access and climbing in case of lifts failure	7%	6%	50%	21%	16%
Water recycling or management facility (Good maintenance at affordable maintenance charges)	6%	5%	14%	40%	34%
Surrounding greenery and parks	5%	4%	39%	35%	17%
No cockroaches or rats	6%	44%	15%	19%	15%

Note* - High ranks refers to high expectations

Expectations	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5
Mosquito netting on windows	7%	3%	38%	37%	15%
Covered personal vehicle parking	7%	3%	55%	21%	15%

Table 11: Understanding about Eco-Friendly/Green Lifestyle/Energy Saving Concept

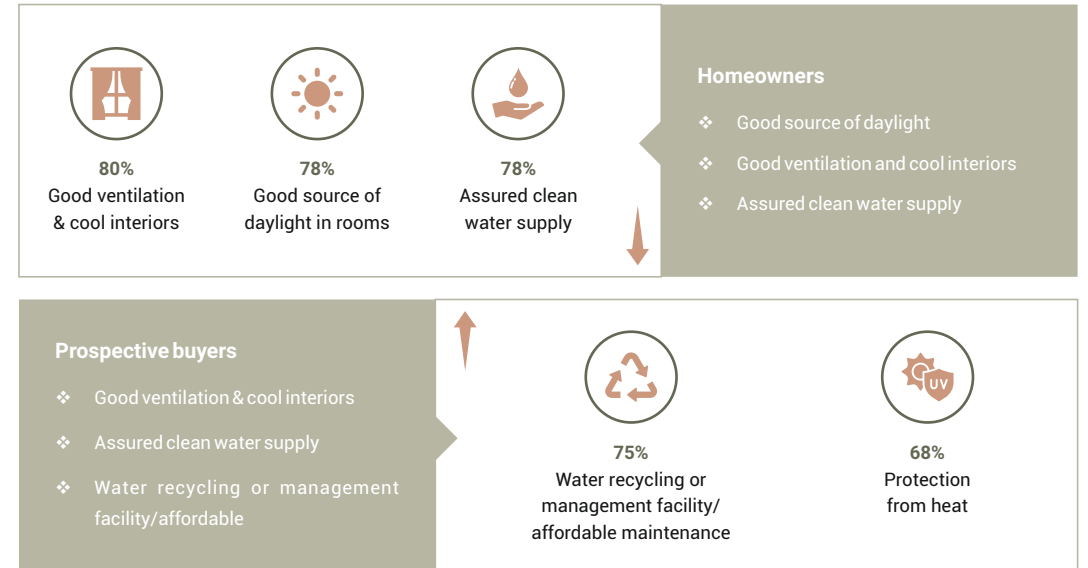
Parameters	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5
Using electric vehicles	11%	6%	22%	20%	41%
Solar panels	5%	10%	28%	46%	11%
Cloth bags for marketing - no plastics	10%	26%	51%	11%	2%
Make compost from food waste	7%	11%	22%	50%	10%
Home gardening - herbs and vegetables	7%	13%	23%	48%	9%
Re usable water bottles	3%	19%	28%	37%	12%
LED lights	4%	11%	23%	52%	9%
Natural cooling - no AC	6%	20%	25%	40%	9%
More use of public transport	8%	15%	32%	36%	9%
Walking and cycling	5%	18%	20%	48%	8%
Solar water heating	5%	17%	22%	44%	11%

Table 12: Factors Affecting Buying Decisions of the Homeowners with Respect to Climate

Factors affecting buying decisions	Warm & humid	Hot, dry & composite	Hot & dry	Composite
Natural ventilation	80%	62%	79%	75%
Passive cooling	69%	68%	71%	55%
Window treatments	31%	27%	21%	28%
Sun dried earth bricks in exterior	33%	38%	23%	41%
Thick and high exterior walls	48%	59%	66%	52%
Double/ single white roofing	19%	28%	23%	28%
Shading devices/elements	7%	14%	12%	8%
Soothing wall colors to avoid trapping of sunlight	30%	38%	44%	38%
Source of sunlight	75%	52%	65%	67%
Green roof/ walls	60%	70%	69%	54%
UV deflecting glasses at doors or windows	10%	13%	11%	17%

Factors affecting buying decisions	Warm & humid	Hot, dry & composite	Hot & dry	Composite
Waterproof interior decor	24%	20%	14%	25%
Installation of energy saving techniques (like rainwater harvesting system, solar panel etc.)	12%	12%	1%	12%
Other (please specify)	1%	0%	0%	0%

Note* - High ranks refers to high expectations



N=776

- ❖ In addition to the above-mentioned expectations, real estate agents also highlighted some other demands of their customers:
- ❖ Open spaces with greenery
- ❖ Green roofs
- ❖ Installation of eco-chargers, energy-saving points, solar devices, and other energy-saving devices to reduce long-term costs and maintenance

73% of respondents have only heard about sustainability. Only **27%** respondents are aware about the concept.

*Note – Considering 4 & 5 ratings for each factor



Awareness About the Sustainability Concept

Of the total respondents approached, 57%* were unaware about the concept of sustainability. Out of the remaining 43%:

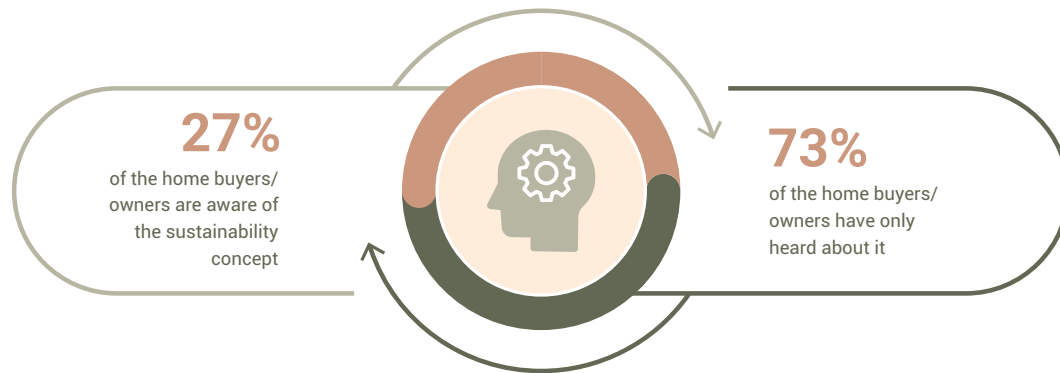


Figure 83: Awareness About the Sustainability Concept

N=776

Awareness with Respect to Buyers

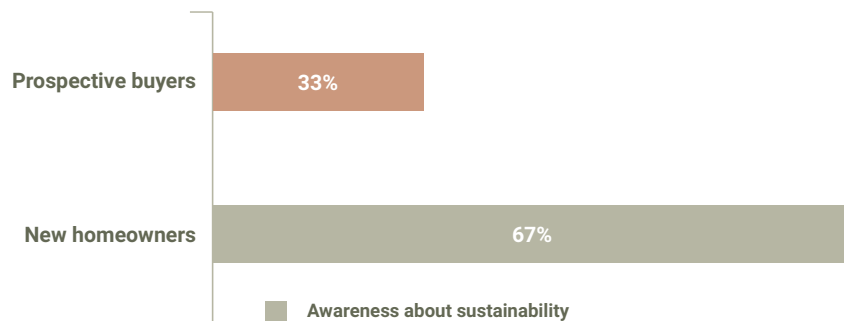
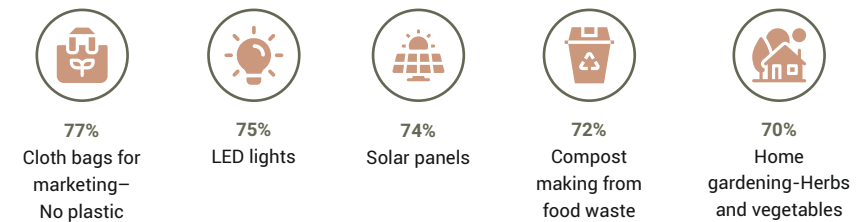


Figure 84: Awareness with Respect to Buyers

N=212

*Note – Calculated based on the responses collected by Benori link (N=580)

Top Known facts about Sustainable Living

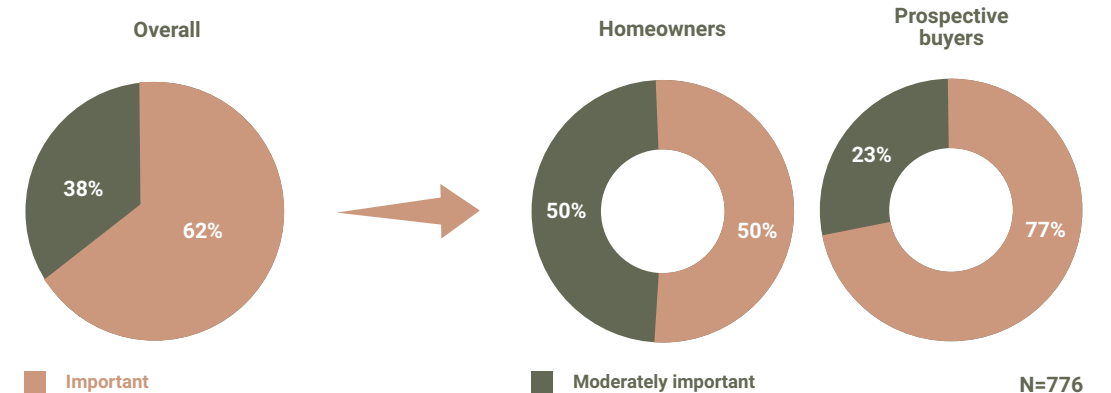


N=212

All Homeowners and Prospective Buyers Consider Sustainability as an Important Aspect due to Growing Concerns about the Environment

- ❖ Respondents perceive sustainability to have a positive impact on:
 1. Health
 2. Maintenance and operation costs
 3. Conservation of natural resources
- ❖ Even though awareness about sustainability is increasing, 54% of the total respondents are still not implementing a sustainable way of living in their daily routine

Table 13: Sustainable Practices Followed in Daily Routine



N=776

Figure 85: Sustainable Practices Followed in Daily Routine

Do you incorporate sustainable way of living in daily life?	Sustainable practices followed in daily routine
Yes 46%	Efficient use of electricity 84%
No 14%	Reduce food waste and compost 74%
Don't think much 40%	Minimal or no use of plastic 64%
	Reuse, and recycle resources 41%
	More use of public transport 28%
	Using renewable resources 8%

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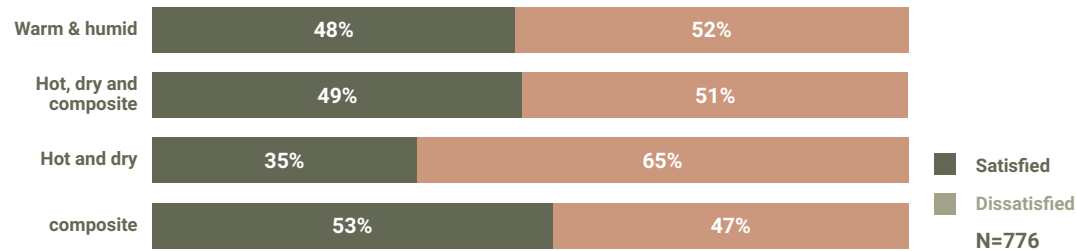
N=354

Natural Ventilation is the Key Expectation Affecting the Buying Decision of the Respondents.

Table 14: Key Factors Considered While Purchasing a Home

Climatic zones	Rank 1	Rank 2	Rank 3
Warm and humid	Natural ventilation (80%)	Source of sunlight (75%)	Passive cooling (69%)
Hot, dry and composite	Green walls (70%)	Passive cooling (68%)	Natural ventilation (62%)
Hot and dry	Natural ventilation (79%)	Green walls (69%)	Thick and high exterior walls (66%)
Composite	Natural ventilation (75%)	Source of sunlight (67%)	Passive cooling (55%)

❖ Regardless of the climatic zone, natural ventilation and a rich source of sunlight are the two major influencing factors when purchasing a home



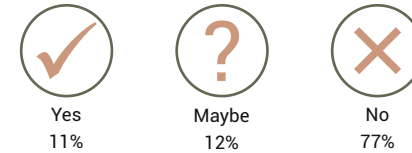
❖ Top-most important home necessities expected by dissatisfied customers living in different climatic zones are *passive cooling, natural ventilation, and green roofs*. Different climate zones have different priorities:

- ❖ Warm and humid – Passive cooling, natural ventilation, and green roofs
- ❖ Hot, dry, and composite – Passive cooling, green roofs, and natural ventilation
- ❖ Hot and dry – Green roofs, natural ventilation, and passive cooling
- ❖ Composite - Natural ventilation, green roofs, and passive cooling

Only **6%** of prospective buyers are willing to pay more to purchase a sustainable home, even when they perceive sustainability as important

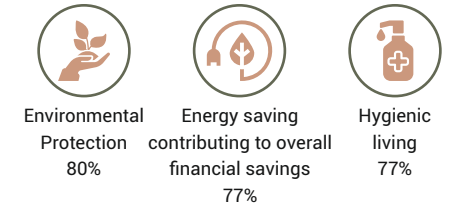
- ❖ A small chunk of people are currently living in sustainable homes (11%)
- ❖ But when it comes to spending, only 6% of prospective buyers surveyed (56%), would like to increase their budget to purchase a sustainable home
- ❖ According to real estate agents, potential owners are willing to increase their budget by 10-15% for a sustainable home
- ❖ Buyers/homeowners are willing to purchase/live in a sustainable home, but the only concern holding them back is the cost of these homes
- ❖ To remedy this, they either wait to save more money or buy a sustainable home in the suburban/interior areas of the city that is relatively cheaper

Is your current home built on sustainable grounds?



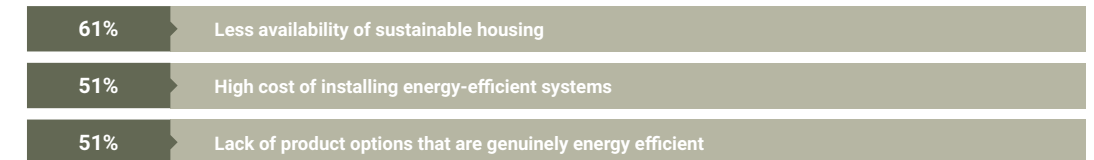
N=776

Top 3 reasons to choose a sustainable home



N=84

Barriers to opt for energy efficient initiatives



N=776

Industry Outlook

Sustainable Housing in India: Emerging Issues and the Way Forward

- ❖ Sustainability in real estate extends beyond energy conservation, encompassing resource efficiency, environmental impact, and occupant well-being. It involves optimizing resource use, minimizing environmental footprint, and enhancing living conditions. It strives for balance between development and ecological preservation, ensuring long-term viability for both inhabitants and surroundings
- ❖ Indian homeowners haven't fully realized the importance of sustainable housing due to a lack of understanding, but awareness has increased recently thanks to government initiatives and social media campaigns.
- ❖ Contemporary consumers are embracing sustainable living, driving a shift in real estate preferences toward eco-conscious solutions, reflecting a growing awareness of sustainability's importance in shaping lifestyles and purchasing decisions.
- ❖ Individuals are integrating sustainability into daily routines by opting for cloth bags over plastic, installing LED lights, and adopting solar panels. Initiatives like composting and home gardening further promote eco-conscious living. These actions demonstrate a proactive commitment to reducing environmental impact and fostering a more sustainable lifestyle on a personal level
- ❖ Buyers and homeowners express willingness to invest in sustainable homes but are deterred by the high initial costs and limited product options. Some opt to delay purchases to accumulate funds, while others choose more affordable sustainable options in suburban or interior city areas. This highlights the importance of addressing cost barriers and expanding sustainable housing availability to meet market demand
- ❖ Over 50% of India's 2030 building stock is still under construction, so the industry has tremendous potential to go green and reduce the growing operational energy requirements of buildings. Huge opportunities for architects, developers, and construction leaders are envisioned in the years to come to create sustainable housing that do not require large investments

Sustainable Social Housing in India , Building green homes: planet over profit, Thinking of buying a house? Green is the way to go

CAPACITY BUILDING FOR GREEN AFFORDABLE HOUSING



**Preface By CUPP,
CEPT University**



Building Sustainable and Inclusive future Policy landscape and reforms to persuade private sector that green and affordable housing is profitable and viable.

Demand for investment in affordable housing is great and for green and affordable housing for women even greater. This solicits innovative policy landscape that envisions and enables significant private sector participation, that persuades private sector that building green and affordable housing is profitable and viable. Fortunately policy enabling supply of 'green and affordable housing for women' is moving rapidly in India. However, the landscape is fragmented, multi-institutional, multi - scalar and complex. Research through which it can be decoded and clearly articulated with benefits for supply mechanism and consumer was needed. The policy research through this TA makes following propositions to the stakeholders of this ecosystem :

1. Building green and affordable housing is profitable and viable for supply mechanisms in India through tax holiday, credit subsidy, zoning incentives, property tax rebate, expedited permissions etc. The unit size and product mix and pricing in the project must appropriately respond to the policy prescription and taxonomy to optimise incentives and make project viable. The question is how can this be simplified and converged through reform?
2. DCR of most states mandate few green building components. Environmental Clearance guidelines mandate few more. Consequently most affordable housing projects easily reach 'certified' score. However the nudge to get 'green' certification depends on the incentives in local DCR for 'green' buildings. The question is what is the right 'nudge' in DCR to tip the behaviour shift?
3. There is policy vacuum to ensure sustenance of green and affordable housing projects, post conveyance to Housing society with exception of few cities which offer property tax rebate. How can the life cycle benefits be achieved through appropriate policy measures including reforms in 'certification' products, housing cooperative society act rules, State RERA rules?
4. Woman home ownership is incentivised in most states through stamp duty and registration fee waiver and through credit subsidy options, albeit limited. To scaleup women home ownership, what new financing models such as tailor made credit scoring system or rent-to-own option can be considered by HFCs and Fis?
5. There is a policy vacuum to support resilient self-built housing by urban poor. Program such as cool room program which supports retrofitting for thermal comfort and enhanced occupational health is the only policy response in this domain. How can this be scaled up and more innovative climate-stress appropriate program be considered?

The journey towards sustainable and inclusive affordable housing is an ongoing commitment with immense potential for societal and environmental benefits. By weaving together holistic policies with innovative construction practices, we can unlock a future

where everyone, regardless of economic status or gender, has access to safe, affordable, and sustainable housing.

This convergence supports thriving communities and contributes to reduced carbon emissions and a healthier planet. As we move forward, we must remain determined to pursue policies and construction practices that create a more equitable and environmentally responsible world for future generations. It's not just about building houses; it's about building futures.

The forthcoming section will focus on:

1. **Holistic Approaches for Sustainability:** Achieving lasting affordability and sustainability hinges on adopting holistic approaches encompassing various housing dimensions. These include energy-efficient design, proximity to essential services, accessible transportation, and community engagement. Future policies should advocate for mixed-use developments, walkable neighborhoods, and efficient public transportation to reduce residents' overall living costs while fostering sustainable communities
2. **Innovative Financing Mechanisms:** To make green and affordable housing projects profitable and viable, policymakers should introduce innovative financing mechanisms. This can involve tax incentives, credit subsidies, and public-private partnerships. For example, tax holidays and property tax rebates can encourage developers to incorporate sustainable features, lowering upfront costs and ensuring long-term affordability
3. **Green Building and Sustainable Materials:** Sustainability in construction is closely tied to energy efficiency and environmentally friendly materials. Future policies must promote green building practices and sustainable material choices. This includes using renewable and recycled materials in construction and integrating energy-efficient technologies such as solar panels and efficient insulation
4. **Innovative Construction Techniques:** Innovative construction techniques like 3D printing and modular construction can significantly reduce construction costs and timelines. Policymakers should encourage the adoption of such technologies, which can translate into more affordable housing units
5. **Embedding Sustainable Design principles:** Sustainable design should be integrated at pre-construction. This involves site selection that minimises environmental impact, thoughtful architectural design for natural ventilation and lighting, and incorporating green spaces to enhance residents' overall quality of life
6. **Construction Stage Efficiency:** During construction, practices that minimise waste, energy consumption, and emissions are crucial. Implementing lean construction principles and utilising sustainable building materials can reduce construction-related environmental impacts while keeping costs in check
7. **Post-construction Operations and Maintenance:** Sustainable operations and maintenance practices are vital to ensuring the longevity of green and affordable housing. This includes ongoing energy-efficient systems, waste management, and community engagement for the responsible use of resources

About Centre for Environmental Planning & Technology (CEPT)

CEPT University, based in Ahmedabad, India, is dedicated to the comprehensive understanding, design, planning, construction, and management of human habitats. Its educational programs aim to nurture thoughtful professionals, while its research initiatives deepen insights into human settlements.

In December 2023, the Government of India recognized CEPT University as a 'Centre of Excellence (CoE) in Urban Planning and Design,' affirming its commitment to excellence in the field.

Established in 2013, the CEPT Research and Development Foundation (CRDF) serves as the university's research and advisory arm. It operates as a multidisciplinary think-do-tank wholly owned by CEPT University, managing research and consulting activities effectively.



Figure 86: Snippets of Capacity Building Workshop, Jaipur

CRDF functions through thematic verticals termed as 'Centers,' collaborating to address complex challenges in the built environment. These include Urban Planning and Policy, Infrastructure Development, Water and Sanitation, Heritage Conservation, Climate Change, Affordable Housing, Advanced Geomatics, Building Science and Energy, and Urban Transportation.

Through its diverse research areas, CRDF significantly contributes to advancing knowledge and practices in urban planning, design, and management, fostering innovation and making substantial contributions to the field nationally and internationally.

CRDF has worked on more than 200 projects, such as Development Plans, Strategic Plans, Feasibility studies, Capacity building, preparation of development control regulations and guidelines and various other assignments. Over the years, CRDF has worked with various levels of Government, multilateral institutions, bilateral agencies, and philanthropic organizations.

- ❖ Lead Consultant: Center for Urban Planning and Policy
- ❖ Sub Consultants: GreenTree Global, Design Works and Chaal Chaal Agency

1. About Center for Urban Planning and Policy (CUPP)

The Center for Urban Planning and Policy (CUPP), operating under the umbrella of CRDF, is at the forefront of delivering integrated solutions aimed at fostering sustainable and resilient urban development. CUPP's approach is multifaceted, encompassing research, capacity building, advisory services, and technical support to address the complex challenges of urbanization.

CUPP's primary objective is to conduct advanced, practice-oriented research and analysis in key areas such as statutory planning, land policy, and capacity building. Through its research endeavors, CUPP aims to generate insights and recommendations that inform policy formulation and urban planning practices. By combining academic rigor with practical relevance, CUPP strives to contribute meaningfully to the advancement of urban development agendas.

Spatial planning is a central focus area for CUPP. By examining spatial patterns and dynamics within urban areas, CUPP seeks to develop strategies and interventions that optimize land use and infrastructure development while promoting inclusive growth and social equity. Additionally, CUPP is actively engaged in researching land development policies and practices to ensure the efficient

and equitable utilization of land resources.

Affordable housing is another critical aspect of CUPP's work. Recognizing the importance of adequate housing for all segments of society, CUPP conducts research to identify innovative housing solutions and policy interventions that address housing affordability challenges and promote inclusive urban development.

Climate resilience is an increasingly pressing concern for urban areas facing the impacts of climate change. CUPP's research efforts in this area focus on developing strategies and policies to enhance urban resilience to climate-related hazards, such as flooding, extreme heat, and sea-level rise. Through its research, CUPP aims to mainstream climate resilience considerations into urban planning and policy frameworks.

Urban design interventions are also integral to CUPP's approach to sustainable urban development. By exploring innovative design strategies and approaches, CUPP seeks to enhance the quality of the built environment while fostering vibrant, livable, and inclusive urban spaces.

Team Structure

Team Leader	▶ Avanish Pendharkar (Center Head and Principal Researcher)	Senior Consultant	▶ Dr. Sejal Patel ▶ Vanishree Herlekar
Project Director	▶ Dr. Saswat Bandyopadhyay	Research Fellow	▶ Vijaya Redekar Salanke ▶ Shashank Trivedi ▶ Darshana Dhande

2. About GreenTree Global

GreenTree Global provides various solutions centered around the concept of energy efficiency and design. This includes Green Building Services, Energy Performance Optimization, Research and Advisory Services, Smart Metering and AI Solutions. Headquartered in Noida, India and founded in 2009, GreenTree Global has executed over 250 projects in India, Bangladesh, Kuwait, Nepal, South Korea, New Zealand and Vietnam.

Team Structure

Director	▶ Anurag Bajpai ▶ Dhruv Jain	Technical Advisor	▶ Sandeep Narang
Sr. Manager	▶ Srijani Hazra (Policy and Advisory)	Energy Associate	▶ Jeyaraj Kalirajan
Energy Analyst	▶ Yesaswini Chilukuri ▶ Donna D'souza	Senior Analyst	▶ Nidhi Khosala (Sustainability Division)

3. About DesignWorks

DesignWorks is a cross-disciplinary design practice offering services in Architecture and Communication Design based in Navi Mumbai, India. The practice is primarily engaged with projects from corporate, real estate and institutional sectors for clients like Unilever, Siemens, Godrej Properties, Vestas, Tata Teleservices.

Team Structure

Principal Architect	▶ Jinu Kurien
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4. About Chaal Chaal Agency

Chaal Chaal Agency is a design practice based in Ahmedabad, India, that utilizes research-design and design-built to reimagine the urban contexts. They work on architecture and urban design concepts to support community-led and pedagogical projects.

Team Structure

Co-Director

- Sebastian Trujillo-Torres
- Kruti Shah

About “Capacity Building for Green Affordable Housing: Bridging Knowledge Gaps for Sustainable Development”

The Capacity Building Initiative stands committed to addressing critical knowledge gaps within the realm of green affordable housing, targeting key stakeholders across the housing value chain. Through meticulous stakeholder identification and the development of tailored training modules, its objective is to advance Green and Sustainable Development within one of the nation's most pivotal construction sectors. Situated at the intersection of cutting-edge research and innovative practice in 'green building,' 'affordable housing,' and 'women's access to housing,' this initiative holds profound transformative potential. With a particular emphasis on women, among other stakeholders, the program is poised to catalyze future habitat development, fortify climate change resilience, and cultivate participatory governance. By empowering women to spearhead the adoption of sustainable development practices, the initiative anticipates a cascade of positive outcomes that transcend mere housing enhancements. The overarching vision is to elevate living standards for families and communities, fostering inclusivity, resilience, and a brighter, more sustainable future for all stakeholders involved.

Methodology

Women's access to green and affordable housing has two aspects - first, the policy landscape within which these projects are formulated, secondly the project implementation including design and development as well as post implementation evaluation. Further, capacity building beyond certification processes or green building requirements is required. Therefore, there is a need to engage and build capacity for policymakers, regulatory authorities, finance companies, designers, developers, and project implementation personnel in their respective domains to see a long-term substantive impact.

The training framework for the capacity building part of the project deals with four thematic areas interpreted as four courses.

- ❖ **Module 1: Design for Sustainable Affordable Housing**
- ❖ **Module 2: Policy Landscape for Green Affordable Housing**
- ❖ **Module 3: Project Formulation & Appraisal**
- ❖ **Module 4: Green Building Site Implementation & Post Occupancy Evaluation**

The course development relied on three primary sources – information and knowledge available in the public domain on topics associated with sustainable development and green buildings, development and construction practices within the building industry and the regulatory and policy framework.

To curate the right content and establish course content that plugs in the knowledge gaps, the CUPP team carried out a Training Needs Assessment (TNA). The TNA was followed by efforts to establish a training content structure and sessions. The content was assembled through desk research, insights from site visits, and stakeholder consultations.

The courses were implemented in the form of 7 training programs in 6 cities: Pune, Hyderabad (course 1), Delhi (course 2), Ahmedabad, Delhi (course 3), Jaipur and Mumbai (course 4). The courses are also adapted in the IIFL's Kutumb App as self-paced learning courses.

The training sessions were designed in such a way that participants could ask questions to the speaker during the session as well as the end of the session. This ensured that any doubts on the subject were dispelled.

After the training delivery each participant was given forms to record their feedback. This feedback was recorded and complied with in the mid-project report and the final report prepared by CUPP.

Module 1: Design for Sustainable Affordable Housing

The course had the following learning objectives:

- ❖ To understand the concept of green and affordable housing, and the technical requirements as per policy landscape and rating systems To understand the sustainable design principles
- ❖ To develop the competency to design green buildings
- ❖ To undertake the sustainable implementation of green affordable housing projects
- ❖ To understand the importance of gender mainstreaming in the green building design and implementation process

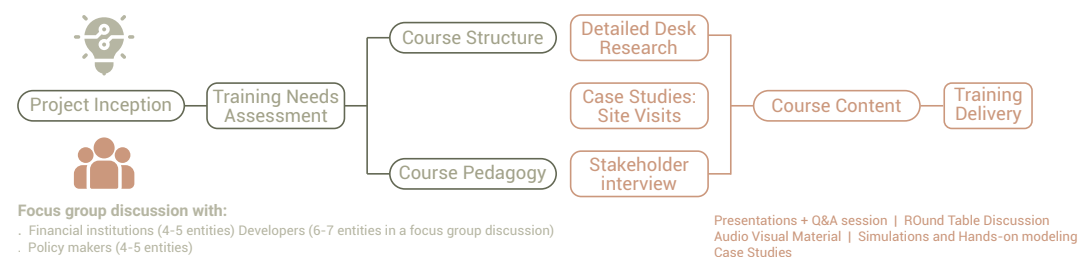


Figure 87: Training Delivery Workflow

The training program on Design for Sustainability and Gender Mainstreaming in Green Affordable Housing was planned as eight technical sessions. The training was held over two days, with four sessions on each day. Details are mentioned below:

Table 15: Session Wise Key Highlights for Design for Sustainable Affordable Housing

Session	Speaker	Key Highlights
Session 1: Green Affordable Housing Policies – Implications on Design	Dr. Sejal Patel, Professor and Chair, Master of Urban Housing, Faculty of Planning, CEPT University, Ahmedabad	<ul style="list-style-type: none"> ❖ The policy framework for Affordable Housing and Green Buildings is extensive. However, it is fragmented ❖ These policies offer incentives to promote affordable housing development and green buildings and are often linked with specific design parameters and conditions ❖ Design decisions should be based on possible policy convergences to avail maximum benefits from the incentives of affordable housing and green buildings ❖ In Maharashtra, by following the Unified Development Control and Promotion Regulations (UDCPR) 2020 and Environmental Clearance (EC) requirements, several IGBC Green Affordable Housing rating criteria are already fulfilled. An affordable housing project can achieve a silver rating through these mandatory requirements and avail a minimum of 3% additional FSI ❖ Most policies and initiatives for Green and Affordable Housing are silent on the 'Gender Inclusion' part. Some affordable housing policies encourage women's ownership, but none of these policies is directly linked to housing design

Session	Speaker	Key Highlights
Session 2: Certification Systems – Energy Efficiency in Building Sector	Anurag Bajpai, Director, GreenTree Global	<ul style="list-style-type: none"> ❖ The concept of green buildings emerged as a response to the need for conserving energy and resources and evolved into a phenomenon that offers both environmental and social benefits ❖ Claims of sustainability are to be substantiated with acceptable documentary evidence' and 'what gets measured gets managed' - are the two foundational mantras for developing a green rating ❖ Green affordable housing projects are often perceived as more expensive ❖ Green buildings can lead to 15-20 per cent energy savings and water savings of around 50-60 per cent.
Session 3: How to get started	Jeyaraj Kalirajan (Associate Director, GreenTree Global)	<ul style="list-style-type: none"> ❖ Indicators of Green Affordable Housing - standard and quality of housing; availability of basic amenities; location close to the services, jobs and community facilities; energy and water efficiency; cost efficiency in maintenance and operations ❖ Real estate developers certainly have a role to play in moderating the detrimental impact of their construction activities on the environment. They have at their disposal advancements in technology which can accelerate the supply of 'green' buildings in the country ❖ ENS code is essential in making affordable housing 'green', but its adoption needs to be expedited
Session 4: Part 1 - Requirements for Green Building – Overview	Avanish Pendharkar (Center Head and Principal Researcher, Center for Urban Planning and Policy, CRDF)	<ul style="list-style-type: none"> ❖ The solar heat transfer through walls is affected by building form (exposed surfaces), the heat conductivity of the material and the technology used to construct walls ❖ A lower U-value of the material means less heat transmitted, higher thermal comfort and lower electricity bills ❖ Appropriate shading devices on the appropriate façade contribute to cutting down solar gain ❖ By incorporating green measures and innovative design solutions into the project, a balance between sustainability and affordability of housing can be achieved
Session 4: Part 2 - One Unit, Infinite Occupations- Many Lives of a 30 sq. mt Unit	Jinu Kurien (Principal Architect, DesignWorks and Adjunct Faculty, Pillai College of Architecture)	<ul style="list-style-type: none"> ❖ Establishing the connection between the design of a housing unit in an affordable housing scheme and sustainability ❖ Demonstration of modifications in the design of the 30-square meter unit and the shift from a rigid, compartmentalized unit to a free-plan unit

Session	Speaker	Key Highlights
		❖ Discussion on the opportunities and challenges concerning the supply side, demand side, and regulatory environment for adopting the idea
Session 5: Service Requirements for Green Buildings	Jeyaraj Kalirajan	❖ Building service engineers are central to the design and assessment of sustainable systems, assessing the life cycle of buildings and their component services to minimize the resources consumed and the impact on the environment ❖ Installation of renewable energy coupling with smart grid and energy management systems is a way forward for better management in energy savings
Session 6: Building Material & Costing	Anurag Bajpai	❖ A building's whole-life carbon emissions start at year zero, where all carbon emissions from construction product manufacturing, transportation to the site, and construction operations are accounted for ❖ The embodied carbon from new buildings may remain the higher long-term emissions driver. However, as buildings become more energy efficient and use more renewable energy sources, the proportional share of embodied carbon grows due to a reduction in operational carbon
Session 7: Green Building Products and Services	Jeyaraj Kalirajan	❖ Waste management infrastructure is vital in delivering sustainable development. Rapid population growth in India has led to the depletion of natural resources ❖ The certified "eco" or "green" labelling products ensure that the product was handled, made or grown under conditions that meet standards of sustained use, pesticide application and harvesting and specific social and economic criteria for workers
Session 8: Integrating Gender Perspective in Housing Design and Delivery	Vanishree Herlekar (Founder and Director, City Collab; Visiting Professor, Faculty of Planning, CEPT University)	❖ Our view of addressing gender in housing is often limited to catering to women's immediate needs (read 'kitchens'), narrowly defined by their traditional gender role as caregivers and homemakers. We must adopt a holistic approach to including women in advancing the Green Affordable Housing agenda that recognizes the changing role of women in the modern context

Table 1: Session wise Key Highlights for Design for Sustainable Affordable Housing

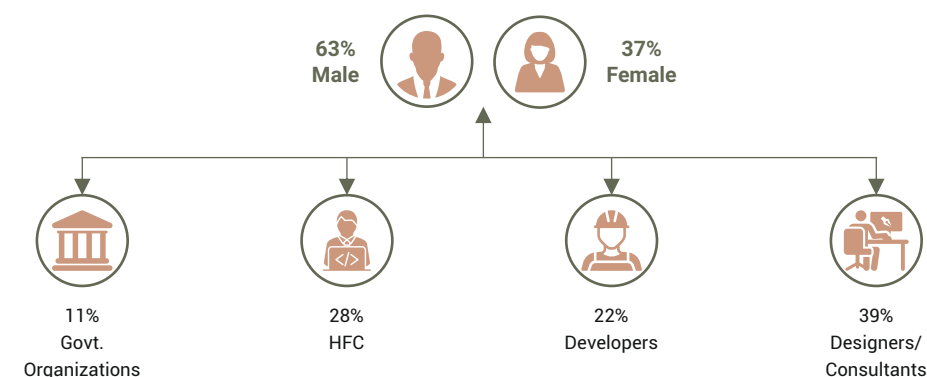
The Module 1 training programs was held on 15 and 16 July 2022 at Pune, Maharashtra, and on 19 and 20 August 2022 at Hyderabad, Telangana. In both cities, more than 65 participants attended the training course, of which 54 obtained a certificate of completion.



Figure 88: Design for Sustainable Affordable Housing, Hyderabad



Figure 89: Reading the Sun-Path Diagram, Design for Sustainable Affordable Housing, Hyderabad



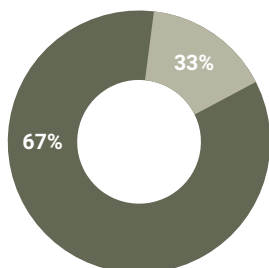
❖ Maharashtra Housing and Area Development Authority (MHADA)	❖ ICICI BANK	❖ Vilas Javdekar Group	❖ GRIT
❖ Chennai Metropolitan Development Authority (CMDA)	❖ Aadhar Housing Finance	❖ Yasodhan Associates	❖ Voussoirs
❖ Andhra Pradesh State Housing Board	❖ Godrej Housing Finance	❖ Sara Developers	❖ Mind Manifestation Design
❖ Telangana Rajiv Swagruha Corporation	❖ Home First (India) Finance Company	❖ Mantra Properties	❖ Design Works
	❖ IIFL Home Loans	❖ Calyx Group	❖ Studio Inscape
		❖ Tranquillo Projects and Holdings	❖ Alankaar Studios
		❖ Janapriya Group	❖ CBRE South Asia Pvt. Ltd.
		❖ IRA Reality	❖ Knight Frank India Pvt Ltd
			❖ Anvi Advisors
			❖ FHD India
			❖ Masterstroke
			❖ Urbanrise
			❖ GV Associates
			❖ D HUB Engineers

Figure 90: Training Participation for Design for Sustainable Affordable Housing

Feedback

Question: How was your training experience?

Training Experience

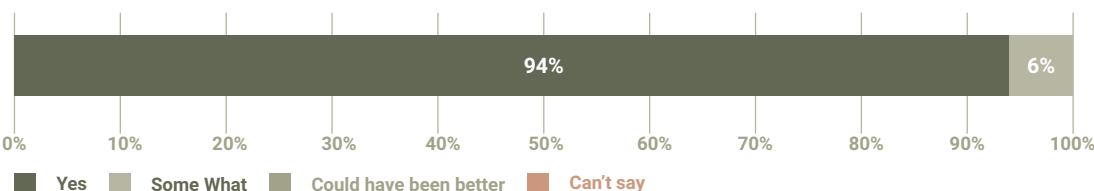


Very Good Good Could have been better Can't say

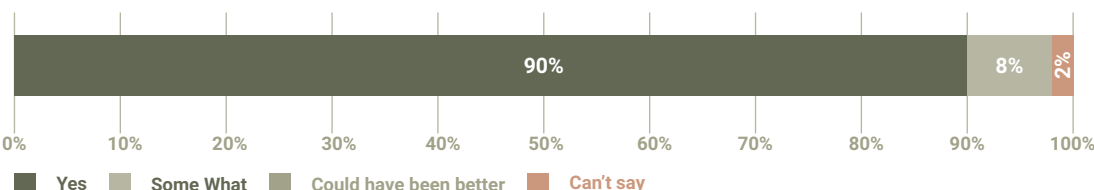
Question: Was the subject matter/topics related to Green Affordable Housing for women covered adequately?



Question: Were the sessions on schedule?



Question: The Trainers communicated clearly and were easy to understand:



Question: Questions raised in the sessions were effectively addressed:



Module 2: Policy Landscape for Green Affordable Housing for Women

The course had the following learning objectives:

- ❖ To understand the policy landscape for affordable housing, green buildings and women's access to housing
- ❖ To identify the divergence and convergence of the three Policy Landscapes
- ❖ To identify the gaps in policies and challenges in their implementation
- ❖ To understand the trajectories to influence policy reforms for convergence of policy landscapes for green and affordable housing for women
- ❖ To identify key areas that require reforms and the possible nature of policy reforms

This module on Policy Landscape for Green Affordable Housing for Women consisted of six technical sessions. The course used a mix of pedagogical tools. Pedagogy for most sessions was - the speaker's presentation followed by questions and answers. High level policy roundtable and panel discussion were organized as two sessions. The last session was an excel-based hands-on exercise. The following table gives details of each session:

Table 16: Session Wise Key Highlights for Policy Landscape for Green Affordable Housing for Women

Session	Speaker	Key Highlights
Session 1A: Need for Green Affordable Housing	Dr Saswat Bandyopadhyay (Professor, CEPT University, Ahmedabad)	<ul style="list-style-type: none"> ❖ Large Indian cities are expanding at an average rate of 20-25 sq. km/year. When unmanaged, urban growth can pose challenges related to climatic vulnerability ❖ Urbanization impacts the biosphere by modifying habitats, destroying habitats, and creating new habitats ❖ Sustainable construction can achieve net zero emissions by 2050; urgent action needed. ❖ Buildings contribute 35-38% of global GHG emissions; only 5% currently green. ❖ Indian residential space to grow from 15.3 to 22-23 billion sq. mt. by 2030; much for affordable housing. ❖ Green affordable housing vital for India's net zero by 2070; GHG reductions by 2030.
Session 1B: Policy Landscape - Implications on Design and Finance	Dr Sejal Patel	<p>The policy framework for Affordable Housing and Green Buildings is extensive but fragmented.</p> <ul style="list-style-type: none"> ❖ These policies offer incentives to promote the development of affordable housing and green buildings, which are often linked with specific design parameters and conditions ❖ Design decisions should be based on possible policy

Session	Speaker	Key Highlights
		<p>convergences to avail maximum benefits from the incentives of affordable housing and green buildings</p> <ul style="list-style-type: none"> ❖ In Haryana, by following Haryana Building Code 2017 and Environmental Clearance (EC) requirements, several IGBC Green Affordable Housing rating criteria are already fulfilled. An affordable housing project can achieve a silver rating through these mandatory requirements and avail a minimum of 6% additional FSI. Haryana offers one of the highest incentives for green building in the form of 12% additional FSI ❖ Most policies and initiatives for Green and Affordable Housing are silent on the 'Gender Inclusion' part. Some affordable housing policies encourage women's ownership
Session 2: High-level Policy Roundtable Possible Reforms to Mainstream Green Affordable Housing for Women	<p>Moderator: Dr Saswat Bandyopadhyay</p> <p>Panelists:</p> <ul style="list-style-type: none"> ❖ Hitesh Kumar S Makwana, Principal Secretary, Housing and Urban Development, Government of Tamil Nadu ❖ Kundan Kumar, Joint Secretary, NITI Aayog ❖ Harpreet Singh Arora, Urban Adviser, FCDO, Govt. of UK ❖ Vaishali Nandan, Project Head, Climate Smart Cities, GIZ-India 	<ul style="list-style-type: none"> ❖ If the country is committed to making net zero emissions by 2070, Green building should become a way of life for us ❖ Urban Local Bodies can regulate the projects getting incentives under green rating with timely inspection of all selected projects to ensure the continued status of green-rated buildings with penalty or withdrawal of incentives upon failure of compliance ❖ Formulating a cross-cutting national level framework is essential to address the challenges related to fragmentation in the green affordable housing segment
Session 3: Local Trajectories in the Policy Landscape and Key Lessons	<ul style="list-style-type: none"> ❖ Dr Sejal Patel ❖ Vijaya Redekar Salanke and Priyankita Pant (Research Fellow, Center for Urban Planning and Policy) 	<ul style="list-style-type: none"> ❖ There are convergences between the green building certification criteria with building code and environmental clearance requirements. Hence, the project can achieve certification by just fulfilling mandatory requirements ❖ IGBC and GRIHA introduced separate ratings for affordable housing in 2017. These are more lenient than their respective residential project rating variants, e.g. Green Homes of IGBC and v2019 of GRIHA. These special variants have reduced requirements, construction costs and certification fees ❖ The incentives play an important role in promoting the development of green affordable housing, changing developers' perspectives, building awareness and offsetting initial capital investment

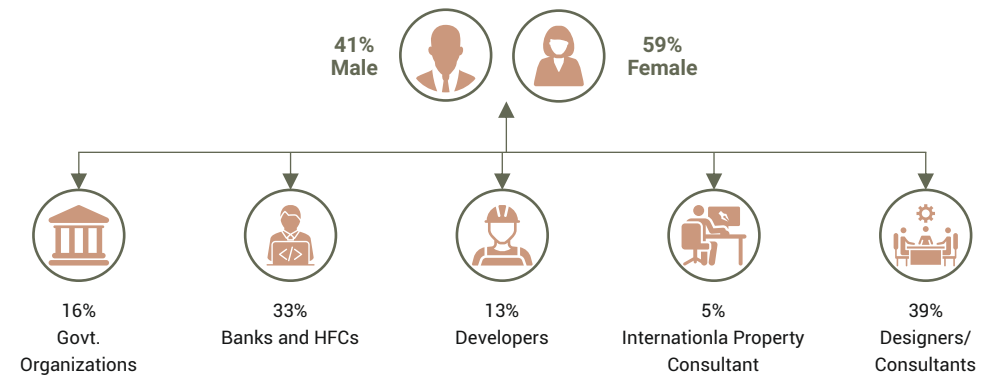
Session	Speaker	Key Highlights
		<ul style="list-style-type: none"> ❖ An incentive of additional FSI in Haryana is a key driving factor for developers, whereas the incentive of discounted premium charges in Gujarat is not lucrative
Session 4: Panel Discussion Implementation of Green Affordable Housing	<p>Moderator: Dr Sejal Patel</p> <p>Panelists:</p> <ul style="list-style-type: none"> ❖ R. Srinivas, Town and Country Planner, TCPO ❖ Jaswant Singh, Secretary-General, KSS-ISPER ❖ Saurav Choudhury, Associate Counsellor, IGBC ❖ Vaishvik Brahmhatt, Assistant Technical Officer, Gujarat RERA 	<ul style="list-style-type: none"> ❖ Reduction in transaction processes and time improves housing affordability because this can translate into an overall cost reduction of the development, where a part of it can be passed on to the consumer ❖ Not only green buildings, but we should also think about green neighbourhoods. The availability of basic amenities in the vicinity also needs to be considered, so people would not add up to the carbon footprint and emissions ❖ The building byelaws can be extended to address the challenges related to post-occupancy operation and maintenance of services ❖ GujRERA is considering including a Green Building Certificate to check compliance, and this should not be a pre-certification but which is audited at the stage of completion. It will also help build a repository of green building data
Session 5A: Policy Vacuum for Self-built Green. Affordable Housing	<ul style="list-style-type: none"> ❖ Dr Sejal Patel ❖ Priyankita Pant 	<ul style="list-style-type: none"> ❖ There is a policy vacuum for selfbuilt affordable housing and informal settlements ❖ Green building rating systems attempt to create rating variants for self-built affordable housing. By getting a certification, such houses will benefit from the incentives offered to green buildings ❖ At the household level, thermal comfort is most important. Heatwaves affect the poor and vulnerable the most ❖ Heat Action Plans (HAP) can mitigate the adverse effects of heat waves. In 2022, 17 states and 120 cities/ districts have formulated HAP. Heatwave strategies are part of the State Action Plan for Climate Change (SAPCC) in about 12 states
Session 5B: Green Building Policy in the Context of India's Urban Amrit Kaal (2022-2047)	Dr Saswat Bandyopadhyay	<ul style="list-style-type: none"> ❖ The urban population is projected to double by 2047. With timely and careful actions, this could be an opportunity to build sustainable towns and cities, as half of urban India is yet to be built ❖ The growth of urban areas is closely linked to India's GDP, as the share of urban GDP in India's total GDP is 80- 85 per cent. It is essential to ensure that this growth is sustainable ❖ There are limited financial instruments in the green building sector There could be a Viability Gap Funding (VGF) similar to that for infrastructure projects. This funding can be availed to cover the additional expenses for green measures

Session	Speaker	Key Highlights
		<ul style="list-style-type: none"> ❖ Urban local bodies need to take essential steps in mainstreaming green and affordable housing in cities ❖ The regulatory role of the Real Estate Regulatory Authority (RERA) can be expanded to post-occupancy operation and performance of building services

The Module 2 training programs were held on 15th and 16th September 2022 at Delhi. 39 participants attended the course, and 21 participants completed the course. On Day 1, Mr Monu Ratra (ED and CEO, IIFL HFL) delivered the inaugural remarks, followed by Mr Kuldip Narayan (Joint Secretary and Mission Director -Housing for All, MoHUA) delivered the keynote address, followed by the technical sessions.



Figure 91: High-level Policy Roundtable Possible Reforms to Mainstream GAH for Women



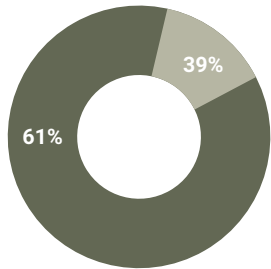
<ul style="list-style-type: none"> ❖ NITI Aayog ❖ GujRERA ❖ Chandigarh Housing Board 	<ul style="list-style-type: none"> ❖ ICICI Bank ❖ Aadhar Housing Finance Ltd ❖ Godrej Housing Finance ❖ Home First India ❖ Savera Housing ❖ IIFL Home Finance Ltd. 	<ul style="list-style-type: none"> ❖ Ace Group ❖ MRG Group ❖ ELDECO Group 	<ul style="list-style-type: none"> ❖ Deloitte ❖ Knight Frank India Pvt Ltd 	<ul style="list-style-type: none"> ❖ National Institute of Urban Affairs (NIJA) ❖ Jamia Milia Islamia University ❖ Centre for Policy Research (CPR) ❖ Institute of Spatial Planning and Environment Research (ISPER) ❖ Council On Energy, Environment and Water (CEEW) ❖ All India Institute of Local Self Government (AIILSG) ❖ International Council for Local Environmental Initiatives (ICLEI-SA)
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Figure 92: Training Participation Policy Landscape for GAH for Women

Feedback

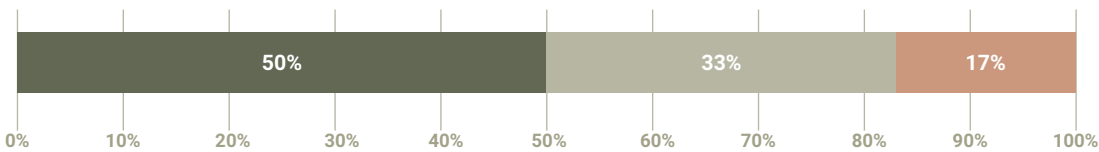
Question: How was your training experience?

Training Experience



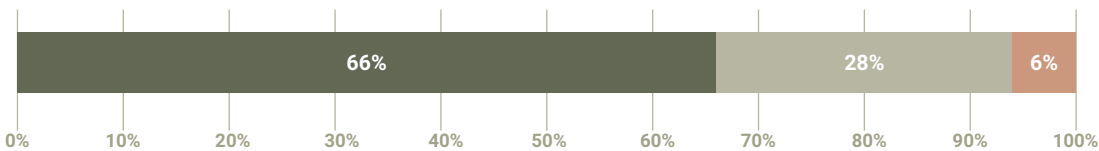
Very Good Good Could have been better Can't say

Question: Was the subject matter/topics related to Green Affordable Housing for women covered adequately?



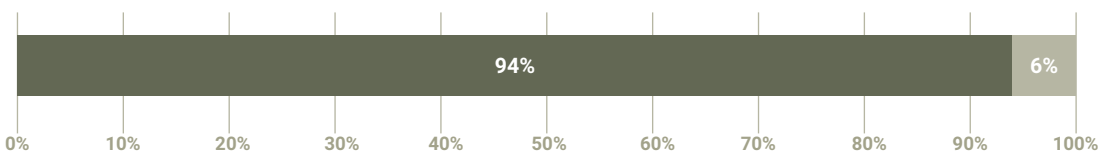
Yes Some What Could have been better Can't say

Question: Were the sessions on schedule?



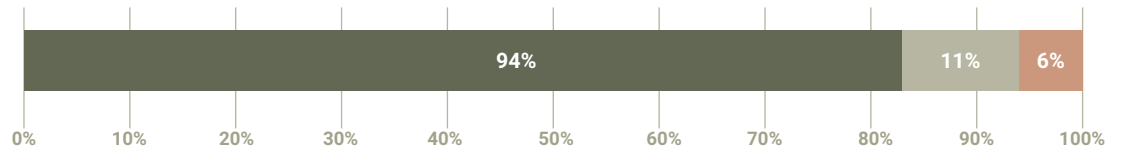
Yes Some What Could have been better Can't say

Question: The Trainers communicated clearly and were easy to understand:



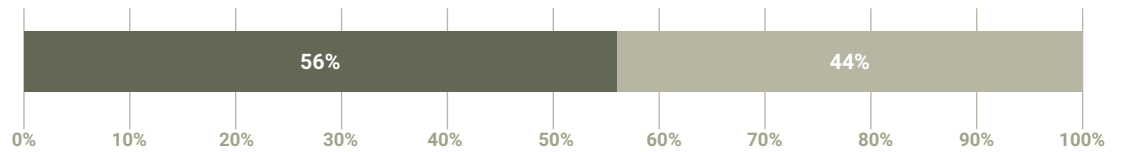
Yes Some What Could have been better Can't say

Question: Questions raised in the sessions were effectively addressed:



Yes Some What Could have been better Can't say

Question: Did the training meet your expectations?



Yes Some What Could have been better Can't say

Module 3: Project Formulation & Appraisal for Green Affordable Housing

The course on Project Formulation and Appraisal for Green Affordable Housing consisted of six technical sessions. The training spanned over two days. It covered the technical and financial viability of green affordable housing, existing financial instruments for affordable housing and green buildings, gender inclusion in finance, appraisal of loans for green affordable housing projects, and innovative finance products to support green affordable housing.

The course used a mix of pedagogical tools - a speaker's presentation followed by question and answers and excel based hands-on exercises to derive the feasibility of different scenarios.

The following are the learning objectives of the course:

- ❖ To understand the technical stipulations for affordable housing under the respective policy landscapes
- ❖ To understand technical specifications for green housing as per green certification rating systems
- ❖ To build competency to derive technical and financial feasibility of green affordable housing projects
- ❖ To build an understanding of the business benefits of lending in green affordable housing sector
- ❖ To understand various innovative financial products to support financing in this segment
- ❖ To develop an understanding about appraisal of green affordable housing projects for construction finance

The following table gives details of each session:

Table 17: Session wise Key Highlights for Project Formulation & Appraisal for Green Affordable Housing

Session	Speaker	Key Highlights
Session 1A Policy instruments for	Dr. Sejal Patel	❖ The policies offer incentives and subsidies to promote affordable housing development, often linked with specific design

Session	Speaker	Key Highlights
design and finance of affordable housing		<p>parameters and conditions</p> <ul style="list-style-type: none"> ❖ State-level affordable housing policies define affordable housing, and this definition may or may not align with national-level policies ❖ The decisions should be based on possible policy convergences to avail maximum benefits from affordable housing incentives from national and state-level policies
Session 1B Hands-on Exercise: Technical and financial viability of affordable housing project	Priyankita Pant Vijaya Redekar Salanke	<ul style="list-style-type: none"> ❖ Awareness regarding the policies plays a crucial role in formulating technically and financially viable affordable housing projects ❖ The Haryana affordable housing policy is popular among developers in Haryana as it allows higher floor space index, higher density, higher commercial area component, relaxed parking norms and fee waivers which improve the project's technical and financial viability
Session 2 Policy instruments for green buildings	Dr. Sejal Patel	<ul style="list-style-type: none"> ❖ The policy framework for Affordable Housing and Green Buildings is extensive but fragmented. The incentives from both can be converged ❖ In most states, by following building regulations and Environmental Clearance (EC) requirements, several criteria of the IGBC Green Affordable Housing rating are already fulfilled. An affordable housing project can achieve a silver rating through these mandatory requirements ❖ Most states offer incentives in the form of an additional Floor Space Index (FSI) based on the rating. Haryana and Rajasthan are among the top two states that offer additional FSI as high as 15 per cent ❖ The incentives play an important role in promoting the development of green affordable housing, changing developers' perspectives, building awareness and offsetting initial capital investment
Session 3A Technical and financial viability of green affordable housing	<ul style="list-style-type: none"> ❖ Saurav Choudhury, Counsellor, Indian Green Building Council (IGBC) (Ahmedabad) ❖ Pallavi Bhallamudi, Engineer, IGBC (Delhi) 	<ul style="list-style-type: none"> ❖ IGBC residential rating systems bring in green design interventions that enhance the occupants' quality of life and reduce resource consumption during operation and maintenance ❖ By undergoing the IGBC Certification process, the projects shall reap the benefits and avail of the incentives provided by the Government ❖ Case studies show that the construction cost of green buildings has decreased over the years. It has become equal to conventional

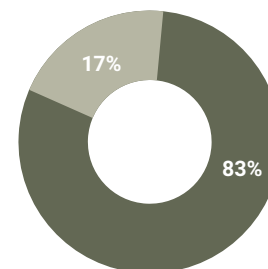
Session	Speaker	Key Highlights
		<p>buildings, and in some cases, it is also observed to go lower than a conventional building</p> <ul style="list-style-type: none"> ❖ The operation and maintenance of the implemented green measures are important as they will lead to enhanced equipment efficiency and increased building life
Session 3B Hands-on Exercise: Technical and financial viability of green affordable housing project	<ul style="list-style-type: none"> ❖ Priyankita Pant ❖ Vijaya Redekar Salanke 	<ul style="list-style-type: none"> ❖ Understanding how policy incentives for Affordable Housing and Green Building can be converged through an Excel Based hands-on exercise ❖ Understanding the feasibility of green affordable housing projects vis a vis other housing projects
Session 4A Gender mainstreaming in green affordable housing	Dr. Sejal Patel	<ul style="list-style-type: none"> ❖ Most of the national and state-level policies of affordable housing and green building are silent on the gender inclusion part. Some policies try to address this gap, but their focus is to promote women's ownership in housing ❖ Women ownership (sole/joint) is mandatory for housing developed under PMAY. PMAY also recommends that States/UTs exempt or reduce stamp duty and/or registration charges for EWS/LIG households, which directly applies to all the housing owned/co-owned by women under PMAY
Session 4B Hands-on Exercise: Technical and financial viability of green affordable housing project for women	<ul style="list-style-type: none"> ❖ Priyankita Pant ❖ Vijaya Redekar Salanke 	<ul style="list-style-type: none"> ❖ Women are important stakeholders of the affordable housing value chain and key decision-makers. They occupy houses more often and contribute to maintaining and upgrading their homes. None of the policies focuses on these roles of women, which have a direct influence on design
Session 5 Green Lending	<ul style="list-style-type: none"> ❖ Ajay Jaiswal ❖ Chief Compliance Officer, IIFL Home Finance Ltd (Ahmedabad) ❖ Dr. Sejal Patel (Delhi) 	<ul style="list-style-type: none"> ❖ DFIs like ADB and IFC are actively involved in supporting the development of green affordable housing. They can help demonstrate the viability of affordable green housing finance through their investments in partnership with private lenders ❖ According to the Climate Bond Initiatives Report, in 2021, the global green bond market was around USD 0.5 trillion, which is expected to grow ten times by 2025 ❖ Around 35 per cent of the proceeds generated through green bonds globally are used in the energy sector, followed by 30 per cent for green buildings. In contrast, this percentage in India is lower

Session	Speaker	Key Highlights
		<ul style="list-style-type: none"> ❖ The Reserve Bank of India is starting to sensitize banks and Housing Finance Companies (HFCs) about the benefits of green finance and encourage green lending products. This will also be reflected in RBI's upcoming policies
Session 6 Project Appraisal	Ravi Chaudhary Technical Lead - Construction Finance, IIFL Home Finance Ltd	<ul style="list-style-type: none"> ❖ Valuation is the art of estimating the value of a property based on scientific data ❖ The value of a property is an opinion on the estimate of what a price ought to be for a particular asset when transacted between a willing buyer and a willing seller without any pressure or stress ❖ In the Direct comparison method, factors impacting comparability differ across sectors and property types ❖ The residual approach is mostly used to derive the value of development properties, especially in Real Estate Financing

Feedback

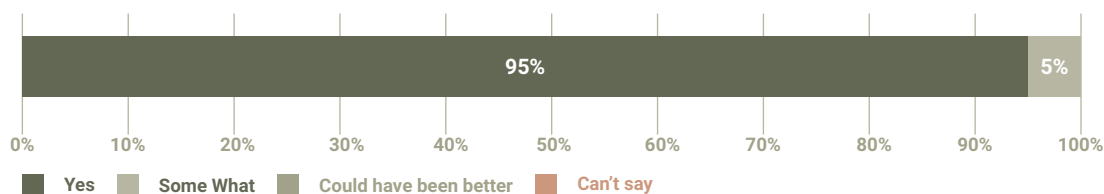
Question: How was your training experience?

Training Experience

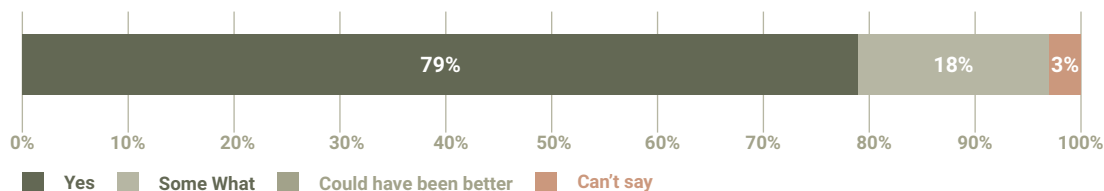


Very Good Good Could have been better Can't say

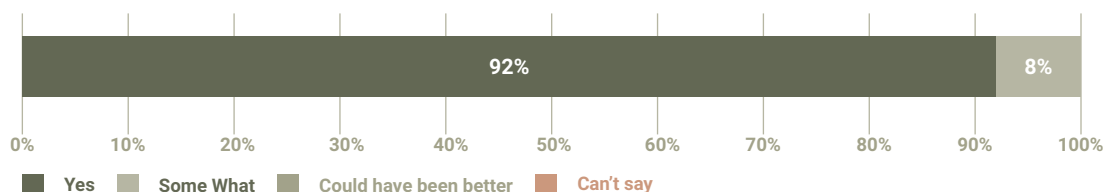
Question: Was the subject matter/topics related to Green Affordable Housing for women covered adequately?



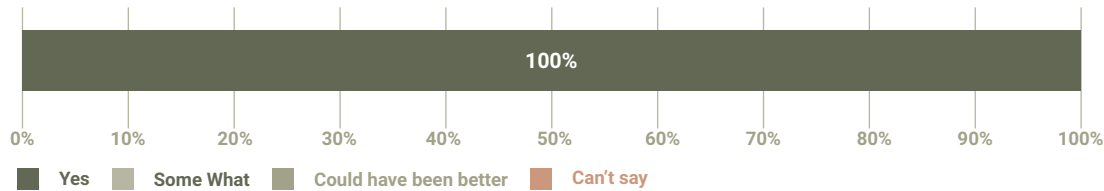
Question: Were the sessions on schedule?



Question: The Trainers communicated clearly and were easy to understand:



Question: Questions raised in the sessions were effectively addressed:



Question: Did the training meet your expectations?

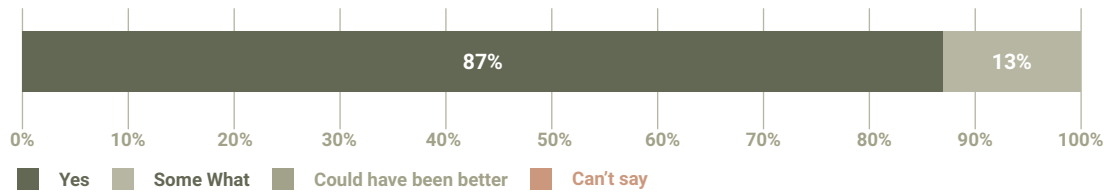


Figure 93: Participants working on the Excel-based Hands-on Exercise, Delhi



Figure 94: Session 5, Project Formulation and Appraisal, Ahmedabad

Module 4: Green Building Site Implementation & Post Occupancy Evaluation

The training program on Green Building Implementation and Post-Occupancy Evaluation spanned two days and comprised six technical sessions along with a panel discussion. These sessions delved into various aspects crucial for green building implementation. Topics covered included certification processes, feasibility analysis at certification level, ensuring quality control during construction, strategies for effective project commissioning, innovative construction practices, and the integration of gender perspectives in housing design and delivery. Through these sessions, participants gained comprehensive insights into the multifaceted aspects of green building practices, from initial planning and certification to post-occupancy evaluation, fostering a deeper understanding of sustainable construction principles and techniques.

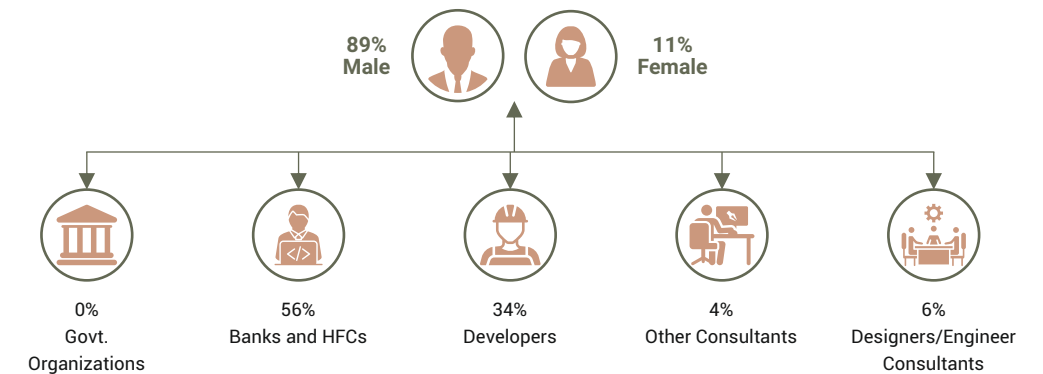
The course aims to achieve several learning objectives:

- ❖ Develop an understanding of the GRIHA and IGBC rating systems, including the processes required to obtain these ratings. Participants will gain insights into the criteria and parameters evaluated by these rating systems, essential for achieving green building certifications.
- ❖ Gain knowledge about due diligence practices necessary during project implementation concerning green building criteria. Participants will learn about the meticulous steps and checks required to ensure compliance with green building standards

throughout the construction process.

- ❖ Gain insight into green building products and services, including performance testing, to understand the array of sustainable materials and technologies available for construction projects.
- ❖ Explore key considerations for successful commissioning of Green Affordable housing projects, focusing on critical factors and best practices to ensure sustainability goals are met and projects perform effectively over time.

The training program was held on 18th and 19th November 2022 at Jaipur, Rajasthan, and on 1st and 2nd December 2022 at Mumbai, Maharashtra. Across these two instances, more than 70 participants attended the training course, of which 55 obtained a certificate of completion. The program was attended by housing finance companies (HFC), real-estate developers, designers, site engineers, etc. The following infographic provides an overview of gender-mix of participants and lists the various organizations' participation in the training program:



❖ Axis Finance Ltd.	❖ Eon Group	❖ Eon Group	❖ Egis India Consulting Engineers Pvt Ltd
❖ HDFC Ltd.	❖ Holistic nature Homes	❖ Holistic nature Homes	❖ Jacobs Engineering India Pvt Ltd
❖ IIFL Housing Finance Ltd.	❖ Hubtown Ltd	❖ Hubtown Ltd	❖ SSA Architects
❖ Yes Bank Ltd.	❖ Kalptaru Construction	❖ Kalptaru Construction	
	❖ Ravi Surya Group	❖ Ravi Surya Group	
	❖ Ruparel Realty	❖ Ruparel Realty	
	❖ Rustagi Estates	❖ Rustagi Estates	
	❖ Suraj Estate	❖ Suraj Estate	
	❖ U B Group	❖ U B Group	
	❖ Unique Builders	❖ Unique Builders	
	❖ Vasant Vihar Realty Pvt Ltd and Ray Nagar Fedration	❖ Vasant Vihar Realty Pvt Ltd and Ray Nagar Fedration	

Figure 95: Training Participation for Green Building Site Implementation & Post Occupancy Evaluation



Figure 96: Participants working on the Excel-based Hands-on Exercise, Delhi

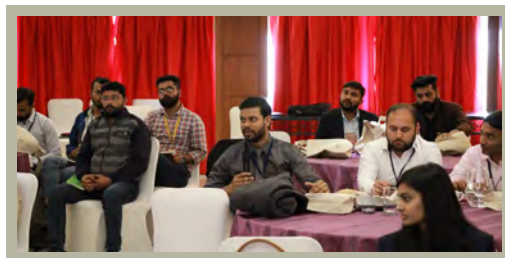


Figure 98: Participants working on the Excel-based Hands-on Exercise, Delhi



Figure 97: Session 5, Project Formulation and Appraisal, Ahmedabad



Figure 99: Session 5, Project Formulation and Appraisal, Ahmedabad

Table 18: Session Wise Key Highlights for Green Building Site Implementation & Post Occupancy Evaluation

Session	Speaker	Key Highlights
Session 1 Introduction to Certification Process	Anurag Bajpai, GreenTree Global	<ul style="list-style-type: none"> The concept of green buildings emerged as a response to the need to conserve energy and resources and evolved into a phenomenon that offers environmental, social, and economic benefits. Claims of sustainability are to be substantiated with acceptable documentary evidence' and 'what gets measured gets managed' - these are the two foundational mantras for developing a green rating. Green affordable housing projects are often perceived as more expensive. Green buildings can lead to energy savings in the range of 15-20 per cent and water savings of around 50-60 per cent.
Session 2 Feasibility Analysis at Certification Level	<ul style="list-style-type: none"> Anurag Bajpai (Jaipur) Donna D'souza, GreenTree Global (Mumbai) 	<ul style="list-style-type: none"> Detailed specifications required by each rating system were explained by grouping them into measures for ease of understanding and comparison based on which the target goal can be set before the project. This brought clarity to the players involved in the project IGBC and GRIHA give the same weightage to a few criteria, while others vary. Based on the advantages the projects present, the bar

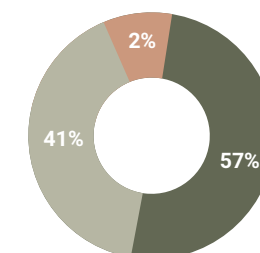
Session	Speaker	Key Highlights
		<p>also can be set by using this presentation as a manual</p> <ul style="list-style-type: none"> The financial feasibility shows that a probability of a 2 to 3% increment in construction cost might be observed, and in return, additional FAR provided will be added to the substantial profit of the project
Session 3 Project Preparation for Documentation	<ul style="list-style-type: none"> Yesaswini Chilukuri, Program Manager, GreenTree Global (Jaipur) Nidhi Khosla, Sr. Analyst, GreenTree Global (Mumbai) 	<ul style="list-style-type: none"> The contractors should manufacture end products like bricks, blocks, tiles, pavers blocks, kerb stones, RMC etc. and generate revenue through the sale of these products plus aggregates (fine & coarse) and processed soil New private constructions be mandated to use recycled C&D waste products to the extent of at least 10 per cent of the total corresponding materials' use Cities generating more than 2000 Tonnes per Day (TPD) of Construction and Demolition (C&D) waste may have more than one centralised processing plant. The number of collection points and location should be such that a small quantity of debris generator/citizen gets a collection point within a distance of 2-3 km
Session 4 Sustainable Construction Practices	Sandeep Narang Consultant - Air Quality and Constructio	<ul style="list-style-type: none"> The standard process for documenting a green building project can be identified based on the targets to be achieved. This can be replicated further Each stage of construction requires different types of documentation. This must be provided to everyone involved as prior information The simulations or basic calculations need to be re-verified to be in the bandwidth of the requirements by the rating system at the early stage, as they cannot be modified post-construction
Session 5 Project Commissioning	<ul style="list-style-type: none"> Anurag Bajpai (Jaipur) Donna D'souza, (Mumbai) 	<ul style="list-style-type: none"> The commissioning process is usually undermined by professionals and stakeholders in a project. This step is introduced only during the later stages when occupants are ready to move in, and a close watch of this process is often ignored unless stressed by the occupants. Therefore, commissioning has to be integrated at every stage of a project Commissioning is not restricted only to the equipment but also to every brick that goes into the building as a static commissioning process

Session	Speaker	Key Highlights
Session 6 Handover and Post-Occupancy Evaluation	Jaipur Moderator: Anurag Bajpai Panelists: Sandeep Narang Dr. Gireendra Kumar (Professor) Tushar Shogani (Architect) Sanjay Kumar Varshney (Developer) Anand Dubey (Environmental Consultant)	<ul style="list-style-type: none"> ❖ Documents such as NBC 2016, ECBC and local bylaws make sure we are within certain limits. Vetting of a structure is required. ❖ Air quality and water monitoring have to be measured. Clean water is affordable today, but the clean air at non-controlled spaces or sites is still a critical question
	Mumbai Moderator: Avanish Pendharkar Panelists: Sandeep Narang Vanishree Herlekar D. R. Hadadare (Ex. Official MahaRERA) Murthy Vakkalanka (RWA)	
Session 7A (BAR) Future of Affordable Housing Construction – 1: A North American Perspective	Pramod Sanoor (BAR Architects) Chris Haeggglund (BAR Architects)	<ul style="list-style-type: none"> ❖ Embodied carbon, when added to Operational carbon, leads to total carbon across the life cycle of the building; hence it is important to reduce operational carbon along the life of the building by using Energy Efficiency, Electrification and Building Codes ❖ The second three-fold strategy focused on reducing Embodied carbon - Reuse, Reduce and Sequester carbon ❖ Potential of Mass Timber as an alternative construction technology with more sequestered carbon and much less impact during construction as well as along the life cycle of the building
Session 7B (TVASTA) Future of Affordable Housing Construction - 2: 3D Printing Technologies	Adithya V S, TVASTA	<ul style="list-style-type: none"> ❖ Potential of 3DP as a sustainable construction technology which reduces the carbon footprint along the entire process of construction including transportation and material wastage while using significantly less time and labour for construction, offering improved thermal comfort as well as integrating passive technologies in design ❖ Making 3DP accessible across different scales

Feedback

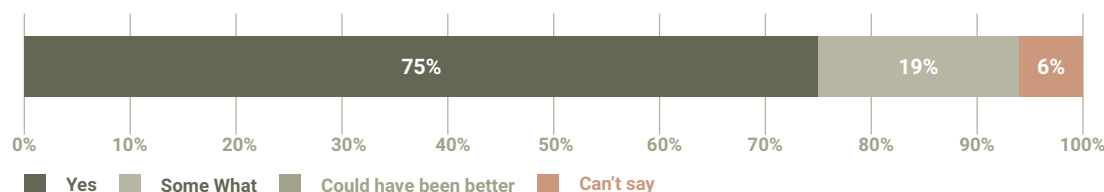
Question: How was your training experience?

Training Experience



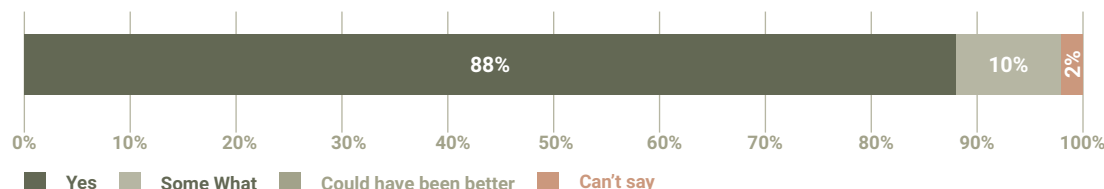
Very Good Good Could have been better Can't say

Question: Was the subject matter/topics related to Green Affordable Housing for women covered adequately?



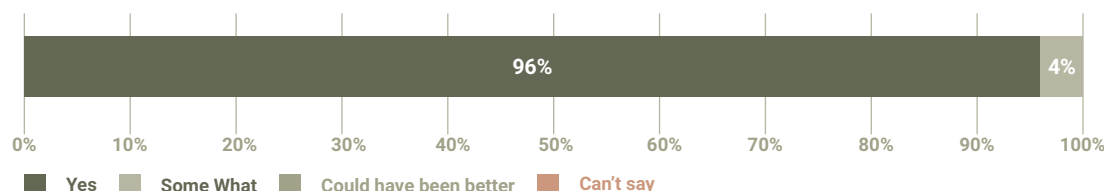
Yes Some What Could have been better Can't say

Question: Were the sessions on schedule?



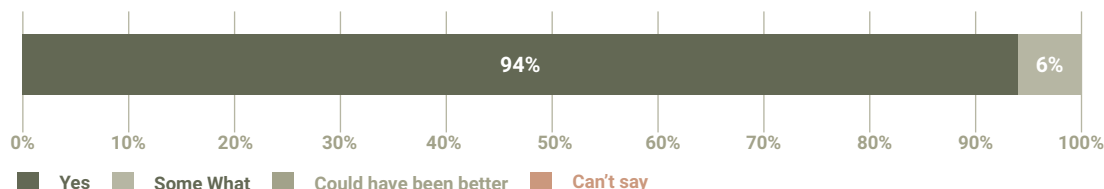
Yes Some What Could have been better Can't say

Question: The Trainers communicated clearly and were easy to understand:

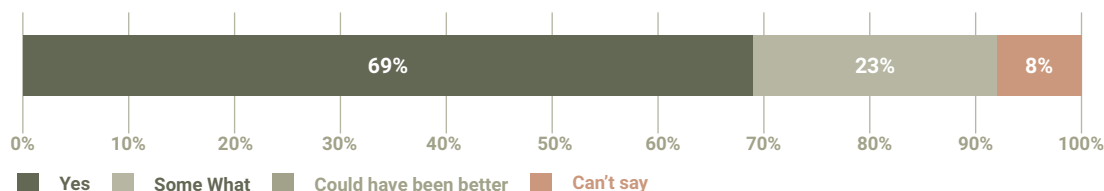


Yes Some What Could have been better Can't say

Question: Questions raised in the sessions were effectively addressed:



Question: Did the training meet your expectations?



Learnings and Gaps Identified

The purpose of conducting a review of the key learning is to retrospectively analyze the capacity building program. This involves recognizing achievements, understanding their underlying causes, and pinpointing areas for enhancement in future capacity-building endeavors. This evaluation draws from both formal and informal feedback received from participants, observers, trainers, and support teams.

The ADB has outlined specific training outcomes that must be attained. These outcomes are primarily gauged using precise, objective criteria. They are designed to ensure the training program's delivery maintains a high standard and endeavors to engage a diverse range of stakeholders. By examining the training statistics provided in the report, it is apparent from a factual and numerical perspective that these predefined benchmarks have been successfully reached.



4 Courses



5 States



6 Cities



20+ experts
Speakers
& Panelist



200+ Participants
from diverse professional
background trained under
this Capacity Building



Training
Effectiveness

From a perspective focused on awareness, each of the four courses has played a crucial role in elevating the understanding of the participants who attended the training program. However, evaluating the true effectiveness of the training requires a longitudinal assessment. Effectiveness encompasses probing whether the knowledge gained is transferable - can the trained individuals serve as educators for others within their organization or emerge as influential advocates for change? In this respect IIFL HFL reached out to the participants to ask about their experience of their training and how they are utilizing the knowledge, a few

The testimonials are attached as an annexure.



Training
Effectiveness

months after the training. The participant response has been largely positive.

Additionally, comprehending the substantial outcomes revolve around achieving objectives, fostering long-term collaborative partnerships, assessing the level of generated awareness based on participant feedback, and gauging the willingness to embrace eco-friendly building practices.



Efficiency of
Training Delivery
Model

The approach to training delivery transitioned from primarily online to in-person sessions held in specific cities. While online delivery might have been more convenient, concerns arose about its effectiveness and the audience's attention span. Despite the wider reach of online training, post-pandemic conditions brought about online learning fatigue, prompting IIFL HFL to recommend in-person training.

Conducting in-person training has provided valuable insights into organizational and logistical aspects. Limiting class sizes to 35 to 40 participants per session posed challenges, compounded by travel constraints from remote areas and traffic issues in metropolitan settings, impacting the available training time.

While some trained individuals may emerge as change agents, becoming trainers necessitates extensive experience in sustainable design, policy, and practice—a process that typically spans at least three years. The training program must persist to cultivate a pool of capable trainers and effectively scale up capacity-building efforts.



Learnings
of Training
Pedagogy

he training program incorporated various teaching pedagogy, encompassing lectures and presentations (76%), practical exercises (12%), panel discussions (6%) featuring invited experts, quiz-based sessions (4%), and site visits (2%).

Participant feedback highlighted the importance of theoretical classroom information, although they expressed a preference for increased hands-on exercises to practically apply acquired knowledge. As trainers, we recognized the significance of condensing content when dealing with new or abstract concepts, opting for shorter session durations (45 to 60 minutes) instead of longer ones (75 to 90 minutes).

Integrating technology tools, such as engaging pop quizzes and Q&A sessions to test knowledge retention, proved beneficial based on audience comfort. While project videos serve as a valuable "show and tell" tool, site visits and interactions with professionals in the field were deemed more effective for information retention and applying learned concepts in different contexts. An essential lesson learned was the necessity for training teams to involve industry peers to provide specific advice pertinent to the field, aiding in implementing change.

The testimonials are attached as an annexure.



Learnings on Content

- ❖ The comprehensiveness of the training content: The four courses covered coherent topics. Feedback across all courses has been positive, with participants acknowledging the novelty of the content, which significantly enhanced their understanding of a subject they were previously familiar with but lacked comprehensive information about
- ❖ Tailoring the audience for content and delivery: Some individuals felt overwhelmed by the level of detail, emphasizing the necessity of pairing participants based on their backgrounds and skills with relevant subject matter. We also realized that as the trainings were primarily aimed at raising awareness, delving deeply into certain topics led participants to disengage, hindering their absorption of new content. In some instances, adjustments had to be made to suit participants' familiarity levels, editing out complex details on carbon sequestration
- ❖ Establishing the Unique Selling Proposition (USP) for future courses: Amidst a crowded space of capacity building for green affordable housing, defining a niche subject area for future courses becomes imperative to stand out. This can set courses apart from others conducted simultaneously, providing a unique value proposition
- ❖ Providing insights into the future: Sessions such as 3D concrete printing innovation reinforce the notion that innovation stems from imagination and aspiration, inspiring participants to explore new, uncharted territories



Learnings on Training Duration

Each of the four courses spanned two training days, totaling approximately 12 contact hours. While most sessions were planned for Friday and Saturday, some were scheduled midweek due to venue availability challenges. Insights gained from participant engagement, training, execution, and attendance issues have revealed several key lessons:

- ❖ Small to medium-scale employers tend to hesitate in sending staff for two consecutive training days, especially for courses perceived as new to the industry and lacking immediate organizational benefits. Recognizing this, we acknowledge that condensing training into a single day is more acceptable. However, this format poses challenges in delivering a substantial amount of knowledge to make a difference in trainees' learning
- ❖ Adjusting training start and end times based on the working culture of each city is essential. Adapting session durations based on pedagogy is crucial. Shortening lectures and presentations, along with panel discussions is crucial to ensure an effective learning structure
- ❖ Conducting hands-on exercises after lunch proved beneficial in keeping participants engaged and committed to the learning process. Post-lunch sessions usually witness decreased retention due to limited attention spans, emphasizing the importance of scheduling interactive activities strategically

The testimonials are attached as an annexure.



Learnings on Training Location

The choice of location significantly impacts course delivery. Certain cities prove more suitable for specific courses due to the concentration of experts in particular subject matters. For instance, in our policy course, Delhi emerged as an ideal hub where speakers and participants convened to discuss policy-level issues. Similarly, when planning state-based courses in the future, selecting state capitals near government offices becomes crucial to facilitate easy access for relevant participants and speakers.

Additionally, we observed that certain cities foster sub-cultures that attract professionals from specific fields. For example, finance-related courses in Mumbai draw a more engaged audience due to the higher presence of finance professionals compared to cities like Indore, Jaipur, or Hyderabad.

Regarding project implementation-related courses, conducting a comprehensive survey of ongoing projects by city or region proves beneficial. Targeting cities or metropolitan areas with established incentives for green-building and affordable housing initiatives becomes essential for implementation programs. Such regions typically exhibit a deeper interest from the supply side in learning about new concepts promoted by city, regional, or state policymakers.



Participation of Women in Trainings Programs

The involvement of women in this capacity-building initiative is positioned primarily in the role of consumers. This positioning aligns with the Government's policy aimed at promoting women's ownership rights concerning affordable housing.

This thematic approach extends into the courses within the capacity-building program, where information and awareness are structured progressively. Topics pertaining to affordability are followed by discussions on sustainable development practices, culminating in a focus on the roles, benefits, or perspectives associated with women. The program adopts a progressive layered learning approach in addressing these aspects.

However, there's a need for further development in crafting appropriate and substantial content concerning the involvement of women in affordable housing initiatives. Presently, the discussions lack solid arguments supporting this subject matter. A more in-depth and focused research approach is essential, as the conversation shouldn't be confined merely to ownership issues. It should encompass the role of women as advocates for change, their leadership in sustainable development initiatives, their effectiveness, and how we can further encourage and support their involvement in these endeavors.

The testimonials are attached as an annexure.

Key Takeaways

There are three key takeaways from the capacity-building effort:

01

Larger awareness-building campaigns of sustainability concepts are essential for buyers and sellers in the affordable housing market. We need many more people asking questions on sustainability for everything we do with our built environment.

02

IIFL HFL needs Partners such as developers, buyers, policymakers and change agents who are willing to experiment and get the first-mover advantage. There is a need to establish a proper policy framework to establish long-term trajectories for implementation and change. For this, identification of priority states for pilot and curation of specific policy is needed to bring advocacy for policies that support green affordable Housing with access to women.

03

Women are the change agents, especially where community-wide change or behaviour-led changes are essential for success. There is a need of a program that pulls together policy initiatives for women, project formulation accounting for borrowing capacities, design for women's needs, and the inclusion of women in the process of implementation in the various roles of construction.

Table 19: Key Learnings Related to Policy and Ecosystem:

- ❖ **Affordable Housing Policies are Silent on the Green Building Aspects:** The incentives for affordable housing can be extended to green affordable housing with some modifications.

Policy Instruments	Benefits	Eligibility Criteria for Affordable Housing	Possible Additional Benefit for Green Affordable Housing
Section 80IBA of Income Tax Act	100% income tax exemption	<ul style="list-style-type: none"> ❖ Carpet Area Ceiling: 60 sq.mt. (Metro cities) ❖ Carpet Area Ceiling: 90 sq.mt. (Non-metro cities) ❖ Commercial Area Ceiling: 3% of total carpet area 	Increased Commercial Area Ceiling: 5%-10% of total carpet area
Reduction in GST	GST reduced from 5% to 1%	<ul style="list-style-type: none"> ❖ Carpet Area Ceiling: 60 sq.mt. (Metro cities) ❖ Carpet Area Ceiling: 90 sq.mt. (Non-metro cities) ❖ Commercial Area Ceiling: 15% of total carpet area 	Increased Commercial Area Ceiling: 18%-20% of total carpet area

- ❖ **States which offer incentives to green buildings do not differentiate among typology of project.** Due to the financial stringency of affordable housing, additional incentives can be offered specifically for green affordable housing projects

Table 20: States offering incentives for any type of Green Rated Building

	Incentives for any type of Green Rated Building	Possible Additional Benefit for Green Affordable Housing
Maharashtra	<ul style="list-style-type: none"> ❖ 3% Incentive FSI - GRIHA 3 star, IGBC/ LEED- Silver ❖ 5% Incentive FSI - GRIHA 4 Star, IGBC/ LEED- Gold ❖ 7% Incentive FSI - GRIHA 5 star, IGBC/ LEED Platinum 	Single window clearance + 3% Incentive FSI
Haryana	<ul style="list-style-type: none"> ❖ 3% Incentive FSI - GRIHA 1 Star ❖ 6% Incentive FSI - GRIHA 2 Star ❖ 9% Incentive FSI - GRIHA 3 Star/ IGBC Silver ❖ 12% Incentive FSI - GRIHA 4 Star/ IGBC Gold ❖ 15% Incentive FSI - GRIHA 5 Star/ IGBC Platinum 	Single window clearance + 3% Incentive FSI
Gujarat	<ul style="list-style-type: none"> ❖ 5% discount on the total payable amount of chargeable FSI 	Single window clearance + 5% Incentive FSI

- ❖ **Green channel for rated building with expedited permissions:** Currently there are 3 processes - Building Approval, EIA and green rating that the developer of a green building undertakes - this should be streamlined

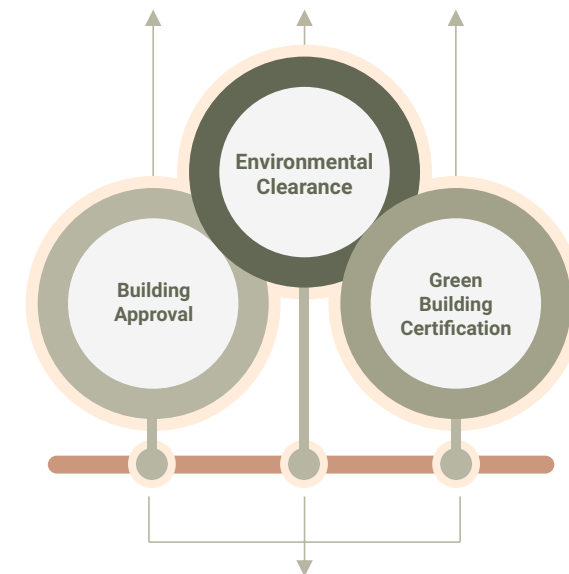


Figure 100: 3 Processes that developer of a green building undertakes

- ❖ **Progressive leakage from pre-certification to certification:** Most supply-side incentives are linked to the precertification of green buildings. Some states have penalties for non-compliance Number of projects going for final certification is less than 50%.

Less than 50%

Registration



Pre-Certification



Certification

- ❖ Policy and most of the initiatives are focused on developer-driven housing construction and not self-built housing. The below Figure clearly illustrates the various policies and initiatives for housing under different supply mechanisms. It also identifies the gaps.

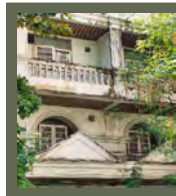
Typically, incentives are given in the form of additional FSI to make green buildings. Developer-built affordable housing takes advantage of these incentives along with green rating variants for affordable housing. The green rating variant for self-built affordable housing (by both IGBC and GRIHA) came in 2022

Policy focused on formally produced housing

Group and High Segment Individual Housing

Policy also needs to target:

1. Self-built Affordable Housing
2. Informal Settlements



Formal Substandard

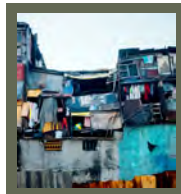
Green mortgage For:

- ❖ Retrofitting the building with green elements
- ❖ Redevelopment to green rated building



Social Housing

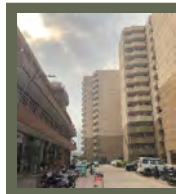
- ❖ Technological innovations
- ❖ Green Rating Variants for affordable housing
- ❖ Green regulation in DCR



Informal Housing



Self-Built
Affordable Housing



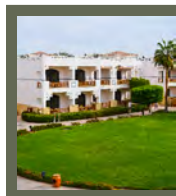
Developer built Affordable Housing

- ❖ Green rating variants for affordable housing
- ❖ Incentives for rated buildings



Market Group Housing

- ❖ Rating for green buildings
- ❖ Incentives for rated buildings



Individual Housing (Luxury)

- ❖ Subsidy for green components
- ❖ Property Tax reduction
- ❖ Green mortgage

?

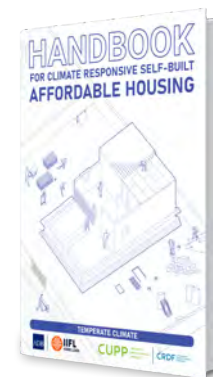
Figure 101: No strategy for self-built affordable housing

Source: Patel et al. (2022) Capacity building - Course 2: Policy Landscape for Green Affordable Housing for Women

- ❖ Empowerment of women is limited to the ownership of housing: The women empowerment efforts are limited to women's sole or joint ownership of housing mandated by Pradhan Mantri Awas Yojana (PMAY). About 12 states & 3 union territories in India also give concession in stamp duty or registration fees while some municipal corporations offer reductions in property tax to women. Finally, there are some financial benefits for women². All these policies and strategies are geared towards women's ownership of housing. There is a need to think of women as consumers of housing and recognize them as skilled workers and as agents of change

Do-it-yourself (DIY) Toolkit for Climate Responsive Self Built Affordable Housing

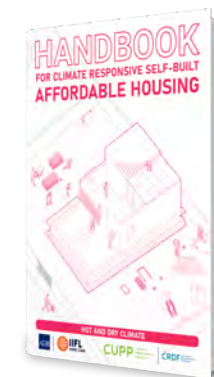
- ❖ The DIY Toolkits were a result of identifying a gap in self-built affordable housing space: The aspiring homeowner does not have much guidance about sustainable design or construction practices. IIFL has been active in this space as an HFC and understands the issue. The DIY Toolkit was an attempt to guide some of the stakeholders involved in the construction of self-built housing: aspiring homeowners, civil work contractors and architects/ engineers / technical representatives from HFCs. These DIY Toolkits were created for all climatic zones



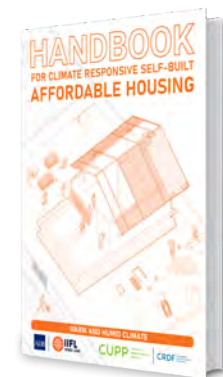
TEMPERATE



COMPOSITE



HOT & DRY



WARM & HUMID

Methodology

These handbooks were created based on the four major climate zones of India: Warm and Humid, Hot and Dry, Composite and Temperate. The cold climatic zones were excluded from the handbook.

Each handbook was structured to cover the following:

- ❖ **Fundamentals of the climate zone:** Providing an in-depth understanding of the climate zone's characteristics and environmental conditions
- ❖ **Passive Design recommendations at Site level and Building level:** Offering guidance at both site and building levels, emphasizing methods to optimize natural elements for energy efficiency and comfort
- ❖ **Sustainable Building Material choices:** Highlighting eco-friendly materials suitable for construction within specific climate zones

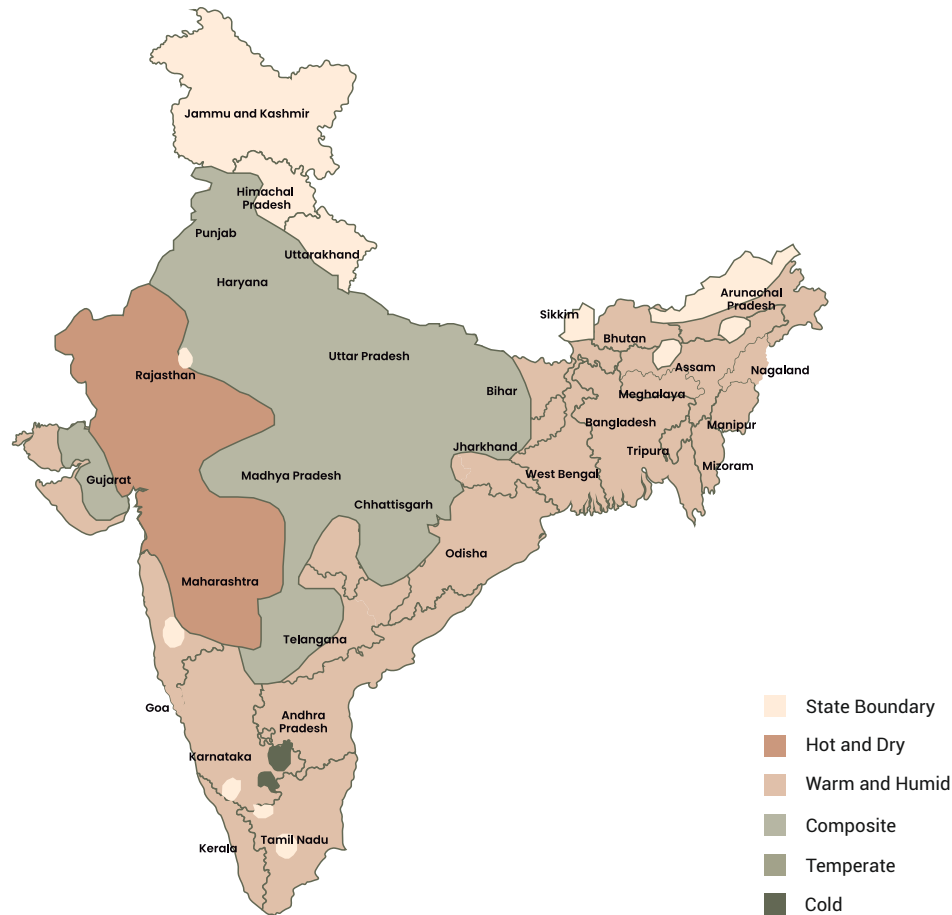
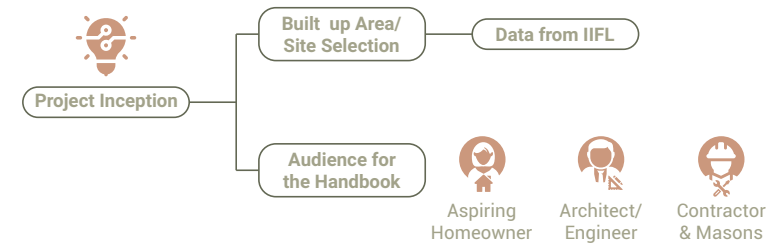


Figure 102: Climatic Zone Map of India

- ❖ **Sustainable appliances and technologies:** Introducing energy-efficient and environmentally friendly options for appliances and technologies suitable for the respective climate zones
- ❖ **Waste management at home:** Addressing waste management practices that align with sustainable living within homes



Source: www.climatelinks.org/resources/climate-risk-profile-india



Key Achievements

The inception of the DIY Toolkit stemmed from a crucial observation - a void existing within the realm of self-built affordable housing. It was noted that aspiring homeowners faced a dearth of adequate guidance regarding sustainable design or construction practices. Leveraging its active role within this sphere as a Housing Finance Company (HFC), IIFL HFL grasped the magnitude of this issue and sought to address it proactively.

This toolkit also provides guidance to various stakeholders engaged in the construction of self-built housing projects such as civil work contractors, architects, engineers, and technical representatives associated with Housing Finance Companies (HFCs). The tailor-made approach suits the distinctive climatic zones prevalent in key regions of India, particularly those susceptible to heatwaves. By aligning the content with the climatic conditions prevalent in these areas, the Toolkit offers region-specific solutions and practices conducive to sustainable construction methodologies, thus ensuring the promotion of resilient housing practices in vulnerable zones.

Learnings and Way Forward

Through the TA 'Enabling the ecosystem to improve access to green affordable housing for women', IIFL HFL and ADB attempted to enable access to inclusive and affordable green housing lower income segments. IIFL would like to continue the work this TA has started.

The exercise has paved the way for delving into the self-built homes segment, which is the major demand driver for greening the housing ecosystem in India. Towards this end, some of the measures being foreseen include:

Awareness, outreach, and knowledge creation

- ❖ Vernacular content
- ❖ Creating collateral such as and pamphlets, to be distributed to IIFL HFL's customers
- ❖ Link pin codes to climate zones and other relevant parameters (such as vulnerability atlas)
- ❖ Outreach for Self-built housing for aspiring homeowners through small-scale events

Capacity Building

- ❖ Training of contractors and masons for greening self-built housing
- ❖ Capacity building of IIFL's internal teams, its supply and value chain, including vendors, developers, builders, green building consultants and ancillary sectors through training

Policy Advocacy

- ❖ Enabling the ecosystem for green affordable housing by taking the white papers to relevant government forums
- ❖ Regulation/Reforms of green building ratings using research conducted under the TA

Table 21: Action Plan Matrix

Action	Aim	Scope	Approach
Translating the DIY Toolkits into vernacular languages	To better reach the people on the ground by translating the DIY Toolkit in the four climatic zones into relevant vernacular languages. The feedback we received on the ground was in favor of translating the DIY Toolkits as aspiring homeowners, contractors and masons are more comfortable in reading vernacular language	The languages selected will be based on the regions in which IIFL does business as well as the key languages spoken in the climate zones. The table below shows identified languages. Language for laborers might be different depending on where (which state) they come from originally	Publishing houses or translators can be engaged. The translation may not be exact for some terms that are commonly used in English, instead phonetic translation will be used
Converting key information related to green self-construction to flyers and pamphlets	To create awareness amongst key stakeholders like homeowners and contractors. The DIY Toolkits are comprehensive documents and may be too intimidating to the stakeholder at the outset. Flyers or Pamphlets would be able to create more awareness. The information here was tailored to a particular stakeholder	There will be different Flyers/ Pamphlets type depending on the audience/ target stakeholder. The two target groups may be homeowners and contractors	For homeowners the flyers could be an introduction to green homes. For contractors, the exact information on how to construct and the key strategies may be shared. The DIY toolkit may be used as a source. These flyers and pamphlets will be distributed to IIFL's customers through physical branches
Link pin codes to climate zones and other relevant parameters (like vulnerability atlas)	To identify the climate zones of the areas we service. This would support our team to guide aspiring homeowners better	Initially the scope would be limited to linking pin-codes to 5 climate zones of India. The scope can be expanded to include other parameters as well	GIS can be used to link the climate zone to pin code. Other uses of GIS can also be explored once pin codes and climate zones are linked
Outreach for Self-built housing for aspiring homeowners through small-scale events	To create awareness about self-built housing and reach the people on ground, particularly aspiring homeowners through small-scale events	About 15-20 people could be invited at a time for a dialogue on green self-built housing	The dialog could be on a variety of subjects – such as benefits of building green, how to build green, and addressing misconceptions in the market about green buildings
Training of contractors and masons for greening self-built housing	Developing and strengthening the skills of the local contractors and masons for greening self-built housing	This would be limited to local contractors who are involved in the construction of single-family housing	IIFL could partner with an organization that has expertise in training laborers, contractors, and masons. These could be institutions like the National Skill Training Institute (NSTI) or local NGOs that have the required expertise

Action	Aim	Scope	Approach
Capacity building of IIFL's internal teams, its supply and value chain, including vendors, developers, builders, green building consultants and ancillary sectors through training	Developing and strengthening the skills of the internal teams for better support and compliance	To begin with, training IIFL's internal team to better support aspiring homeowners and ensure proper compliance. Vendors will also be trained wherever required	The training would be in Hybrid mode- both online and in person depending on the subject of the training. Upcoming training courses in collaboration with IFC and DFC are already planned
Enabling the ecosystem for green affordable housing by taking the white papers to relevant government forums	Policy advocacy to create an enabling ecosystem for green affordable housingScope: The learnings from the TA activities, possible reforms and recommendations based on the leanings have been collated in various white papers created during the TA	The learnings from the TA activities, possible reforms and recommendations based on the leanings have been collated in various white papers created during the TA.	Publishing the white paper, and handbooks identifying stakeholders in relevant government forums, ministries etc., and presenting it to them. Initiating discussions on possible reforms and key recommendations of the white paper
Regulation/ Reforms of green building ratings using research conducted under the TA	To improve the credibility of green building ratings. Currently the green building rating systems do not enjoy the trust of the market. The consumer does not see the direct benefit from it. The green building rating is intent based and not performance based	Key Learnings and Reforms from the Research and Innovation component	The green building rating should be performance based and there is a need for regulating these rating systems. Appropriate, government bodies need to be identified which ensure that the rating system is not getting diluted to service the market. This may be done in partnership with CARBSE

Table 22: Language Distribution by Climatic Zones

Climatic Zone	Languages
Warm and Humid	Telugu, Tamil, Kannada, Marathi, Gujarati, Hindi
Hot and Dry	Hindi, Gujarati, Marathi
Composite	Hindi, Punjabi, Gujarat, Marathi, Telugu
Temperate	Kannada

ADVANCING GREEN AFFORDABLE HOUSING THROUGH RESEARCH AND INNOVATION



**Preface By CUPP,
CEPT University**



Resource-efficient buildings conducive to occupants' health and well-being are termed Green Buildings (GB). Dedicated organizations, called Green Building Rating Agencies (GBRA), are involved in formulating Green Building Rating Programs (GBRP). The GBRPs feature predetermined, intent-based Rating Criteria. Their rating mechanism is based on a relative comparison between the building's base case and Green-iteration, apathetic to its absolute operational performance. This Research and Innovation track of the ADB-supported collaborative Technical Assistance Project between IIFL and CEPT Research and Development Foundation illuminates the gaps in the prevailing GBRPs and makes suggestions to maintain their future relevance. It concludes with the requirement of a rating framework anchored to absolute design baselines and operational performance benchmarks.

Our study on Climate Resilient Green Affordable Housing Certification Standards and Innovative Technologies for Green Housing Construction assessed prevailing GBRPs, in India, from the perspective of Climate Response, Climate Resilience, Gender Sensitivity, and Affordability. It was found that the prevailing GBRPs do approximately assimilate the Rating Criteria pertaining to the four Key Parameters. However, they forgo the opportunity to establish and enhance the criteria for Climate Resilience. The inputs from GBRA's indicate that Green and Affordable Housing projects are spread across the country. The most targeted Rating Criteria were provision-based, while the least commonly targeted ones were related to spatial planning or building operation.

Prevailing GBRPs are primarily focused on mitigating climate change, i.e., Climate Response; their rating framework is relative-comparison based; and their core ideology is based on satisfaction of the intent of a GB. The work recommends that (i) the climate response needs to evolve to Climate Response and Resilience, (ii) the relative performance assessment needs to make the transition to absolute performance and (iii) the intent-based approach must evolve to a performance performance-based approach. These are three domains in which the prevailing GBRPs may be required to evolve. The two methods – 'Bottom-up' and 'Top-down' are suggestive of the level of making change. The 'Bottom-up' approach would involve starting with surface-level changes, i.e., shifting the focus from Climate Response to Resilience. While the 'Top-down' approach would involve making a change in the GBRP's core ideology, i.e., embracing a Performance-based appreciation Resource-efficient buildings conducive to occupants' health and well-being are termed Green Buildings (GB). Dedicated organizations, called Green Building Rating Agencies (GBRA), are involved in formulating Green Building Rating Programs (GBRP). The GBRPs feature predetermined, intent-based Rating Criteria. Their rating mechanism is based on a relative comparison between the building's base case and Green-iteration, apathetic to its absolute operational performance. This Research and Innovation track of the ADB-supported collaborative Technical Assistance Project between IIFL and CEPT Research and Development Foundation illuminates the gaps in the prevailing GBRPs and makes suggestions to maintain their future relevance. It concludes with the requirement of a rating framework anchored to absolute design baselines and operational performance benchmarks.

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About Center for Advanced Research in Building Science and Energy (CARBSE), CEPT University

The **Center for Advanced Research in Building Science and Energy (CARBSE)** is a center under CEPT Research and Development Foundation (CRDF) that aims to provide an impetus to research and development in the area of energy and habitat. They rely on the tenets of building science to provide solutions for current and future challenges facing our communities and cities. Their multidisciplinary work aims to provide scientifically validated inputs towards policymaking, assist the development of design and technology, and facilitate knowledge-exchange for human capacity building. CARBSE's focus areas include passive and low energy building design, building material and construction characterization, occupant comfort, energy benchmarking of buildings and energy use modelling. We study buildings through the design phase, construction phase and their operational life. Their studies extend beyond individual buildings to the wider neighborhood and city scales.

CARBSE houses state-of-the-art research infrastructure and employs highly trained and motivated domain specialists. Their research facilities are accredited by the National Accreditation Board for Laboratories (NABL). They also participate in International Round Robin inter-laboratory tests for various experiments and procedures on an annual basis. They have worked with multiple leading industry, government, and non-government/not-for-profit organizations. The Center operates out of a Net Zero Energy Building (NZEB), which they designed. It is a living laboratory that houses the Center's activities and provides lessons in designing, constructing and operating a net-zero energy facility.

The key initiatives of CARBSE include:

- ❖ Performance evaluation of thermo-physical-optical properties of building materials and construction technologies
- ❖ Occupant comfort studies and climate-specific thermal comfort models
- ❖ Development and performance evaluation of low energy cooling technologies
- ❖ Technical assistance for development and enforcement of building codes and construction

Team Structure

Leadership

► Yashkumar Shukla (Center Head and Principal Researcher)

Senior Advisor

► Rajan Rawal

Subject Matter Experts and Researchers

Sr. Assistant Professor and Program Chair-

Jyoti Trivedi (Master of Technology in Construction Engineering & Management)

Urban Management Centre

Meghna Malhotra

CEPT Research and Development Foundation, CEPT University

Ariba Khan | Mili Jain | Sneha Asrani Bhavya Pathak | Srinidhi Lakshmi Narasimhan | Shivani Senthilkumar | Subham Das

About 'Research on Climate Resilient Green Affordable Housing Certification Standards and Innovative Technologies for Green Housing Construction'

The project, titled "Enabling the Ecosystem to Improve Access to Green Affordable Housing for Women - Research & Innovation" had the following components- "Green Building and Climate Research", and "Incubation and Innovation".

The study's objectives were to establish and enhance the present state of understanding of affordable, climate-resilient housing in India from the perspectives of gender sensitivity, finance, and overall performance. And to facilitate the development of novel green technologies which complement the affordable and resilient building stock.

Housing is connected to multi-dimensional aspects: it impacts the occupants' mental and physical wellbeing and standard of living expectations (Al horr et al., 2016; Ige et al., 2019), it has close ties with the financial and social eco-systems (Doling et al., 2013; Rolfe et al., 2020), and it also drives Green House Gas (GHG) emissions by consuming resources and energy (IEA, 2021a). Hence, in its true essence, housing is required to be holistically sustainable – conducive to occupant comfort, affordable, and environment friendly or 'green.'

Globally, governments have invested between 0.1% and 1.4% of their national Gross Domestic Product (GDP) per annum towards the development of affordable housing (OECD, 2019; OECD, 2021). Collectively USD 1.9 trillion, which comprised 2% of the global GDP in 2021 (IEA, 2021b; Statistics Times, 2022), has been invested towards enhancing energy efficiency. India, too, has cumulatively invested more than USD 98 billion into developing 11.5 million affordable houses (PMAY-HFA(Urban), n.d.) under the Pradhan Mantri Awas Yojana (PMAY) scheme. Moreover, India has implemented policy-level measures encircling energy efficiency through the Energy Conservation Building Code (ECBC) in 2007 (BEE, 2007) and Eco Niwas Samhita in 2017 (BEE, 2017), and flagship schemes like the UJALA scheme for efficient LED bulbs, and Standards and Labelling program for appliances (BEE, 2018). The simultaneous efforts being put into developing housing and energy efficiency have found unified integration in Green



Green Building and Climate Research:

- ❖ Understanding gaps, and recommending modifications in the present-day Green Building Rating Programs keeping Climate Response and Resilience, and Gender Sensitive and Affordable building practices in view
- ❖ Identification of energy and resource baselines, and operational performance benchmarks
- ❖ Mapping and analyzing the occupants' home-buying decision process to align stakeholder interventions for enhanced access to resilient and affordable buildings



Incubation and Innovation:

- ❖ Facilitating the development of novel green technologies to complement the affordable and resilient housing stock
- ❖ The formulation of a financial system integrating green lending, climate-related risks, and climate adaptation strategies, for Affordable Housing
- ❖ The formulation of gender-sensitive guidelines for Green and Affordable Housing; a compendium of strategies for rendering buildings Climate Responsive and Resilient; and the best practices for Green and Affordable Housing

Affordable Housing, i.e., housing that is affordable and optimizes its resource consumption and thermal and energy performance (World Green Building Council, n.d.). India has recorded a growth of 19% in the green built-environment space, from 0.59 billion m² in 2018 (Diwarkar, 2018) to 0.70 billion m² in 2020 (Kumar, 2020). Buildings are certified as 'green' based on the criteria specified within Green Building Rating Programs formulated by Green Building Rating Agencies. These criteria include the aspects of energy, environment, water, materials, Site, waste, and practice. (Kuok Ho et al., 2020).

Exacerbating climate change has led to the warming of the earth's surface temperatures, consequently leading to a stark rise in the occurrence and intensity of extreme events such as cyclones, tsunamis, heat waves, and flashfloods (Dobricic et al., 2020; Kumar et al., 2021; Sharma & Mujumdar, 2017). In such continually deteriorating environmental conditions, the pursuit of built-environment sustainability has become even more relevant. Hence, the Green Affordable Housing must simultaneously: a) respond to the present and future worsening weather conditions, b) withstand locally catastrophic heat waves and flash floods, and c) be holistically – up-front and operationally – affordable for the occupant. Additionally, Green Affordable Housing could also help manifest the dimension of gender equality.

Understanding the nuanced way the genders perceive and utilize buildings, and integrating them into the design and construction of Green Affordable Housing could offer an opportunity to make housing and the surrounding development safer, more inclusive, and community-driven (United Nations, 2022; OECD, 2018). The housing eco-system can be boosted by integrating aspects of various thematic and functional concepts in Climate Responsiveness, Climate Resiliency, Affordability, and Gender Sensitivity.

This study was aimed at understanding and enhancing the current state of Affordable Housing in India by means of a literature study and discussions with relevant stakeholders. This study was aimed at improving the Economically Weaker Section's (EWS) and Lower Income Group's (LIG) access to Green Affordable Housing, with a focus on prioritizing gender. The study comprised fourteen Activities that resulted in eight Deliverables, as shown in Figure 18. A detailed description of each Activity can be found in Annexure A. The research for this study was carried out in two broad categories:

Methodology

The research and innovation component of the TA aimed at improving the Economically Weaker Section's (EWS) and Lower Income Group's (LIG) access to Green Affordable Housing, with a focus on prioritizing gender. The scope of work was divided into fourteen Activities which were carried out by Center for Advanced Research in Building Science and Energy (CARBSE), CRDF.

The following are the fourteen Activities, mapped to the eight deliverables which we will discuss in the upcoming pages:

- ❖ Assessment of prevailing Green Building Rating Programs, codes, standards, and guidelines for their applicability to achieve Climate Responsive, Climate Resilient, and Gender-sensitive Affordable Housing in India
- ❖ Identification of gaps or recommendations for improvement or enhancement with a view to increasing Climate Resilience and/or ease of adoption by relevant stakeholders
- ❖ Establish a benchmark for the performance of Green Building Rating Programs, codes, and standards during the operation stage of the Affordable Housing projects, including economic indicators, to facilitate performance measurement of design and construction projects
- ❖ Mapping of the decision-making process for buyers considering the mandatory aspects of climate-resilient housing to drive the design of actionable interventions by policymakers, builders, financiers, and other key stakeholders
- ❖ Propose a methodology to assess the average cost of climate adaptation measures (in % of total project cost or other relevant metrics) if a newly built construction is to adhere to contemporary rating programs and codes available in India, with any regional or climatic differences identified
- ❖ Derive outcomes that can benefit financial institutions (banks, non-banks or housing finance companies) to develop a financial mechanism to support the design and operation of climate-responsive, climate-resilient Affordable Housing

- ❖ Analyze the prevailing resource and energy baseline codes and their applicability to Indian Affordable Housing. Develop a suitable benchmark for resource and energy performance applicable to the Indian Affordable Housing context with a view to recommending areas for improvement in the existing codes and/or other actionable policy measures
- ❖ Formulate an implementation model and policy recommendations based on analysis of the above-mentioned parameters
- ❖ Publish a compendium of strategies for climate-responsive and climate-resilient housing for various climatic zones in India
- ❖ Identify cost-effective, innovative climate resilient green construction technologies from across the country/globe currently available in the market or research phase; identify programs with a view to catalyze the implementation of the selected technologies with the help of industry partners or respective government agencies; and aid the administration of granting any incentives to support this exercise
- ❖ Develop and publish a unified resilient green building system encompassing standards tailored to the local climate zones of various regions across the country. Coordinate with all stakeholders, including leaders, scholars, certification agencies, developers, and government bodies, to understand, discuss, and formulate relevant policies based on the innovative solutions identified
- ❖ Establish climate risk and adaptation assessment and formulate a system to integrate green lending and climate adaptation strategies in the context of Affordable Housing finance for Financial Institutions; develop a knowledge product module based on the results for public dissemination
- ❖ Develop and upload a knowledge product module on gender-sensitive green building infrastructure projects. Prepare guidelines for mainstreaming gender in green housing and green urban infrastructure development for public dissemination
- ❖ Develop and upload a knowledge product module on lessons learned and best practices in the implementation of Green Affordable Housing in India based on the technical analysis and research results obtained for publication and dissemination in India/globally

Deliverables

- ❖ These activities are input into the deliverables:
- ❖ **Deliverable 1:** Green Building Rating Systems: Assessment and Gap Identification
- ❖ **Deliverables 2 & 6:** Financing Green and Affordable Housing
 - ❖ **Deliverable 2:** Financial Mechanisms to Support the Design and Operation of Climate Responsive and Climate Resilient Affordable Housing
 - ❖ **Deliverable 6:** Integrating Green Lending in Affordable Housing Finance: Policy Recommendations and Interventions for Financial Institution
- ❖ **Deliverable 3:** Policy Recommendations and Implementation Model Enhancing the Current State of Green Affordable Housing in India
- ❖ **Deliverable 4:** Compendium of strategies for making buildings Climate Responsive and Resilient
- ❖ **Deliverable 5:** Unified Resilient Framework for Next Generation Voluntary Green Buildings Rating Programs
- ❖ **Deliverable 7:** Mainstreaming Gender Sensitivity in Green Affordable Housing: Guidelines
- ❖ **Deliverable 8:** Green Affordable Housing in India: Best Practices
- ❖ **Activity 10 Report:** Innovative Construction Technologies for Green Affordable Housing
- ❖ Report Summarizing all Activities



Figure 103: : Activities input into Deliverables

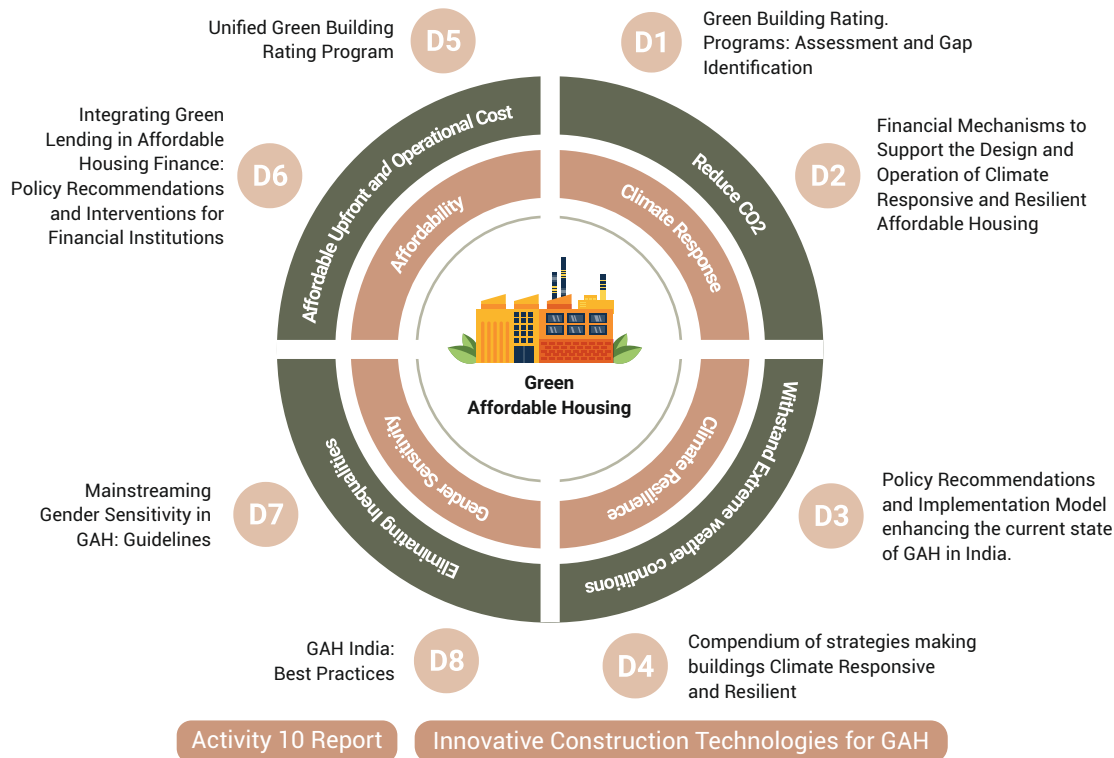


Figure 104: : Study Key Parameters and Deliverable Description

Deep Dive into the Green Building Eco-system in India

Buildings consume resources from the point of their conception to demolition. Globally, buildings are responsible for 40% of the total operational energy consumption (GlobalABC et al., 2020) and 25% of water (UNEP, n.d.) consumption. This energy and resource usage leads to Carbon Dioxide (CO₂) emissions. Worldwide, the CO₂ emissions from buildings have risen from 19% in 2010 (O. et al., 2014) to 38% in 2021 (UNEP, n.d.). Operational carbon emissions comprised 27% of the latter, and embodied carbon emissions comprised 11%. As operational efficiency increases, the contribution of embodied carbon has been estimated to increase and become equal to operational carbons.

A 'Green Building,' often used interchangeably as 'Sustainable Building,' prioritize energy and resource efficiency alongside a healthy indoor environment (World Green Building Council). Various rating programs serve as blueprints for achieving sustainability in construction. Examples include location-specific programs like BREEAM in the UK and the BCA Green Mark Scheme in Singapore, as well as global ones like LEED and EDGE (BREEAM, 2021; BCA, n.d.; LEED, n.d.; EDGE, 2021). These programs operate on voluntary compliance. India's construction sector is rapidly growing, with an annual growth rate exceeding 15% in 2021 ("Construction in India-Key Trends and Opportunities to 2025 (Q3 2021)", 2021). Currently, about 40% of buildings projected for 2037 are under construction, mostly residential (AEEE, 2017). Given that Indian residential buildings already consume 30% of total energy demand (IEA, 2020), it's crucial to ensure new constructions don't exacerbate energy consumption. India aims to promote energy efficiency in buildings and appliances through its Nationally Determined Contributions, which also entail ramping up renewable energy capacity to combat climate change (MoEF, 2018).

India is witnessing a 'Green' movement in the building sector. Moreover, Green Building projects are eligible for several economic and technological incentives put forth by India's central and state government(s). The Green Building projects can accept economic incentives such as additional Floor Space Index (FSI), financial assistance and subsidies, and reduction in one-time building tax and stamp duty (IGBC, n.d.b). Concurrently, Green Building projects can integrate compliance with the Energy Conservation Building Code (ECBC) and Eco Niwas Samhita (ENS) codes, align with the Residential Building Energy Labelling Program, and avail benefits from the state-level renewable energy schemes. Among others (BEE, 2007; BEE, 2017; BEE, 2021; National Portal of Solar Rooftop - Ministry of New and Renewable Energy, 2022).

With nearly 5% of the total buildings certified 'green,' the movement is in its nascent stage and gaining momentum (IFC, 2018). Affordable Housing Projects, including the 11.5 million units being developed under the PMAY scheme (PMAY-HFA(Urban), n.d.), have the potential to be multi-faceted catalysts when driven by 'green' principles. Indian Green Buildings seek 'green' certification from either country-specific Green Building Rating Programs formulated by Indian Green Building Council (IGBC), Green Rating for Integrated Habitat Assessment (GRIHA), Green and Eco-Friendly Movement (GEM), or universal Green Building Rating Programs formulated by LEED, or the International Finance Corporation (IFC). These Rating Programs assess buildings based on criteria, hereafter referred to as Rating Criteria, encircling environment, energy, resources, waste, water, and occupant wellbeing.

The following sections detail the lessons learned:

Deliverable 1

Green Building Rating Programs: Assessment and Gap Identification

Deliverable 1 looked at the prevailing Green Building Rating Programs, referred to as Rating Programs, henceforth, through the lens of the four Key Parameters with a view to enhance the former's future relevance. The Rating Criteria were studied to understand whether and to what extent they embody the Key Parameters. Furthermore, this study invited on-ground insights regarding the execution of Rating Programs from stakeholders – Green Building Rating Agencies and Consultants. The study identified gaps in terms of the appropriate implementation of the intended Rating Criteria or context to enhance the current Rating Criteria's scope and potential.

The prevailing Rating Programs may benefit from incorporating new Criteria or enhancing existing ones to bridge the gaps mentioned below:

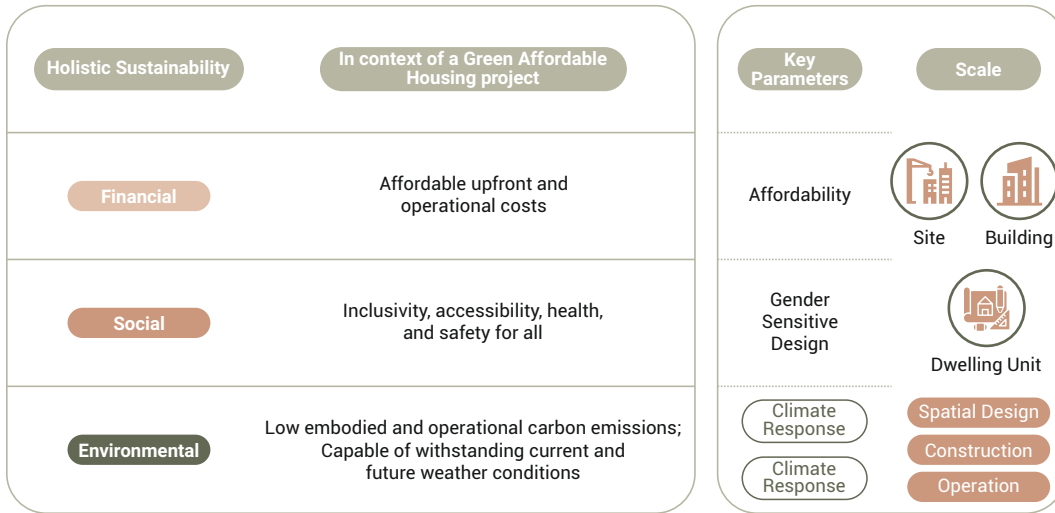


Figure 105: Tier of Sustainability, Key Parameters, and Scales and Execution Levels of interventions

- ❖ **Intent vs Performance:** The programs should include measures to assess the actual performance of certified Green Buildings in alignment with their intended goals
- ❖ **Cooking Energy:** Consideration of access to clean cooking fuel is crucial for occupants' well-being and has implications for affordability and gender sensitivity
- ❖ **Operational Measures & Split-Incentive:** Developers bear the initial cost of green measures, but the programs should ensure that occupants benefit from operational cost savings, addressing the split incentive issue
- ❖ **Climate Resilience:** Enhance criteria for heatwave resilience beyond U-value and include measures for flooding resilience, considering the seasonal occurrence of both disasters
- ❖ **Thermal Comfort:** Make "Adaptive Thermal Comfort" mandatory by establishing thermal comfort requirements
- ❖ **Optimizing Embodied Energy:** Specify quantifiable criteria for embodied energy reduction in construction materials, providing a clear benchmark for comparison
- ❖ **Supplementing Urban-level Systems:** The Rating Programs should contribute to and integrate with existing urban-level systems for waste, water, electricity, environment, and disaster management



Number of projects
Commonly and rarely attempted points
Project location

[a] Information gathered Rating Agencies



Energy Efficiency index
Net State Domestic Product
Population
Climate zone
Disaster

[b] Project location overlayed against

Deliverable 2

Financial Mechanisms to Support the Design and Operation of Climate Responsive and Climate Resilient Affordable Housing

Deliverable 2 delved into homebuyers' perceptions of Green and Affordable Housing, considering factors influencing them and their budget. Awareness emerged as a critical link between demand and supply, with homebuyers aware of Green Building's definition but lacking awareness about local projects. Developers cited homebuyers' lack of awareness as a barrier, alongside limited support from government entities.

Furthermore, the study examined current financing mechanisms, suggesting a shift in implementation strategy. Financing Agencies were proposed as vital stakeholders in the design, finance, and delivery of Green and Affordable Housing. Key Performance Indicators (KPIs) were formulated (Figure 6) to assess project sustainability, and variations of Public Private Partnership financial models were developed, considering the land ownership (Figure 7).

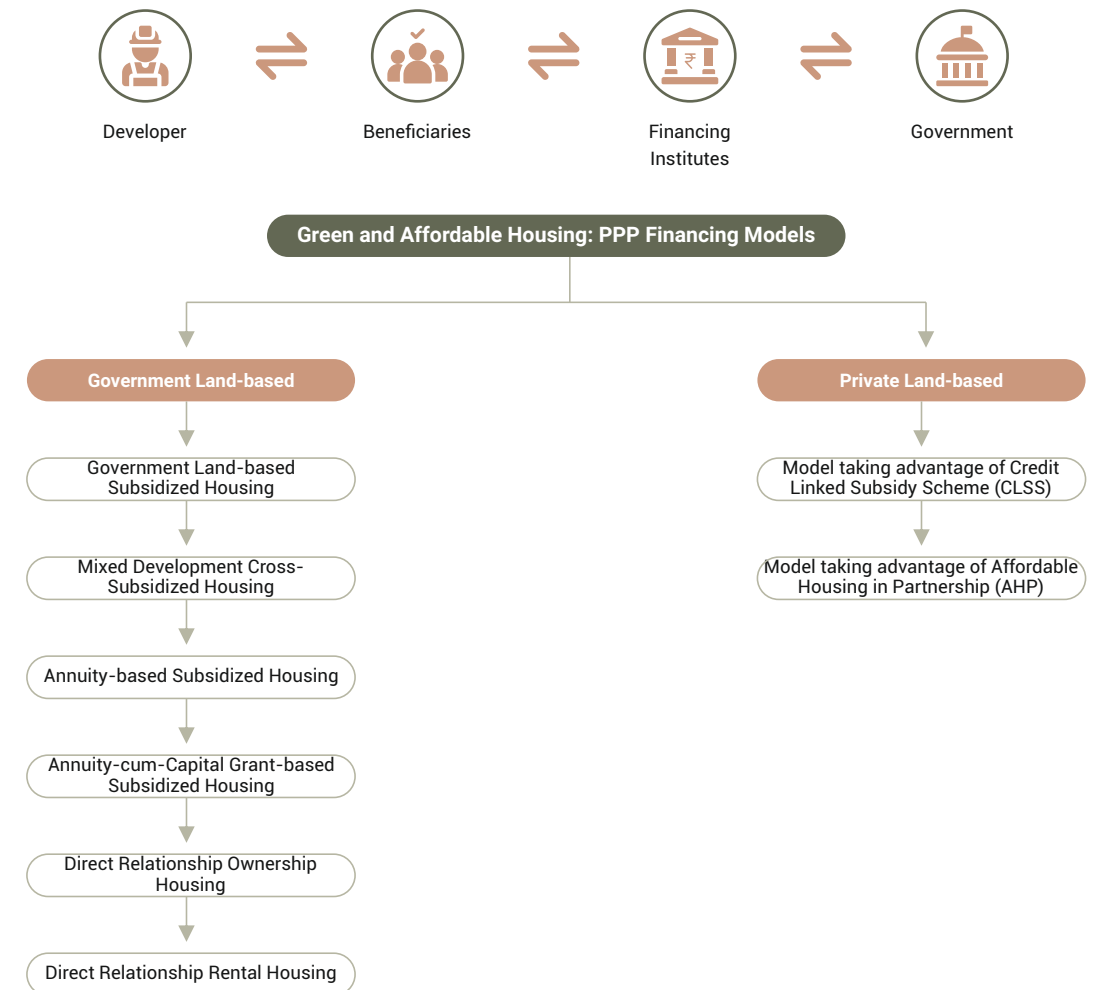


Figure 106: PPP Financing Models

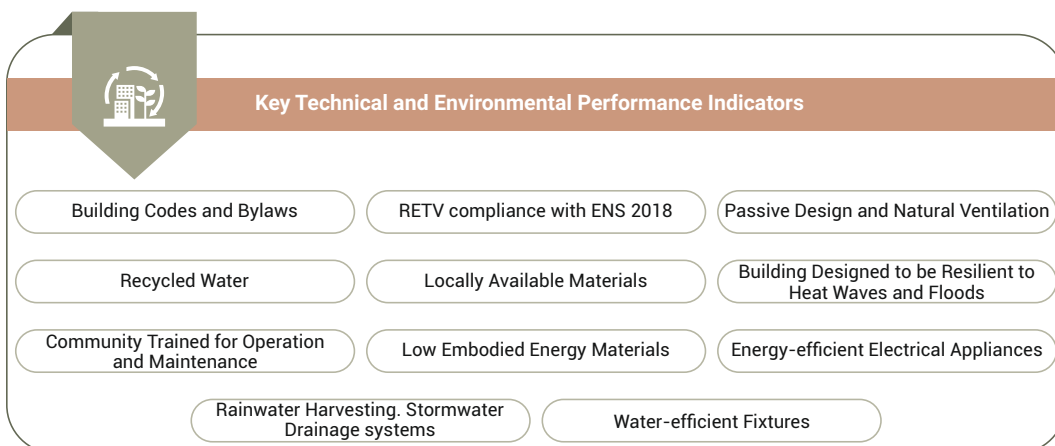
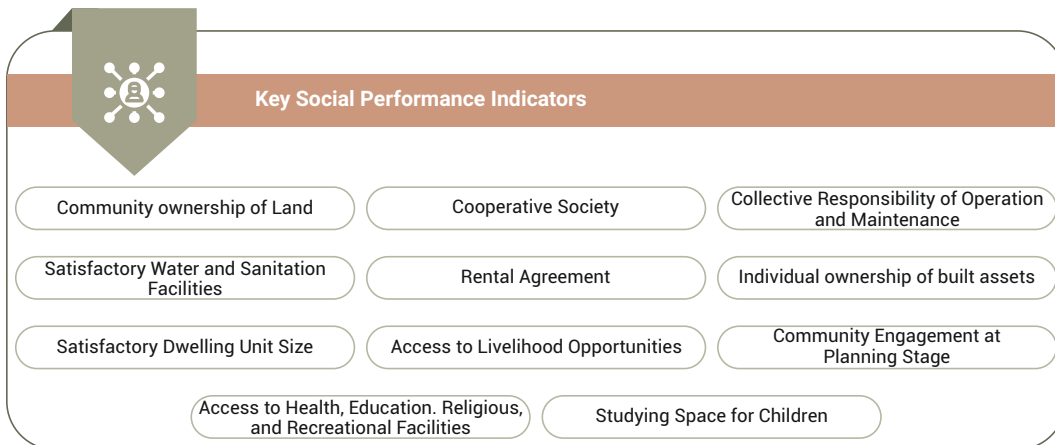
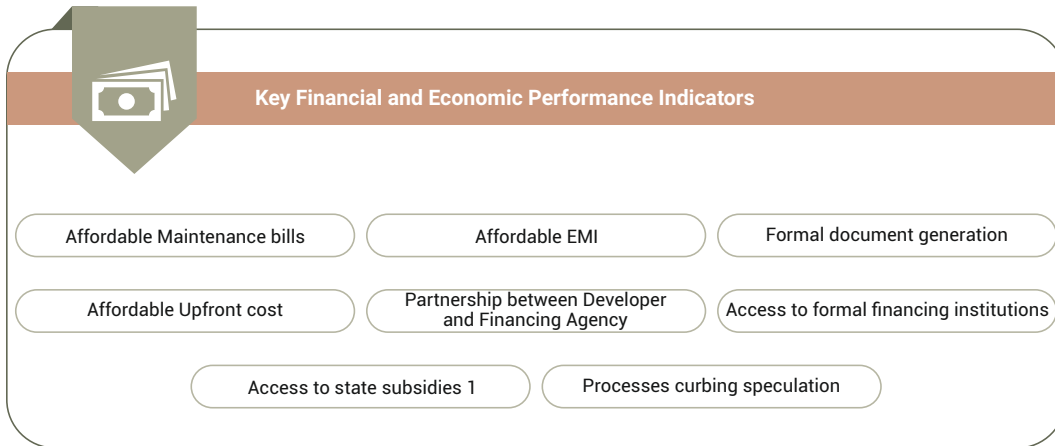


Figure 107: Key Performance Indicators to incorporate within Financial Mechanisms

Deliverable 3

Policy Recommendations and Implementation Model Enhancing the Current State of Green Affordable Housing in India

Deliverable 3 is oriented toward policymakers from the government and their contemporaries from the private and industrial sectors. It encompasses policy-level suggestions that can nudge the national and voluntary building codes, and Green Building Rating Programs toward the Green trajectory.

Based on the lessons learned by researching relevant literature and taking inputs from concerned stakeholders, the policy-level recommendations encompassed technical suggestions for the National Building Code (NBC) (Figure 8), Energy Conservation Building Code (ECBC) (Figure 9), Green Building Rating Programs, and governance-related suggestions for central or state governments and/or local stakeholders.

Green Building Rating Programs: The Rating Criteria must recalibrate their framework and integrate a performance-based approach. For this, a Green Building would be required to a) be Certified once – any time before occupancy and b) go through an annual performance appraisal – ensuring its performance is in compliance with the certification criteria.

Recommendations for National Governance

The technical changes, that the codes and/or Green Building Rating Programs would integrate, must be accompanied by paradigm-shifting governance methodologies. Recommendations for the policymakers are as follows:

- ❖ Government initiatives directed at increasing the Affordable Housing building stock must invite 'Expression of Interest' (EoI) from financial institutions
- ❖ The Reserve Bank of India (RBI) must create a credit risk assessment framework associated with climate change to secure the financial support
- ❖ RBI may also undertake the creation of separate financial instruments, such as green bonds, to promote effective stakeholder engagement
- ❖ National initiatives to enforce capacity-building programs for the development of urban infrastructure to promote Green Affordable Housing can be designed

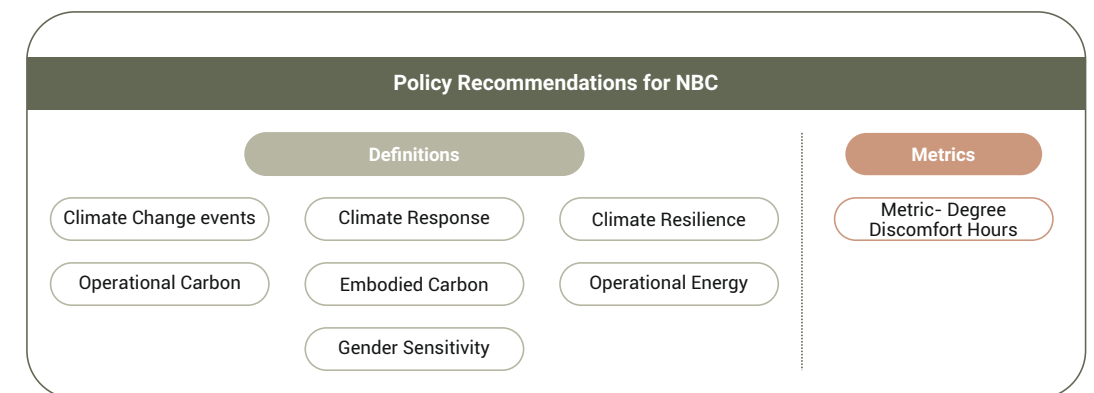


Figure 108: Policy Recommendations for NBC

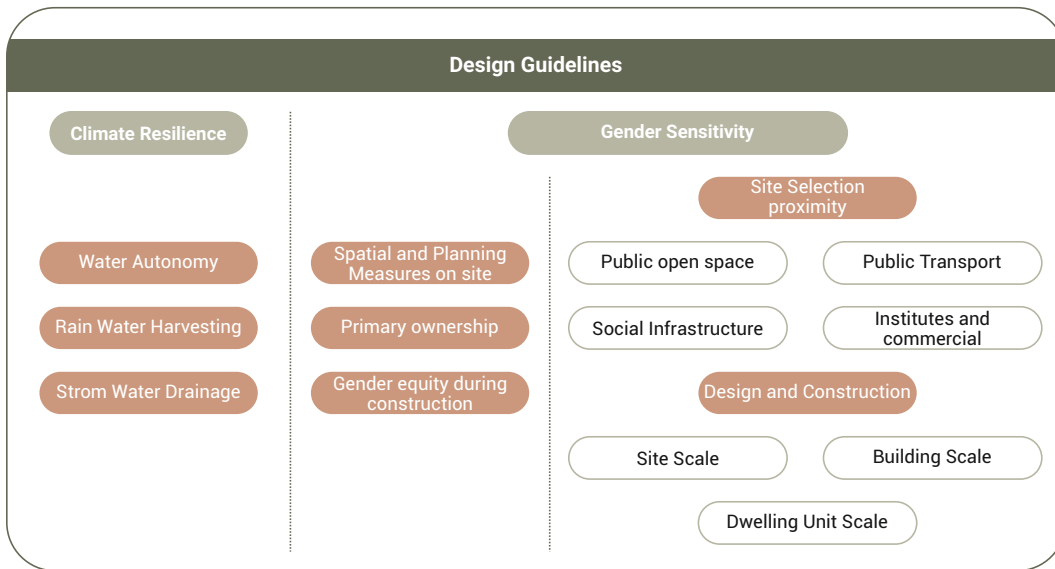


Figure 109: Design Guidelines

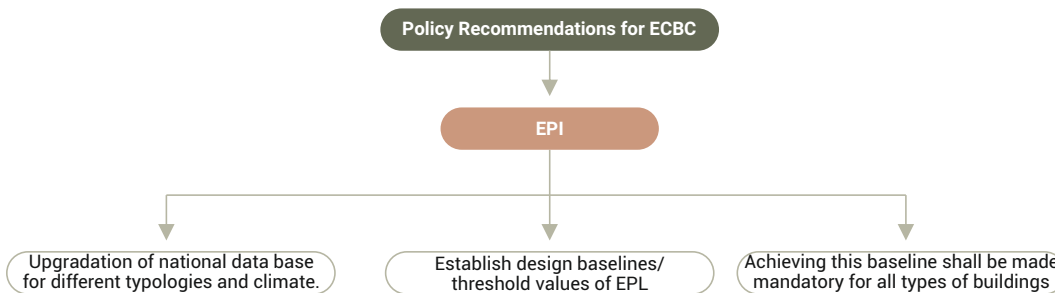


Figure 110: Policy Recommendations for ECBC

Deliverable 4

Compendium of Strategies for Climate Responsive and Resilient Buildings:

Deliverable 4 is concerned with the Environmental sustainability tier; it encompasses strategies and measures aimed at making buildings climate responsive and resilient. The strategies have been developed for applicability to various spatial Scales and lifecycle Stages.

Climate Responsive

Buildings designed to be considerate of the local climatic context would provide their residents with a comfortable indoor environment while simultaneously curbing the demand for space cooling. These strategies have been classified as per the following Aspects:

- ❖ **Carbon Impact**
 - ❖ Embodied Carbon - Carbon emitted during the non-operational phases of the building; it is a representative of the

carbon, which is, by default, embedded into the building fabric

- ❖ **Operational Carbon** - Carbon emitted during a building's operational phase; caused by the Site's annual electricity usage, freshwater demand, and wastewater discharge
- ❖ **Thermal Comfort**: Refers to a state of mind which expresses satisfaction with its surrounding environment. Various environmental parameters, such as indoor air temperature, mean radiant temperature, air speed, and relative humidity, and personal parameters, such as metabolic rate and clothing insulation, impact the occupants' relationship with their indoor thermal environment
- ❖ **Visual Comfort**: Sufficient and good-quality lighting in residential spaces allows residents to live and work comfortably without experiencing too much strain or stress
- ❖ **Indoor Air Quality**: Refers to the nature of the conditioned or unconditioned air that circulates within the space. It is considered to be healthy when the air does not contain contaminants in harmful concentrations.
- ❖ **Water Quality**: Water is a fundamental necessity, and people require proper access to quality water to lead a healthy life

Climate Resilient Strategies

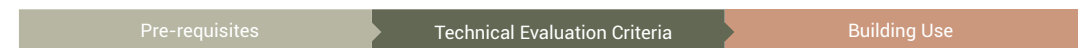
Across their lifespan, buildings would be exposed to increasingly intensifying extreme weather events such as heatwaves and floods. Hence, they must be designed to withstand such events while maintaining a comfortable indoor environment for the occupants. These strategies have been developed for a) extreme weather events, such as heatwaves and floods, and b) water autonomy, which refers to the number of days the essential services of a project can function if the municipal water supply is cut off.

Deliverable 5

Unified Resilient Framework for Next Generation Voluntary Green Buildings Rating Programs:

Deliverable 5 discusses the various types of sustainability frameworks. It deliberates upon the need for a unified framework addressing all categories of sustainability. The narrative also elaborates on the systematic approach to establishing the unified framework's key aspects and methodologies. It delineates the design, planning, and operational criteria central to the developed Framework. Finally, it summarizes the Framework and sheds light on each Aspect's future steps.

Section



Aspect

Affordability	Gender Sensitivity
Access to green and open spaces	Access to social infrastructure
Carbon Impact : Operational Carbon Impact Embodied Carbon Impact	
Health and Well-being: Thermal Comfort Visual Comfort Indoor Air Quality Water Autonomy Water Quality	
Conducting continuous checks: Operational Energy Consumption Thermal Comfort Visual Comfort Indoor Air Quality Water Quality	

Figure 111: Sections and Aspects of the Unified Resilient Framework

The Unified Resilient Framework

The Unified Resilient Framework is a comprehensive tool designed to ensure that certified Green Buildings maintain consistent performance over time. It consists of three main sections, each branching into specific aspects, as illustrated in Figure 10. This framework serves as a guide for stakeholders to monitor and optimize the ongoing sustainability of green buildings.

Deliverable 6

Integrating Green Lending in Affordable Housing Finance:

Policy Recommendations and Interventions for Financial Institution: Deliverable 6 proposed to strengthen the ties between design, planning, finance, and administration in both green and affordable housing sectors. Recommendations include streamlining processes such as single window clearance and fast-track approvals, along with increasing awareness about sanctioned projects. Additionally, the report suggests extending tax benefits to eligible developers under Section 80 IBA of the Income-tax Act 1961 to incentivize green housing initiatives. Highlighting the importance of climate resilience, the report emphasizes the limited consideration of climate change-related risks within the financial ecosystem. It advocates for avoiding vulnerable project locations and calls for the assessment of both physical and transitional climate change-related risks. Furthermore, the report urges regulatory bodies like the Reserve Bank of India (RBI) to take the lead in developing a comprehensive climate risk evaluation framework for banks and financing agencies. By incorporating such measures, the aim is to foster a more resilient and sustainable approach to housing development in India.

Green and Affordable Housing Project

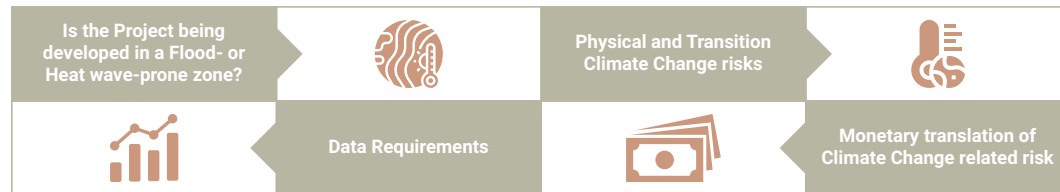


Figure 112: Climate change-risk specifics to look at when developing Green and Affordable Housing

Deliverable 7

Mainstreaming Gender Sensitivity in Green Affordable Housing: Guidelines:

Worldwide, initiatives boosting Gender Sensitivity at the scales of city planning and urban design have been implemented. These initiatives address different facets of a singular issue – gender inequality. This document is a comprehensive guidebook for integrating a gender lens into planning, designing, constructing, and operating GAH projects.

Deliverable 8

Green Affordable Housing in India: Best Practices:

Deliverable 8 elaborates on relevant executable practices for satisfying the environmental, social, and economic sustainability at the Site, Building, and Dwelling Unit-scale.

The Figure 12 and Figure 13 illustrates the best practices for the following: a) the four Parameters – Social facet, Gender Sensitivity, Climate Response, and Resilience for which the intended practices have been devised, b) the Execution Stage – Design, Construction, and Post-Occupancy, during which the intent would be realized, and c) the spatial Scale – Site, Building, and Dwelling Unit, at which the practice would be applicable.

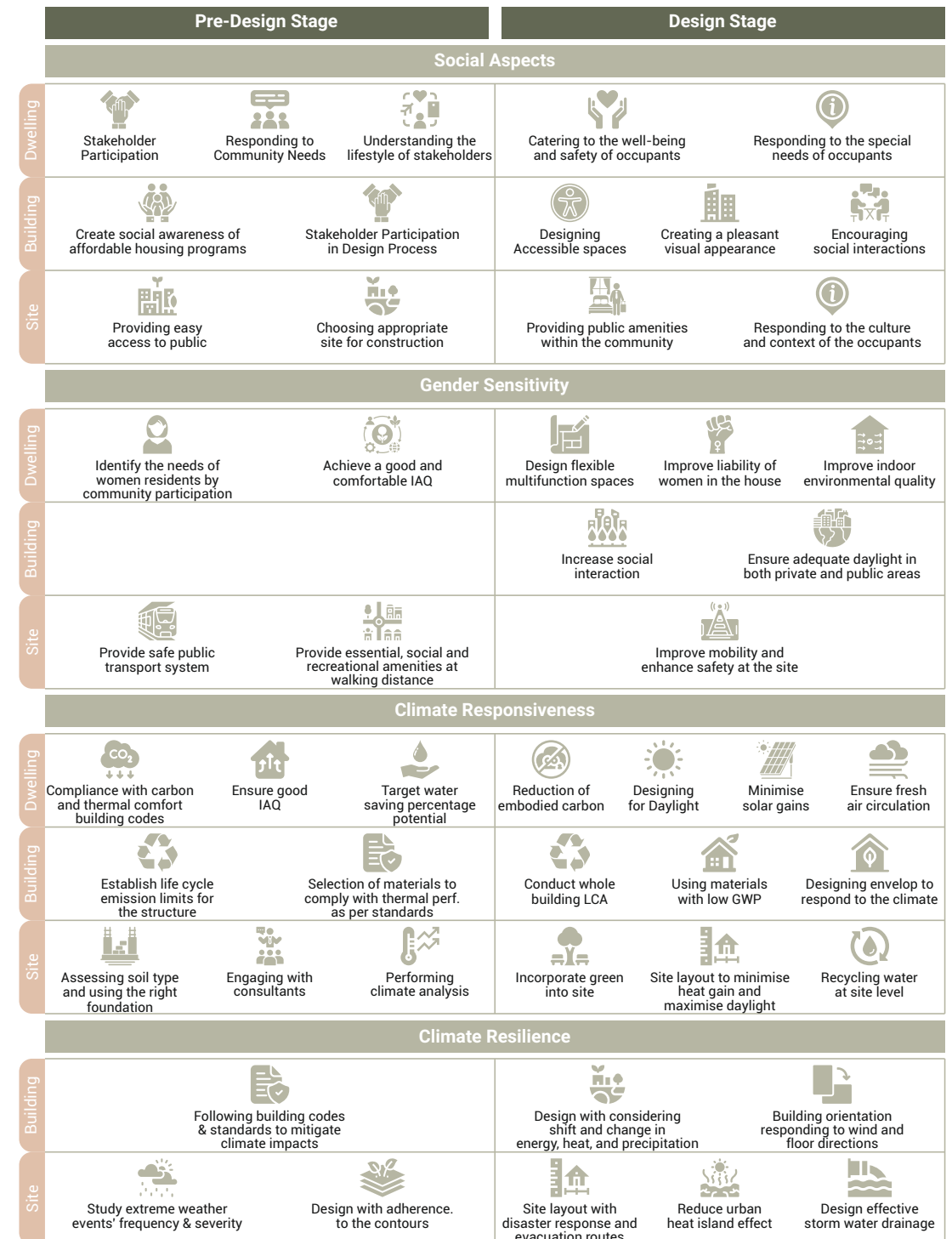


Figure 113: Best Practices for the Pre-Design and Design stage and all Spatial scales








































Pre-Design Stage			Design Stage		
Social Aspects					
Dwelling	 Maintain the Quality of Construction.	 Provide a safe construction environment	 Maintain equity and inclusivity		
Building	 Supporting local economy by employing locals workers		 Creating a socially Integrated community		
Site	 Addressing social concerns of workers, like safety, security and skill development		 Promoting positive image of residential area and creating a healthy environment		
Gender Sensitivity					
Dwelling	 Enhance women's sense of safety by having additional security features, e.g. double doors, jaali in balconies etc		 Provide community spaces for women to socialise and form associations		
Building	 Enable maximum building facade exposure	 Provision of healthcare and creche facilities for women workers on-site	 Provide surveillance	 Provide access control to resident women for permitting visitors	 Provide power backup
Site	 Gender equality in construction sites		 Representation of women in residents' committees and associations		
Climate Responsiveness					
Dwelling	 Reduce embodied carbon	 Use of pre-fab materials	 Using Lean Manufacturing process	 Establish embodied carbon reduction targets for future renovations	 Sub-metering for occupant's awareness of energy use
Building	 Design for disassembly and adaptability	 Maximise structure efficiency	 Sourcing local materials	 Monitoring AQI post occupancy	
Site	 Limit emission from machinery	 Minimise & recycle construction waste		 Rainwater Harvesting	 Stormwater drainage planning
Climate Resilience					
Building	 Design structural system to respond to the site	 Design for modularity	 Building materials to respond to climate	 Maintenance of landscape and green infrastructure to tackle heatwaves	
Site	 Reduction of erosion	 Reduction of impervious paving	 Building on higher grounds in coastal areas	 Enhancing community awareness	 Tree plantation drives to protect from heat waves, cyclonic winds and flooding.

Figure 114: Best Practices for the Construction and Post Occupancy stage and all Spatial scales

Activity 10 Report:

Innovative Construction Technologies for Green Affordable Housing:

Activity 10 involved researching new and innovative construction technologies – walling, roofing, and fenestration (Rawal, Shukla, Pathak, Asrani, et al., 2022).

These materials have an impact on the building's capital cost and lead to embodied carbon emissions. Based on how mature these technologies were with respect to being used in mass housing projects, they were assigned a Technology Readiness Level (TRL), detailed in Table 1. Figure 14 illuminates the types of construction technologies researched, their respective parameters studied – capital and environmental cost, and TRL, and their respective evaluation methods or scales. The identified technologies' performance was evaluated against a Base Case. Depending on how close or far away their performance was in comparison to the Base Case, it was categorized as 'Low,' 'Medium,' or 'High.'

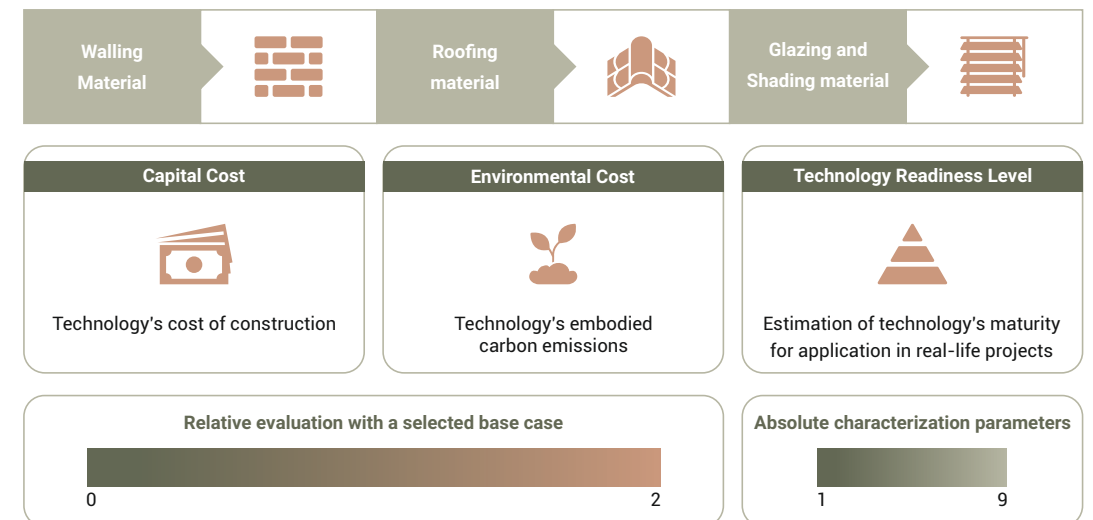


Figure 115: Innovative construction materials and assessed parameters

Table 23: Description of Technology Readiness Levels

TRL	Description
1	Basic principles observed and reported
2	Technology concept and/or application formulated
3	Analytical and experimental critical function or characteristic proof-of-concept
4	Technology basic validation in a laboratory environment
5	Technology basic validation in a relevant environment
6	Technology model or prototype demonstration in a relevant environment
7	Technology model demonstration in an operational environment
8	Actual technology completed and qualified through test and demonstration
9	Actual technology qualified through successful project

Among the walling technologies assessed were light gauge steel framed structural system with infill concrete panel, monolithic concrete construction using aluminum / tunnel formwork, precast concrete construction system- 3d precast volumetric, prefabricated sandwich panel system + pre-engineered steel structural system, PVC stay-in-place formwork system etc. Moreover, structural roofing and layer technologies, including but not limited to precast reinforced concrete slab, funicular shell roof, precast funicular shell roof with concrete, brick pyramidal roof, jack arch roofing with terracotta hollow blocks and precast RCC beams etc were assessed. Furthermore, fenestration technologies included window glazing materials, such as Single Glazing Unit (SGU) and a combination of Double-Glazing Unit (DGU) and low-e coating, as well as shading materials, like RCC horizontal overhangs and movable shading systems.

Various technologies at different TRLs require intervention or support in different domains. While a technology may be well-researched, developing a marketable product may remain a struggle. On the other hand, if a functioning prototype for a technology has been developed, it may lack applicability in a wider context to become a market player. Following is the technical, financial, or governance-based pathways to improve TRL:

- ❖ **TRL 1-3: Technical and Financial Support:** Technologies at TRL 1-3 may greatly benefit from technical and financial support. The goal of technical and/or financial support may be to a) Build a knowledge base to identify steps for validation in different environments and b) Build infrastructure to develop and test the proof-of-concept in a laboratory environment
- ❖ **TRL 4-6: Technical and Financial Support:** Technologies at TRL 4-6 may rely heavily on financial support to develop the infrastructure required to produce, test, and perfect prototypes of the technology in different environments. These technologies may also benefit from researching applicable contexts for the technology
- ❖ **TRL 7-9: Governance Support:** With a nearly fully developed technical knowledge base, technologies at TRL 7-9 may demand support in market integration and the involvement of stakeholders from the construction industry. Therefore, governance support is needed to facilitate the testing of technologies in an operational environment – to establish their success. Guidelines an assessment of the technologies and guidelines from concerned organizations is also needed to overlook the adoption of these technologies by builders, developers, and other stakeholders in a manner that is safe and healthy for future building occupants

Research activities conducted during the TA resulted in the development of 9 Deliverables focused on:

Evaluating prevalent green building rating programs for climate-resilient, gender-sensitive affordable housing in India. The research recommends rating programs may benefit from enhancing the existing rating criteria and adding new relevant rating criteria, to better align and contribute to the key parameters of climate response, climate resilience, gender sensitivity, and affordability.

Enhancing the current state of green affordable housing in India through policy recommendation and finance. The recommendations are made for Indian Codes like National Building Codes, Eco-Niwas Samhita (ENS Parts I and II) and Energy Conservation Building Code (ECBC- 2017) to include climate-resilience, climate response and gender sensitivity related aspects. There are also recommendations for the finance sector as it holds the potential to moderate the stakeholders to create a thriving market for Green Buildings or Residences. The finance sector needs to nudge developers to develop efficiently designed and performance sustaining green buildings by ensuring them that these homes would sell and create a pull factor for the homebuyers by proving low interest loans and ensuring them of the savings despite the high capital cost.

Identifying cost effective, innovative climate resilient green construction technologies, strategies, and best practices from across the world. These include a compendium of executable strategies for rendering the project at different scales and execution stages Climate Responsive and Resilient. Here the project scales are site, building and dwelling unit. And execution stages are design construction and post occupancy; a report on the best practices that should be adopted in Green Affordable Housing projects, some of which have been demonstrated in various projects worldwide; A report on innovative construction technologies for green affordable housing assessed on capital cost, environmental impact, and climate resilience. The identified technologies' performance has been evaluated against a base case.

Key Achievements

The current study has led to formulation of the following design-related takeaways:

1. Unified Resilient Green Building Framework:

The Unified Resilient Framework has been developed to ensure that a certified Green Building is a consistently performing Green Building. Figure 9 mentions the three Sections, which further branch into respective Aspects:

- 1.1 The Prerequisites-Section encompasses Aspects that must, by default, be satisfied before the technical evaluation is even considered
- 1.2 The Technical Evaluation Criteria ensure that the Site is environmentally sustainable. The Criteria have been framed such that each Aspect is associated with a quantifiable metric
- 1.3 Building Use: All affordable housing projects are expected to have a service life of 60 years or more. The project must conduct checks for this operational period to ensure that the intended performance translates to actual use

2. Compendium of Strategies for Climate Responsive and Resilient Buildings:

- 2.1 *Climate Responsive Buildings* designed to be considerate of the local climatic context would provide their residents with a comfortable indoor environment while simultaneously curbing the demand for space cooling. See Figure 15
- 2.2 *Climate Resilient Buildings*: Across their lifespan, buildings would be exposed to increasingly intensifying extreme weather events such as heatwaves and floods. Hence, buildings must be designed to withstand such events while maintaining a comfortable indoor environment for the occupants

3. Gender Sensitive Guidelines for Green Affordable Housing

- 3.1 *Site-level Selection and Planning*: Selecting the appropriate Site for GAH project shall enable equitable access to opportunities, inclusivity, and a safe environment for women. Figure 20 [a] illustrates that the presence of natural ecosystems, local sociocultural practices, and the nature of development in the surrounding areas (e.g., industrial, residential, commercial) must be paid attention to when selecting a prospective Site
- 3.2 *Design and Construction process*: Depending on the scale at which these guidelines are applicable, they have been subdivided into Site-scale, Building-scale, and Dwelling Unit-scale guidelines, as shown in Figure 20 [c]
- 3.3 *Guidelines for the Site-scale*: The guidelines include the provision of better street frontage for safety and security, universal accessibility, possibilities of home-based livelihood opportunities, recreation centers, and open spaces for all genders
- 3.4 *Guidelines for the Building-scale*: The guidelines detail the necessities for courtyards, building height, length, and depth, while considering the requirements of women's day-to-day activities
- 3.5 *Guidelines for the Dwelling Unit-scale*: Outline the measures concerning the design of an individual Dwelling Unit. These guidelines aim to provide the residents with a thermally comfortable indoor environment, adequate natural ventilation, and daylight

4. Implementation and Monitoring

This includes women ownership, participation of women in RWA/ governance bodies as well as involving women in the construction sector. See Figure 20[b]

Climate Responsive Strategies					
Thermal Comfort			Indoor Air Quality		
Stage	Scale	Incorporation Measure	Stage	Scale	Incorporation Measure
Design	Site	Optimizing Site layout to reduce heat transfer	Design	Dwelling Unit	Reduce the concentration of PM2.5 and PM 10
Design	Dwelling Unit	Providing appropriate ventilation	Design	Building	Provide fresh air and ventilation Use low VOC material
Post Occupancy	Dwelling Unit		Design	Site	Check AQI of prospective Site
Design	Building	Low-energy cooling technologies			
Appropriate building Orientation		Appropriately shading windows	Indoor Air Quality		
Massing		Optimize Wall to Window Ratio (WWR)	Stage	Scale	Incorporation Measure
Appropriate window placement		Reduce heat transfer through walls and roof	Design	Dwelling Unit	Ensure sufficient daylight
Indoor Air Quality			Design	Building	Site Orientation Appropriate window placement
Stage	Scale	Incorporation Measure	Design	Site	Optimizing the Site layout for Visual Comfort
Design	Site	Conserve Water			
Carbon Impact					
Embodied Carbon					
Stage		Scale	Incorporation Measure		
Construction		Site	Optimizing the Site layout for Visual Comfort		
End of Lifecycle		Site	Appropriate disposal Construction of waste		
Design		Building	Recycle and reuse material		
Construction		Building	Reduce material related embodied emissions		
Embodied Carbon					
Stage		Scale	Incorporation Measure		
Design		Site	Reduce electricity consumption	Reduce water consumption	Reduce wastewater discharge
Design		Building Dwelling Unit	Reduce electricity consumption	Reduce water consumption	Reduce electricity consumption

Figure 116: Climate Responsive Strategies

Climate Resilient Strategies					
Carbon Impact			Water Autonomy		
Stage	Scale	Incorporation Measure	Stage	Scale	Incorporation Measure
Design	Site	Heat wave resiliencer	Design	Site	Flood resilience
		Optimum thermal mass			Ensure thermal autonomy
Design	Building	Ensure water autonomy			Prohibit ground water usage

Figure 117: Climate Resilient Strategies






















Guidelines for Planning and Designing					
Site level selection and planning			Site level selection and planning		
 Proximity to public transport	 Mixed Land Use		 Decision making and governance	 Women ownership	
 Access to Social Infrastructure	 Access to Recreational spaces		 Women in Construction		
Design and Construction					
Site Level		Block Level		Dwelling Unit	
 Access to Site		 Building Block Orientation		 Gender centric design	
 Provision of common spaces		 Building Mass		 Dwelling unit typologies and layouts	
 Provision of open spaces		 Building Safety		 Envelope thermal performance	
 Provisions of social amenities				 Adequate lighting and ventilation	
 Water and Sanitation				 Water and solid waste service	
				 Enhanced safety	

Figure 118: Guidelines for Planning and Designing

- ❖ Policy level recommendations for Codes and Green Building Rating Programs (See Section 2.2)
- ❖ Performance evaluation of several walling, roofing, and fenestration technologies and their readiness for applicability in Green Affordable Housing. (See section 2.5)

Insights and Way Forward

Following are the actionable insights derived from this study:

- ❖ Need for prevailing Green Building Rating Programs to address gaps identified by the research
- ❖ Technical, financial, and governance related support for new and innovative construction materials
- ❖ HFCs to be an integral part of Green Affordable Housing financing models. The governance and administrative process for Green Affordable Housing needs to be simplified

The study, led by Rawal, Shukla, Asrani, Lakshmi Narsimhan, & Pathak (2022) and their team, reviewed India's Green Building Rating Programs, building codes, policies, and financial mechanisms. They suggest a shift to a performance-based approach for better sustainability. The study's deliverables aim to guide stakeholders in designing sustainable housing projects, inducing changes in financial and policy instruments, and sensitizing the sector to climate-related risks.

We suggest that the research undertaken, and work produced in this study could further be enhanced by the following future engagements:

- ❖ **Database:** Formulation of Green Buildings' operational and embodied energy databases. Relevant stakeholders, such as financing agencies, contractors, and designers, may be approached, and a common consensus be reached regarding data granularity, collection interval, and parameters needed. The collated databases could potentially improve building design and associated decision-making processes and enlighten areas for improving the operational performance efficiency of the current and upcoming housing stock
- ❖ **Green Building Rating Programs:** The existing Green Building Rating Programs could embrace a performance-based approach incorporating operational performance rating criteria and make themselves holistically more robust. The new generation Green Building Rating Programs would benefit from adopting a Whole Building Life Cycle Assessment (WBLCA) approach, which specifies energy and resource baselines that the building must be designed to achieve and showcase operational performance benchmarks for the same. A shift in the implementation methodology of Green Building Rating Programs is also vital. Green Building Rating Programs may benefit from devising an implementation strategy delineating the relevant stakeholders from various domains. Importantly, involving financing agencies in the project steering process would facilitate linking the technical and economic performance of the building
- ❖ **Policy-level discussions:** The policy-related recommendations illuminated by the study could be taken forward to stakeholder discussions. Using these recommendations, a push could be created for the Building and Construction sector to shift to a WBLCA approach that stresses overall embodied carbon reduction and demonstrates operational performance efficiency
- ❖ **Market transformation:** The consequences of the codes and Green Building Rating Programs' shift towards a performance-based approach would be a shift in the value chain and financing mechanisms of Green and Affordable housing projects. The financing agencies and Green and Affordable housing developing stakeholders could benefit from finding a common interaction platform – unifying the design, construction, financing, and administration domains. Their interaction would create a strong pull factor for Green and Affordable housing stock, where homebuyers could secure a larger loan for a sustainable home. The pull factor may further be augmented by organizing public dissemination sessions where prospective homebuyers could be made aware of Green Buildings and their benefits. These sessions may educate the homebuyers about the economic benefits of Green Buildings. Lastly, embracing a Public Private People Partnership (PPPP) model for upcoming Green and Affordable housing projects – making people crucial stakeholders in the housing design process, and unifying the efforts by private stakeholders like developers, contractors, designers, and financiers could facilitate bringing about a market shift

ANNEXURE A

Abhay Bakre is the Director General of BEE. A Post Graduate (M. Tech.) in Elect. Engineering from IIT, Kharagpur. He belongs to 1988 Batch of Indian Railways Electrical Engineering Services, Ministry of Railways. He has worked in several Railway projects including Delhi Metro & Kolkata Metro extension projects. He has also worked as Joint Development Commissioner in the Ministry of Micro, Small and Medium Enterprises and was Nodal officer for National Manufacturing Competitiveness Programme. As ED PCRA, Ministry of Petroleum & Natural Gas, he has been instrumental in development and implementation of various programs aimed at petroleum & energy conservation in industry, transport, domestic sector etc. Before joining BEE, he worked as Executive Director in the newly created Environment Directorate of Ministry of Railways. He was the nodal officer for developing INDC for the Railway sector along with a roadmap for Green House Gas reduction in Indian Railways. He also participated at the transport sector events of COP 21 held in Paris and COP 22 held in Morocco.



Abhay Bakre
Director General,
Bureau of Energy Efficiency



Ajay Jaiswal
Chief Operating Officer,
IIFL Home Finance Ltd.

He has over 14 years of work experience in various roles including Compliance, Internal Controls, Secretarial & Legal. Prior to joining India Infoline, he has worked with organizations like Edelweiss Retail Finance, Edelweiss HFC, Deutsche Postbank HFC & Marvel Vinyls Ltd.

He joined BHBFC in 1996 as a Senior Officer. As General Manager, Chowdhury has held important positions in various departments and offices of BHBFC as well as Managing Director (Extraordinary). He was awarded the Integrity Award in the financial year 2019-2020 in recognition of his honesty and efficiency in BHBFC. Arun Kumar Chowdhury graduated in 1st class from the Department of Statistics, University of Chittagong and obtained his post-graduate degree in 1st class from the same department.



Arun Kumar Chowdhury
Deputy Managing Director,
House Building Finance
Corporation, Dhaka,
Bangladesh



Ar. Ashok B Lall,
Principal Architect,
Ashok B Lall Architects

Ashok Lall, b. 1948, graduated from the University of Cambridge U.K. in Architecture Fine Arts and obtained the Architectural Association Diploma in 1970. His architectural firm (estd. 1981) is committed to an architectural practice based on the principles of environmental sustainability and social responsibility. It has won a number of awards and its work has been published widely. Engaged in architectural education since 1990, he has developed curricula and teaching methods to address.



Ashok Kumar
Deputy Director General,
Bureau of Energy Efficiency
(BEE), Ministry of Power

Dr. Ashok Kumar brings over two decades of invaluable expertise in the fields of energy efficiency, sustainable development, and policy formulation. As the Deputy Director General at the Bureau of Energy Efficiency (BEE), he is at the forefront of shaping policy and regulatory frameworks that drive energy efficiency and combat climate change.

With a distinguished career, Dr. Kumar has honed his skills in technical and economic analysis of energy technologies, providing critical insights into the intersection of technology and society. His intellectual and managerial acumen has been instrumental in guiding initiatives that promote sustainable development in the energy sector.

Dr. Kumar's work extends beyond borders, as he continues to influence global conversations on energy efficiency. His commitment to creating a greener, more sustainable future is evident in his dedication to advancing policies that foster innovation and environmental stewardship.

Prior to his stint with CSIR Rorkee, he worked as an Assistant Architect at NBM Associates, New Delhi, from June 1989 to June 1990. Throughout his career, Dr. Kumar made significant R&D contributions, completing about 100 Research & Consultancy Projects. These included designs for Navodaya Vidyalaya Complexes nationwide, Medical College in Haldwani, and disaster-resistant housing.

He contributed to key national R&D projects, led the SINP project, and organized the CSIR-UGC NET Exam. Dr. Kumar secured the Indo-US project on 'Improving Building Energy Efficiency' and supported national missions like Housing for All and Smart Cities.

Currently, Dr. Kumar is Principal Investigator for Indo-US, Indo-UK, and DST sponsored research projects. He supervises four Ph.D. scholars and two M.Tech. students.



Dr. Ashok Kumar
Ex. Scientist
(Energy Efficient Building
Technologies & Head –AcSIR



Ashraful Islam
Chief Town Planner,
Rajdhani Unnayan
Kartipakkha (RAJUK)
Dhaka, Bangladesh

Md Ashraful Islam is the Chief Town Planner of Rajdhani Unnayan Kartipakkha (Rajuk), having joined the organization in 2008 and rising through the ranks to assume the role of chief town planner. He holds a BURP degree from Bangladesh University of Engineering and Technology (BUET) and has received extensive training in urban redevelopment and comprehensive city planning from countries like Japan, South Korea, and the USA.

Ir. Ashwin Thurairajah is a Professional Engineer and Executive Director of GreenRE Sdn Bhd. He holds a Masters Degree in Electrical and Electronic Engineering from Imperial College, London and has more than 13 years of experience in engineering spanning building services, oil and gas and sustainable development.

Ir. Ashwin Thurairajah speaks frequently in workshops / seminars on the topics of green development and low carbon design. He has contributed to research papers pertaining to distributed generation and renewable energy solutions for residential applications.



Ashwin Thurairajah
Executive Director,
GreenRE, Malaysia



Ayushman Jain
Director,
Siddha Group

Ayushman Jain is the Director of Siddha Group, a prominent figure in the field of sustainable construction and development. His expertise lies in steering projects towards green certifications and integrating environmentally friendly practices into the construction industry. With a background in MSc from Westminster University, London, Ayushman brings a global perspective to his role at Siddha Group. His educational foundation combined with hands-on experience has equipped him with a deep understanding of green design principles and their practical implementation.

Bhavya Shetty, a Bachelor of Engineering in Construction Technology and Management, has been a trailblazer in the field since 2012. Stepping into leadership, she brings her unique ideas and talents to manage generations of dedication and hard work.

In 2005, Mr. M G Somashekar introduced monolithic construction to the government sector, aiming to provide fast-track, quality homes for economically weaker sections. Bhavya is inspired by this vision and has a strong desire to enhance the efficiency of this technology.

With a steadfast vision, Bhavya seeks to revolutionize housing in India by making monolithic construction more efficient to meet the substantial demand for housing in the country's near future. Driven by an unwavering passion for innovative and sustainable housing solutions, she is committed to elevating the quality of life through her work.



Bhavya Shetty
PG Shetty Constructions



Bidyut Saha
Senior Investment Officer,
Private Sector Operations,
ADB

A mechanical engineer from Bangladesh University of Engineering and Technology and a MBA from University of Dhaka. With over 25 years of work experience in origination of Investment Deals, Investment Risk Analysis, Corporate and Structured Finance, Bidyut has been involved in various projects towards Financial Sector Development. Prior to joining ADB, Bidyut worked with HSBC as Head of Risk Analysis Unit and Cash Management.



Autif Sayyed
Project Lead- Green
Buildings South Asia,
IFC- World Bank Group

Autif Sayyed, an accomplished green building and sustainability professional, holds a Master of Science degree from Arizona State University in Building Design with a focus on Climate Responsive Architecture. With a diverse background spanning private design firms, energy consulting firms, and global development organizations, Autif has established himself as a leader in sustainable design and development.

Throughout his career, Autif has been instrumental in the creation of millions of square feet of green floor area across multiple countries. His innovative approaches to sustainable design have not only transformed buildings but have also had a profound impact on communities and the environment.

Autif's expertise extends beyond project implementation; he has played a pivotal role in shaping green building regulations in five different countries. His contributions have been crucial in fostering sustainable practices and encouraging the adoption of environmentally friendly building standards on a global scale. With a passion for sustainability and a proven track record of success, Autif Sayyed continues to be a driving force in the green building industry, advocating for a more sustainable and eco-friendly future.



Ar. Chitra Vishwanath
Senior Architect & MD,
Biome Environmental
Solutions

Ar. Chitra Vishwanath, an esteemed architect with over two decades of experience, specializes in ecology and sustainable built practices. As the Principal Architect and Managing Director of BIOME Environmental Solutions, she has established herself as a leading expert in the field. Chitra Vishwanath's work revolves around the fundamental principle of harmony with the natural environment, focusing on passive design strategies to achieve optimal energy efficiency.

Throughout her career, Chitra Vishwanath has spearheaded numerous projects that demonstrate the practical application of sustainable design principles. These projects span residential complexes, institutions, and public spaces, showcasing her dedication to creating environmentally responsible and efficient structures. Chitra Vishwanath's expertise and advocacy for eco-conscious design have positioned her as a key influencer in the realm of sustainable architecture. Through her work at BIOME Environmental Solutions, she has effectively bridged the gap between architecture and environmental responsibility, inspiring others to prioritize sustainability in their designs.

Diane manages origination of both debt and equity investments in the region for Proparco. Since joining the French Development Agency in 2008, Diane held different positions within the group with a focus in Africa and has worked in numerous impactful sectors.

Before this posting in India, she held the position of Deputy Director of the French Development Agency (AFD) in Dakar (2017 – 2021), one of the important offices of AFD Group network. She has done all her studies at the French high school in Pondicherry (India) and she graduated with a MBA from the Nice business school.



Diane Jegam
Regional Director,
Proparco South Asia,



Ekta Mehra
Senior Specialist
KfW

Ekta Mehra is a Senior Sector Specialist at KfW, the German Development Bank, specializing in facilitating finance for Renewable Energy (RE) generation and Energy Efficiency projects. With over 15 years of experience in Investment Banking and Climate Finance, Ekta plays a crucial role in identifying and structuring projects that promote sustainable energy development.

In her role, Ekta collaborates with project developers and financial institutions to ensure successful implementation of renewable energy and energy efficiency initiatives. She brings expertise in financial analysis, risk management, and optimizing financing structures to support KfW's mission of promoting sustainable development and climate action.

Ekta's passion for environmentally sustainable initiatives led her from Investment Banking to Climate Finance. Through her work at KfW, she continues to contribute to the transition towards a low-carbon future and the advancement of clean energy solutions.



F.R. Khan
Managing Director, Building
Technology and Ideas Ltd.

Faizur Rahman Khan is the managing director of Building Technology & Ideas Ltd (bti). Mr. Khan completed his graduation from Bangladesh University of Engineering and Technology, the statement added. He also served Asset Developments & Holdings Ltd and ABC Real Estates JV as the managing director. He is also a member of the current advisory committee of the Real Estate and Housing Association of Bangladesh.

Gagan Sidhu is Director of the CEEW Centre for Energy Finance (CEEW-CEF) where his work is focused on advancing the energy transition in emerging economies. Gagan was previously Adviser to CEF in which capacity he provided support to the team in the areas of clean energy markets and the finance ecosystem. In parallel, he was also engaged in independently advising entrepreneurs and corporates on capital raising and deployment strategies in the renewable energy space. Prior to joining CEEW, Gagan was CFO of GMR Renewable Energy where he held responsibility over strategic finance, project finance and accounting functional areas, including relationship management with lenders, equity co-investors & rating agencies Gagan has also worked in the investment banking industry across multiple geographic locations (Tokyo, Singapore, London, Dubai & Delhi), where his various roles with leading European and Asian financial institutions covered M&A, capital markets, straight & structured lending and cross-sell. His writings on renewables finance and policy related topics have appeared in publications such as The Economic Times, Energetica, Financial Express, Infraline Plus, Renewable Energy World and Solar Quarter. Gagan holds a BA (Hons) degree in Economics from Delhi University's Shri Ram College of Commerce, and an MBA from Duke University.



Gagan Sidhu
Director Centre of Energy
Finance, CEEW



Gurneet Singh
Director Environmental
Design Solutions

Gurneet Singh (Director, Environmental Design Solutions) is an experienced sustainability and energy efficiency consultant, building performance diagnostics expert and educator and has led the energy efficiency team at EDS for nearly 15 years. His experience includes areas such as energy sector policy and regulatory implementations, techno-economic feasibility studies, energy performance contracting projects, LEED, and GRIHA certification projects. He specializes in Integrated Building Design; using simulation tools to assist in the design and delivery of energyefficient buildings predicting the performance of the daylight systems and energy-efficient cooling services.

Hoe Yun Jeong, a national of the Republic of Korea (ROK), holds a Master's degree in Business Administration from the University of Washington, USA, and a bachelor's degree in economics from Seoul National University, ROK. He has more than 23 years of professional experience, including over 12 years at ADB. He joined ADB in July 2009 as an Economist in the former Office of Regional Economic Integration (OREI). He moved to SARC in August 2014 as Senior Economist (Regional Cooperation) and was promoted to Principal Economist in December 2016. He transferred to India Resident Mission (INRM) in December 2018 as Principal Country Specialist and supported INRM's management in achieving record annual commitments. He currently works as Deputy Country Director in the INRM, assisting the Country Director in planning and implementing INRM's operations in line with evolving development needs and priorities. He closely coordinates its processing with sector divisions and India's Department of Economic Affairs. He also supports knowledge operations with a focus on aligning programs with corporate strategic and thematic priorities.

Prior to joining ADB, Mr. Jeong worked at the Ministry of Strategy and Finance of the Republic of Korea, where he held various roles in several bureaus, including Economic Policy, International Finance, and International Economic Affairs.



Hoe Yun Jeong
Deputy Country Director
ADB, India



Jaiprakash Shroff
Chairman, IGBC Pune Chapter, and Managing Director, ShroffGroup

Shroff is a gold medalist and completed his Bachelors in Civil Engineering from C.O.E.P in 1980 and subsequently also completed his Master in Business Administration in 1982. He also completed an L.L.B from ILS college. He has been awarded by various awards such as All India Achievers Award ,Glory of India Award presented by Institute of Economic Studies , National Award for E-Governance 2014-2015 for Skill Development in the Construction Sector, and award for outstanding contribution in role as Expert for Brick Laying at World Skill Competition from Ministry of Skill Development and Entrepreneurship, Govt. of India. He currently is the Chairman – IGBC Pune Chapter, Kushal – Credai Pune on the Board of Construction Sector Skills Council and Painting Sector Skills Council, Paint and Coating Sector Skills Council, Govt of India. He has been the past Chairman of Builder's Association of Pune ,Kushal, Rotary Club Pune Riverside, Constro 2009 and Abhinav Abhyantriki Sthapatya Kendra . Mr. J. P. Shroff is truly an educationalist and extremely passionate about Skilling in the Construction Sector. A multi- talented and a visionary he has contributed immensely in the fields of Construction, Skilling, Entrepreneurship and Sustainability.

Shri Lochan Sehra is a distinguished officer of the 2002 Gujarat cadre of the Indian Administrative Service (IAS). His career has been marked by a series of impactful roles in key districts and departments. Notably, he has served as the Collector of Vadodara, Mehsana, and Dahod, as well as the District Development Officer (DDO) in Surat and Bharuch districts. Shri Sehra's exceptional leadership and dedication to public service were recognized with the Best Collector award for Mehsana and the Best DDO award for Bharuch. His commitment to excellence and innovative approach to administration continue to leave a lasting impression in the realm of public governance.



Lochan Sehra
IAS – Municipal Commissioner, Ahmedabad, Gujarat, India



Mahmuda Alam
Co-Founder & Architect, Platform of Community Action & Architecture (POCAA), Dhaka, Bangladesh

Ar. Mahmuda Alam is the co-founder of POCAA which is a platform for exchange of knowledge formed with a dream to create a network of communities and professionals engaged in self-initiated community architecture. It's objective is to facilitate the interested communities to initiate their self-help community development with their available resources through the exchange of the academic knowledge and the living wisdom within their societal system using mapping as a tool.

Md. Nafizur Rahman holds a MS in Renewable Energy Technology, Climate, Energy Efficiency from the University of Dhaka, and a Bachelors in Architecture from the University of Asia Pacific. He has published many papers and articles around sustainable construction and eco-housing. At present, he is the Principal Research Officer with HBRI which is an autonomous research organization under the Ministry of Housing and Public Work, Bangladesh.



Md. Nafizur Rahman
Principal Research Officer, Housing & Building Research Institute (HBRI), Ministry of Housing and Public Works

Medapati Vishnuvardhan Reddy, the CEO and director of Tranquillo Holdings and Projects Pvt. Ltd., is the backbone of the company. With his strong entrepreneurial skills coupled with a great understanding of world-class construction techniques, he plays an important role in shaping Tranquillo as the next best building company in Hyderabad. Mr. Vishnu holds a Bachelor of Architecture degree from the esteemed Woodbury University, California, and is currently among the top architects in Hyderabad. His experience as an architect at the famed Gruen Associates, Los Angeles, and his exposure to world architecture, coupled with delivering projects with unprecedented finesse, distinguishes him from the run-of-the-mill architects.



Medapati Vishnuvardhan Reddy
CEO and Director, Tranquillo Holdings and Projects Pvt. Ltd.



Mischa Lentz
Senior Urban Development Specialist
Emerging Areas Team, Water and Urban Water Development Sector Office, Asian Development Bank

Dr. Lentz has over 14 years of banking and finance experience in developing countries. He was fund manager for ADB private sector concessional finance funds, carrying responsibility for implementing various, innovative blended finance transactions in Asia and the Pacific. He joined ADB from EBRD, where he was an Associate Director / Senior Banker opening EBRD's newest office in Lebanon and leading the cross-sector banking operations in the country. Prior to this post, he worked in EBRD's infrastructure team in London, Amman and Istanbul, where he led and closed a wide range of project finance and corporate transactions, focusing on private/PPP infrastructure projects. In addition to this role, he was managing EBRD's urban infrastructure equity portfolio. Before EBRD, Mischa was a Senior Consultant at PwC Germany, working on large scale corporate restructuring and distressed M&A transactions in Central and Eastern Europe.

Dr. Lentz is a German national and holds Masters in both Civil Engineering and Finance and a PhD (Dr.-Ing.) from Technical University Berlin.

With 27 years professional experience, Mohammad Hossain is a professional leader and was the Secretary, Institution of Engineers, Bangladesh (IEB) and Dhaka Centre. He is a member of Joint Steering Committee (JSC) for Bangladesh-India Cooperation in Power Sector. He led the Joint Working Group (JWG) for Renewable Energy (RE) Cooperation between Bangladesh and India. He is a Member of the Governing Board (GB) from Bangladesh in SAARC Energy Centre (SEC). He is also a member of the Taskforce for Policy & Legal Issue of South Asia Regional Initiative/ Energy (SARI/E), member of the D-8 Working Group on RE. He is a Member of Expert Group on Energy in UN-ESCAP. Mr. Mohammad Hossain graduated from Bangladesh University of Engineering and Technology (BUET). He obtained his MBA from IBA, Dhaka University. He also obtained a post graduate diploma in IHRD from Denmark.



Mohammad Hossain
Director General, PowerCell, Dhaka, Bangladesh



Mohammed Nazrul Islam
Asst. General Manager, House Building Finance Company Dhaka, Bangladesh

Md. Nazrul Islam, M.Com in Finance and Banking, started his career at Islam Bank Bangladesh Ltd. He went on to work with Alana Group, Karnaphuli Group, Islamic Finance and Investments Ltd., and joined National Housing Finance and Investments Limited as "First Assistant Vice President (FAVP)" in 2006. Currently he is working as "Vice President (VP)" and Head of Principal Branch. He received many trainings from Bangladesh Bank Training Academy, ICSMB and Islami Bank Training & Research Institute in his career.



Mohd Khairolden Ghani
Construction Research
Institute of Malaysia
(CREAM), Malaysia

Dr. Ghani is a part of the leadership team at CREAM Malaysia. Construction Research Institute of Malaysia (CREAM) is a leading-edge research institute for technology innovations in the construction industry. It is a one-stop centre for product inspection, testing and certification services. It aims at elevating safety, health, environment and quality of the construction industry and unifies construction industry players from public and private sectors, both local and international

Mohua Mukherjee has had a long and distinguished career at the World Bank in development policy and investment lending. She headed the USD 1 billion India solar energy program from 2014-2017. Mohua has served as team leader of sustainable development projects in 44 countries in nine different sectors. More recently she served as Program Ambassador at the International Solar Alliance, as a member of the founding team.

Mohua is an economist, banker and climate finance/ESG professional by training, at Boston University and Harvard University. Her recent specialization is Public Private Partnerships that will deliver India's climate goals. Mohua has numerous publications in energy and finance journals and has authored three books.



Mohua Mukherjee
Senior Research Fellow of
Oxford Institute of Energy
Studies, Independent Director,
IIFL HFL



Monu Ratna
Executive Director & Chief
Executive Officer,
IIFL Home Finance Ltd.

An architect (BArch) and a postgraduate in management, Monu has over 24 years of experience in leading business growth across leading banks and NBFCs such as HDFC Ltd., ICICI Bank and IndiaBulls Housing Finance. He aims to build IIFL Home Finance into a fintech, green affordable housing finance company that believes in impact creation, financially and socially. He is the pioneer of KUTUMB, IIFL HFL's flagship green building platform. Under his leadership, IIFL HFL, one of the largest growing AUMs in the industry, has become a large-scale HFC in the housing industry, trying to resolve the housing problem in the country, by focusing on affordable housing.

Nasim Baten has been working at DBH for the last 24 years. He has more than two decades of experience in the housing finance and real estate industry. Nasim completed his BBA and MBA from Institute of Business Administration (IBA) of University of Dhaka. He attended various local and overseas trainings in England, Ireland, Singapore, Thailand, India, and Bangladesh. He is a member of Old Faujian Association, IBA Alumni Association and Cadet College Club Ltd.



Nasimul Baten
Managing Director & CEO,
DBH Finance PLC Dhaka,
Bangladesh



Neha Kumar
Head, South Asia Programme,
Climate Bonds Initiative

Neha Kumar drives policy, strategy, and partner programmes to scale up the green bonds market and sustainable financial ecosystem. Her efforts are targeted at building policy mechanisms, market infrastructure and capacities to accelerate financing for green, just and resilient transition. She has also served on the Ministry of Finance Working Group on Sustainable Finance Taxonomy Development and international ESG standard-setting bodies. She is trained in international diplomacy, politics and science and holds an M.Phil. from Jawahar Lal Nehru University, India. She is also a Senior Research Fellow with the ODI.

Nirmal Jain holds an MBA from IIM Ahmedabad, excels as a rank holder Chartered Accountant, and is a Cost Accountant. Commencing his professional journey in 1989 at Hindustan Lever Limited (HUL), the Indian subsidiary of Unilever, he established Probity Research and Services in 1995, later rebranded as India Infoline Limited (IIFL). This venture marked one of the pioneering independent equity research firms in India. With his astute leadership, the IIFL Group has flourished into a prominent and diversified entity within the financial services sector.



Nirmal Jain
Founder & chairman,
IIFL Group



Poorva Keskar
Director
VK:eenvironmental

Director Poorva Keskar is an architect, environmental designer, educator and an author of articles and research papers on the practice of Environmental Design and Management.

With an extensive professional experience of 22 years, she has worked on diverse projects of varying scales and complexities. Poorva spearheaded the structuring of syllabus for Masters program in Environment Architecture, University of Pune and also headed this Masters Program at BNCA, till 2012.

She was among the first few to get qualified as LEED AP and GRIHA Evaluator and Trainer in India. She is also a facilitator for Global Reporting Initiative, Amsterdam. Poorva has served as an Environment and Energy expert on various Boards and Committees at local and National level.

Pradeep Ramakrishnan is a graduate in Commerce and a qualified company secretary. He worked in the secretarial department of Madras Fertilizers Limited, Chennai during 1999-2000 and as a Company Secretary of Kothari Petrochemicals Ltd., Chennai, a Listed Company, during 2000-2002.

He joined SEBI in February 2002 at Head Office, Mumbai. Initially starting off with the Primary Market Department, he worked at the Southern Regional Office of SEBI from 2008-15, after which he commenced his second stint at the head office.

He was working in the Corporation Finance Department at SEBI in-charge of issue, listing, corporate governance, BRSR, ESG, compliance and monitoring functions from 2015-2020. He is presently handles issue and listing of corporate bonds at the Department of Debt and Hybrid Securities handling corporate bonds, green finance and municipal bonds.



Pradeep Ramakrishnan
General Manager,
Department of Debt &
Hybrid Securities
(DDHS) | (SEBI)



Dr. Preetha R Sajin
Director of School of
Planning and Development,
Sushant University

Dr. Preetha Sajin is an Architect and Urban Planner specializing in Housing with over 21 years of practical and teaching experience, both nationally and internationally.

Throughout her career, Dr. Sajin has undertaken planning projects focusing on area planning, zonal planning, disaster mitigation, and tourism circuit plans, all aimed at enhancing the socio-economic development of local communities. She also gained valuable international experience during her time working in London, where she taught at a leading design school and collaborated with local architects.

Dr. Sajin is a trained Building Information Modeling (BIM) professional and holds certification in differentiated learning pedagogy. Since 2011, she has been associated with SU, where she has extensive experience teaching both bachelor's and master's students of architecture and planning.



Priya Sunder
Senior Investment Officer,
Private Sector Operations
Asian Development Bank
(ADB)

Priya has an extensive 15-year tenure in the financial services industry. Her role entails originating and structuring debt and equity transactions within the financial institutions' sector across South Asia. Before her tenure at ADB, Priya garnered experience at distinguished organizations such as India Ratings (Fitch Group), CRISIL (GR&A), and Avendus Securities. She holds a B.Tech from IIT Madras, an MBA from IIM Calcutta, and is a Chartered Financial Analyst (USA).

Shri Rahul Bhawe is a senior banker with extensive experience in commercial banking, particularly in the areas of supervision, refinance, risk management, and IT. He has contributed significantly to promoting a robust housing and housing finance system in India during his tenure at the National Housing Bank. In addition to his role as Executive Director at the National Housing Bank, he has also showcased his expertise in retail operations and has served on various committees established by the RBI and IBA. Shri Bhawe holds an MBA in Public Management & Policy from IIM, Ahmedabad, and is a qualified CAIIB professional with over 24 years of experience in commercial banking.



Shri Rahul Bhawe
Executive Director,
National Housing Bank

Rajan Rawal is a Professor at CEPT University and a senior advisor at the Center for Advanced Research in Building Science and Energy (CARBSE), CEPT Research and Development Foundation (CRDF). He served as the Executive Director of CARBSE from 2006 to 2021. His influence spans national and international spheres, where he actively contributes to shaping energy policies and standards.

Internationally, Rajan leads collaborative efforts such as the Indo-US Joint Clean Energy R&D Centre and spearheads initiatives like the Global Cooling Prize, showcasing his commitment to global sustainability challenges. As a representative of India, he contributes to forums like the Mission Innovation Affordable Heating and Cooling Innovation Challenge, advocating for innovative solutions. At the forefront of building performance simulation, Rajan serves as the member secretary of IBPSA's India chapter, driving advancements in simulation technologies. His advisory roles in esteemed organizations like AEEE and DA, coupled with his editorial contributions to the Journal of Building and Cities, further cement his influence in the field. Recognized as a Fellow by both ASHRAE and IBPSA, Rajan's expertise is acknowledged globally, earning him the distinction of an ASHRAE Distinguished Lecturer for his significant contributions to energy-efficient building practices.



Rajan Rawal
Senior Advisor, Center for
Advanced Research
in Building Science and
Energy (CARBSE) |
CRDF Professor,
CEPT University

A Chartered Accountant by profession, he has been instrumental in the group's success. With a dynamic and multi-talented personality, Ravi possesses exceptional communication and interpersonal skills, guiding his team to repeated successes. He holds a Post Graduate Diploma in Business Management, specializing in Sales, Marketing, and Finance. Since assuming his role in 2013, Ravi oversees Finance, fund raising, legal matters, overall business development, planning, sales, and Customer Relations Management of the Company.



Ravi Aggarwal
Co-founder and Managing
Director Signature
Global Group

Ravi Chaudhary, a graduate of the Dept of Civil Engineering at IIT Roorkee, is a dedicated environmental enthusiast. With a robust background spanning over 12 years in the Mortgage Industry, Ravi has excelled in various domains including Collateral Risk Evaluation & Management, Best Use Study, and Market Research. His rich professional journey includes tenures at esteemed organizations such as Synergy, ICICI Bank, and L&T Finance. Currently serving as the Head of Technical at IIFL Home Finance Limited (IIFL HFL) for over five years, Ravi leads the technical wing of construction finance, demonstrating his expertise in the field. His commitment to environmental sustainability is evident through his involvement in the 'Green Value Partner' Programme since its inception, showcasing his dedication to promoting eco-friendly practices within the industry. Ravi's multifaceted experience and passion for environmental conservation position him as a valuable asset to both his organization and the broader community.



Ravi Chaudhary
Head Technical,
IIFL Home Loans



Rupesh Agarwal
Managing Director,
SARA Group

A dynamic leader with a strong educational background, Rupesh joined the business in 2005 after completing his Diploma in Civil Engineering in 2002 and B.Sc. (Honours) from Buckingham University, UK in 2004. He oversees all engineering aspects, actively participates in the planning processes, and contributes to the legal department. His revolutionary ideas have made a significant impact on the industry, leveraging architectural concepts and the latest technologies to give the business a competitive edge in the market. His relentless dedication ensures the highest quality of construction and timely project delivery.

A dynamic leader with a strong educational background, Rupesh Shri Sarada Kumar Hota, a Post-Graduate in Agricultural Science, is a senior banker with 29 years of commercial banking experience having served across the country and was General Manager of Canara Bank till June 27, 2019. He was also the Circle head of Nagpur and Jaipur Circles of Canara Bank for 3 years followed by a brief stint in the Recovery Wing of the Bank at Head Office. Apart from his expertise in retail operations, he also carries with him the experience of working in the areas of Human Resources, Strategic Business Planning and Profit Planning at the Head Office of the Bank.

Shri Sarada Kumar Hota has been appointed as the Managing Director of National Housing Bank (NHB) w.e.f. June 27, 2019. Before joining NHB, Shri Hota was the Managing Director & CEO



S K Hota
Managing Director,
National Housing Bank



S. Sridhar
Chairman, IIFL Home
Finance Ltd. | Ex - Managing
Director - NHB

Srinivasan Sridhar is the Chairman and an Independent Director on our Board of Directors. He holds a Bachelor's degree in science from Bangalore University and a master's degree of science in physics from the Indian Institute of Technology, Delhi. He has previously worked in the banking and finance industry and has held several positions in retail, corporate, and export / import banking, including as the chairman of the National Housing Bank and Central Bank of India. While he was chairman and managing director of the National Housing Bank, he was responsible for a number of initiatives, such as the NHB Residex, Rural Housing Fund, and Reverse Mortgage for senior citizens. Prior to this, he was associated with the Export Import Bank of India as executive director. He is a certified associate of the Indian Institute of Bankers and was conferred with honorary fellowship of the Indian Institute of Banking and Finance in recognition of his contribution in the field of banking and finance.



Sachin Sharma
(IGBC Western UP Chapter)
Project Director, Wave
Infratech,

Sachin Sharma (IGBC Western UP Chapter) is presently the Project Director with Wave Infratech, the real estate arm of the Wave Group. He is handling the development of an upcoming integrated mixed-land-use township on NH-24 and commercial projects in Noida. Sachin has a master's degree in management from New Delhi and has more than 15 years of experience in planning, execution, construction, development, and operations of urban projects, infrastructure, and the energy sector.

Sandeep Virmani is a founding member and the Executive Vice Chairman of Hunnarshala Foundation. With a background in architecture, he has dedicated the past three decades to initiatives involving sustainable housing, water conservation, organic farming, renewable energy, nomadic communities' living conditions, and natural resource management.

Within Hunnarshala, Sandeep has spearheaded projects focused on sustainable post-disaster housing for the underprivileged. These projects engage local artisans and leverage local materials and technologies. His commitment to community development extends to his roles as a founding member of several organizations, including Satvik, Arid Communities and Technologies (ACT), and Kutch Navnirman Abhiyan, a collective encompassing 38 rural development organizations across 650 villages.

Additionally, Sandeep Virmani serves on the Board of Directors of Sahjeevan, an organization dedicated to promoting commons-based livelihoods in Gujarat. Through his multifaceted roles and dedication to sustainable practices, he continues to make a significant impact on the lives of individuals and communities in the region.



Sandeep Virmani
Founder, Hunnarshala
Foundation

Sanjay Seth is Senior Director of the Sustainable Habitat Division with The Energy and Resources Institute (TERI). He is also the Chief Executive Officer of GRIHA Council which administers the Green Rating for Integrated Habitat Assessment. Prior to joining TERI, he worked with the Bureau of Energy Efficiency, Ministry of Power, Government of India and headed the vertical on Building Energy Efficiency.

He was also the interim Secretary of the Bureau of Energy Efficiency and responsible for the administration and financial management of the organization. In this capacity, he provided oversight to the implementation of policies and programmes of BEE as well as the National Mission on Enhanced Energy Efficiency (NMEEE), and all international bilateral/multilateral cooperation programmes. He also represented BEE on the Board of Energy Efficiency Services Limited (EESL) as Director. He joined BEE in 2007, with the introduction of the 'Energy Conservation Building Code (ECBC)', and was given the responsibility of developing an enabling framework for facilitating its implementation in a consistent manner throughout the country.

By training he is a Civil Engineer and has more than twenty eight years of experience in the power sector of which the last nine years have been on the Demand Side. Prior to joining the Bureau, he has worked in various capacities in a Central Public Sector Generating company, under the Ministry of Power and was associated with planning, monitoring, co-ordination and construction management of Hydro and Thermal power projects.



Sanjay Seth
Senior Director, Sustainable
Habitat Division, The Energy
and Resources Institute
(TERI) | CEO, GRIHA Council

Saswat is currently Professor at the Faculty of Planning, CEPT University. He has over 25 years of experience in the Urban Development sector in the South Asian region with a focus on Sustainable Urban Development, Climate and Disaster Risk Reduction, Integration of Land use and Infrastructure, Nature-Based Solutions and the management of Historic Cities.

Saswat has spearheaded several Climate and spatial planning related research work such as GIZ supported Sustainable Urban Development and Smart Cities, Government of Gujarat supported Regional Climatic Variability Studies, Risk-Informed Urban development and Building Regulations, Mainstreaming Nature-Based Solutions in Urban areas, among many others.

He has been extensively involved in several pan-Asia pilot initiatives such as Asian Development Bank Green Cities Toolkit in Asia, Cities Development Initiative for Asia (CDIA) Localisation of City Infrastructure Investment Prioritization and Programming (CIIPP) Toolkits in India & Nepal, piloting of World Bank Supported Cultural Heritage and Tourism Assets based City Development strategies and Sustainable Tourism Assessment Toolkit for India.

He holds a Bachelor's degree in Civil Engineering and a Master's in Urban Planning and Infrastructure Management. His PhD focuses on Climate Change and Urban Vulnerability in India.



Saswat Bandyopadhyay
Project Director, Centre
of Urban Planning and Policy
(CUPP), CEPT Research and
Development Foundation



Sean Kidney
CEO, Climate Bonds
Initiative

Sean Kidney is CEO of the Climate Bonds Initiative, an international NGO, working to mobilize global capital for climate action. Projects include a green bond definitions and certification scheme with \$34 trillion of assets represented on its Board; working with the Chinese central bank on how to grow green bonds in China; market development programs in Brazil, Mexico, ASEAN and Africa; and market tracking services for the green bonds industry. He is a member of the European Commission's Platform on Sustainable Finance, and was a member of its predecessors, the 2017 EU High Level Expert Group on Sustainable Finance and the EU Technical Expert Group on Sustainable Finance. He is also a member of green finance committees in China, India, Mexico and Kazakhstan. Sean is also a Professor in Practice at SOAS University of London.

Dr. Sejal Patel is Professor and Program Chair, Master of Urban Housing and Head, International Office, CEPT University. With more than 25 years of experience, she has engaged in professional practice, research and academics in housing policy and projects, participatory urban governance, and urban planning and legislation.



Dr. Sejal Patel
Professor and Program
Chair, Master of Urban
Housing at CEPT
University



Md. Shaheen Iqbal
Deputy Managing Director,
BRAC Bank Limited

Md. Shaheen possess excellent analytical skill, in depth knowledge and experience in Treasury, Capital Markets, Asset Liability Management and Financial Institutions. Prior to joining BRAC Bank, he worked with Dutch Bangla Bank. Md. Shaheen is a CFA and a MBA from the University of Dhaka.



Shailesh Kumar Agrawal
ED, Building Materials &
Technology Promotion
Council (BMTPC)

Having 19 years of experience, Shailesh is committed to provide S&T backup to all areas of building science and technology through continued R & D with quality objectives in applied research, societal based R&D programmes, resource generation, and publications & patents. His professional contribution can be classified in four discipline of Building Science & Technology, viz. Earthquake Engineering; Repair, Rehabilitation & Earthquake Resistant Construction; Computer Aided Structural Analysis & Design; Distressed Buildings.

Shaleen is a Fellow of the Higher Education Academy, United Kingdom and had been a Visiting Fulbright Fellow at the Yale University in 2018. Dr Singhal also works with The Nature Conservancy, India as Head of the Indian Collaborative for Applied Sustainability Solutions (ICASS) being established with support from the Tata Trusts to strengthen the Science-Policy Practice Interface in India. He has over 25 years of research, consultancy, teaching and academic administration experience. His research relates to climate change, sustainable smart cities, sustainable consumption, urban redevelopment, and public policy and planning. His PhD from Ulster of University, UK (now Ulster University) received the Global Emerald/EFMD Outstanding Doctoral Research Award 2009 and the Best Thesis in Built Environment, University of Ulster, Faculty Award 2009. He had worked as a lecturer in Sustainability Design at the School of the Built Environment, University of Ulster. He is a founding member of the International Universities Climate Alliance, member of the Global Urban Competitiveness Project Council, US, and board member of the ProSPER.Net alliance in the Asia-Pacific region.

Dr Singhal has successfully led several multi disciplinary research and consultancy assignments focusing on India and other developing countries. He had been the Principal Investigator of the EU-UNEP funded Switch Asia initiative on Sustainable Consumption and Production (SCP); and the Indian Lead Collaborator of the Indian European multi-level climate governance research networking programme. Inter-disciplinary research by him and his PhD scholars, examines the challenges and solutions for cities. He had pioneered in structuring first-of-its-kind MTech programme on Urban Development Management in India; and the first masters' course on Sustainable Consumption and Production with emerging economies perspective for civil servants and professionals. Prof. Singhal contributes as an external Ph.D. examiner, doctoral research committee member and guest faculty at leading architecture and planning schools in India. He provides intellectual leadership and advances the frontiers of research through partnerships with leading institutions globally.



Prof. Shaleen Singhal
Dean, TERI School of
Advanced Studies (SAS),
India



Shounak Ray
Business Development
Lead, International Finance
Corporation

Shounak Ray, an IIM Kozhikode alumnus, brings over two decades of expertise to his role as Business Development Lead at the International Finance Corporation (IFC). He spearheads efforts in the Green Building Program, aiming to bolster the green building sector through regulatory enhancements, voluntary standards, capacity building, and investment opportunities.

As an advocate for sustainable development within the International Finance Corporation (IFC), Shounak Ray spearheads initiatives such as EDGE certification. By championing this certification program, he actively promotes sustainable design practices across various asset classes, ranging from commercial buildings to residential complexes. Shounak's strategic leadership is instrumental in driving the widespread adoption of environmentally conscious approaches.



Susan Olsen
Unit Head, Private Sector
Financial Institutions
Division Asian
Development Bank

Susan heads the Private Sector Financial Institutions Division Unit for South Asia, based in New Delhi India. Prior to joining ADB, she was Lead Specialist for the Financial Institutions Division of IDB Invest, leading debt and equity operations across Latin America and the Caribbean. Her areas of expertise in the financial sector range from microfinance, SME, Affordable Housing and green finance, and include product expertise in local currency structures, complex multi-stakeholder syndications, as well as risk sharing and guarantee products. Susan was also previously Lead Specialist for the "Opportunities for the Majority" program, a flagship initiative of the Inter American Development Bank to scale innovative private business models serving base of the pyramid markets. Susan holds the Chartered Financial Analyst (CFA) designation, as well as Master's Degrees from the Norman Paterson School of International Affairs (Canada) and the College of Europe (Belgium). She is certified by the Canadian Securities Institute.

Syed has over 20 years of experience in the banking sector. He started his career as Management Trainee in the Credit Division of Southeast Bank Limited in 2000. He joined IDLC Finance Limited in 2001 in the Corporate Division. He went on to serve Standard Chartered Bank in its Corporate Banking Division. He rejoined IDLC and worked in the Consumer Division prior to joining HSBC Bank where he worked as Head of Global Trade and Receivable Finance until 2016. He rejoined IDLC again in 2016 as Head of Consumer Division.



Syed Javed Noor
Deputy Managing Director,
IDLC Finance Ltd.



Takeo Konishi
Director General, South
Asia Department
Asian Development Bank
(ADB)

Takeo Konishi has over 27 years of experience, with 24 at the Asian Development Bank (ADB). He holds a master's degree in public and international affairs from the University of Pittsburgh, US, and a bachelor's degree in political science from Lynchburg College, US.

Since joining ADB as a Young Professional in 1999, Mr. Konishi has held various roles, currently serving as Country Director for India since September 2020. In India, he achieved program objectives, led the 2023–2027 country partnership strategy, and strengthened government relationships.

During India's G20 Presidency, ADB supported key working groups. Mr. Konishi's inputs shaped the G20 Leaders' Declaration. He focuses on climate change, sustainable cities, energy transition, climate-health nexus, and women's empowerment.

Previously, Mr. Konishi was Director of ADB's SARD Public Management, Financial Sector, and Trade Division, and Country Director for Uzbekistan. He has also consulted for the Inter-American Development Bank and PADCO (now AECOM International Development) in the US.



Vishal Goyal
General Manager, National
Housing Bank, India

Shri Vishal Goyal is a Graduate from Delhi College of Engineering, Delhi University and holds Master's degree in Business Administration from the Faculty of Management Studies(FMS). He has 30 years of Working Experience with NHB in various functions such as Credit Department, Market Research Consultancy & Policy Department, Business planning and Promotion Department, Corporate Communications and Training Department, etc. He has also headed the Secretariat of the Asia Pacific Union for Housing Finance (APUHF) on behalf of the NHB.

Yamal Vyas is a Chartered Accountant – all India Merit Rank holder in CA Final examination and a Company Secretary with more than 38 years of post-qualification experience in Auditing, Corporate Finance, Development Finance, Personal Finance, Capital Market and Corporate Laws. He was a Full time Member of Gujarat State Third Finance Commission from 2011 to 2015 and was Government Nominee on the Central Council of The Institute of Company Secretaries of India for two terms. He was also Member, Fee Fixation Committee for B.Ed., M.Ed., B.P Ed., M P Ed Colleges in Gujarat for 10 years and was also a Member of Special Committee on Media of Government of Gujarat. He has been an Independent Director on the Boards of Government companies like Gujarat State Financial Services, Gujarat State Seeds Corporation, Gujarat State Investments Ltd. in the last 7 years.



Yamal Vyas
Director, National Housing
Bank



**Prof. Zebun Nasreen
Ahmed**
Bangladesh University of
Engineering and Technology
Dhaka, Bangladesh

Architect-Professor Dr. Zebun Nasreen Ahmed, former Dean, Faculty of Architecture and Planning, Bangladesh University of Engineering and Technology, has been teaching at the BUET Department of Architecture, in Dhaka, since 1988, from where she got her B.Arch degree. She completed her M.Phil in 1987 from Sheffield City Polytechnic, UK, and her PhD in 1994 from De Montfort University, Leicester, UK. Her area of specialization for both these degrees was on aspects of building-climate interactions, particularly focusing on the thermal and luminous environments. She has numerous national and international publications in reputed journals and proceedings around the World, and has presented her work in several countries. Dr. Ahmed is a Core member of the Green Architecture Cell at the Department.

Zeenat Niazi is the Sr. Vice President and Chief Knowledge Officer at Development Alternatives Group. With a background in architecture, she focuses on sustainable development, climate change, and natural resource management. Zeenat specializes in building resilience in human settlements through Sustainable Consumption and Production (SCP) strategies, especially green and inclusive circular economy models.

Currently pursuing a Ph.D. in reciprocal learning systems and nature-based solutions for urban resilience, she teaches Sustainability and the Built Environment at Anant National University, Ahmedabad. Zeenat is a member of the Multi-stakeholder Advisory Committee (MAC) for UN's One Planet Network Sustainable Buildings and Construction Programme and the Steering Committee of the Green Economy Coalition (GEC) in India. She chairs the Task Force on Green and Inclusive Circular Economy for Angul District, Odisha, and is a member of committees focusing on rural housing and prefabricated materials for the Bureau of Indian Standards. Previously, she co-chaired the Board of the Climate Action Network South Asia and served on various task forces for the Ministry of Rural Development and NITI Aayog, Government of India.



Zeenat Niazi
Vice President,
Development Alternatives

ANNEXURE B

Testimonials

IIFL HFL reached out to selected participants to provide us with testimonials after a few months of the trainings

TESTIMONIAL FOR DESIGN FOR SUSTAINABLE AFFORDABLE HOUSING

"I attended the training pertaining to Design for Sustainable Affordable Housing. Professionally, as our company is funding and putting efforts in green building activities, this training helps me in taking initiatives from technical departments either in policy making or implementations. Getting an awareness and teaching this back to others is a good way of learning for us. Personally, these sessions made me understand there is another wing which needs to be investigated in my career pathway which is also related to this real estate sustainable valuations. Furthermore, I have tried to attend the webinars related to EGBC and want to get certification. Hope, in the coming future our company allows us to participate and be certified in such sustainable related courses."

T M M Bharadwaj
Regional Technical Manager, IIFL HFL

TESTIMONIAL FOR POLICY LANDSCAPE FOR GREEN AFFORDABLE HOUSING FOR WOMEN

"First and foremost, I would like to commend the entire team for organizing such an insightful and valuable training program. The content and structure of the program were exceptional, providing a comprehensive understanding of the policy and its shortcomings in different states of India. This comprehensive overview helped to shed light on the challenges faced by women in accessing affordable and eco-friendly housing options. By highlighting these gaps, the training program enabled me to better comprehend the current policy landscape and the urgent need for improvement. I must also mention the policy landscape matrix that was provided as part of the training materials. This matrix was exceptionally detailed and served as a valuable resource throughout the program. It allowed me to visualize and understand the interconnectedness of various policies, making it easier to navigate the complex policy landscape. Additionally, the hands-on exercise provided during the program was an excellent way to apply the knowledge gained throughout the sessions. It allowed us to actively participate and experience the process of policy implementation, further solidifying our understanding of the subject matter."

Mihir Lekhadia
Technical Analyst, GUJRERA

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LIST OF ABBREVIATIONS (1)



- ❖ ADB: Asian Development Bank
- ❖ AAC: Autoclaved Aerated Concrete
- ❖ AFOLU: Agriculture Forestry and other Land Use
- ❖ AIILSG : All India Institute of Local Government
- ❖ BFD: Bidirectional Forwarding Detection
- ❖ BEE: Bureau of Energy Efficiency
- ❖ BMTPC: Building Materials and Technology Promotion Council
- ❖ Bn: Billion
- ❖ BREEAM: Building Research Establishment Environmental Assessment Methodology
- ❖ CEEW: Council on Energy, Environment and Water
- ❖ CEO: Chief Executive Officer
- ❖ CEPT: Centre for Environmental Planning and Technology
- ❖ CII: Confederation of Indian Industry
- ❖ Cr: Crore
- ❖ CRDF: CEPT Research and Development Foundation
- ❖ CREAM: Comprehensive Retrofit Energy Audit and Management
- ❖ CSR: Corporate Social Responsibility
- ❖ CUPP: Centre for Urban Planning & Policy Development Alternatives
- ❖ CEEW: council on energy, Environment and Water
- ❖ CPR: Centre for Policy Research
- ❖ CO₂: Carbon Dioxide
- ❖ CSEB: Compressed Stabilized Earth Blocks
- ❖ DDHS: Department of Debt & Hybrid Securities
- ❖ DFC: Delhi Financial Corporation
- ❖ DFI: Development Financial Institutions
- ❖ DIY: Do It Yourself
- ❖ DNA: Deoxyribonucleic Acid
- ❖ EC: Environmental Clearance
- ❖ ED: Executive Director
- ❖ EDGE: Excellence in Design for Greater Efficiencies
- ❖ ENS: Eco Niwas Sanhita
- ❖ ESG: Environmental, Social, and Governance
- ❖ EV: Electric Vehicle
- ❖ EWS: Economically Weaker Section
- ❖ FAR : Floor Area Ratio
- ❖ FSI: Floor Space Index
- ❖ G+4: Ground + 4 Floor (a Building with a Ground Floor Plus Four Additional Floors)
- ❖ GAH: Green Affordable Housing
- ❖ GB: Green Buildings
- ❖ GBRA: Green Building & Rating Agencies
- ❖ GHG: Green House Gases
- ❖ GRIHA: Green Rating for Integrated Habitat Assessment
- ❖ GVP : Green Value Partner
- ❖ GST: goods and services tax
- ❖ HAP: Heat Action Plans
- ❖ HBRI: Housing and Building Research Institute
- ❖ HFC: Housing Finance Companies
- ❖ IBA : Institute of Business Administration
- ❖ ICLEISA: International Council for Local Environmental Initiatives
- ❖ IPPU: Industrial Processes and Product Use
- ❖ IGBC: Indian Green Building Council
- ❖ IIFL HFL: IIFL Home Finance Limited
- ❖ Insulation U Value: The U-value (or U-factor) is a Measure of How Well a Building Material Conducts Heat. It Represents the Rate of Heat Transfer Through a Material, with Lower U-values Indicating Better Insulation.
- ❖ KSS ISPER: Kanwar Surjit Singh Institute for Spatial Planning and Environment Research, India
- ❖ KFW: Kreditanstalt Für Wiederaufbau (German for "Reconstruction Credit Institute")
- ❖ KGS: Kilograms
- ❖ KPIs: Key Performance Indicators
- ❖ LEED : Leadership in Energy and Environmental Design
- ❖ LIG: Lower Income Group

LIST OF ABBREVIATIONS (2)



- ❖ MTCO₂: Meitnerium Carbon dioxide
- ❖ MD: Managing Director
- ❖ ML: Mega Litre
- ❖ MWH: Megawatt per Hour
- ❖ NAP : National Adaptation Plan
- ❖ NSTI : National Skill Training Institute
- ❖ NDC: Nationally Determined Contributions
- ❖ NHB: National Housing Bank
- ❖ PID: Project Information Document
- ❖ PMAY: Pradhan Mantri Awas Yojana
- ❖ POCAA: Pre-Occupancy Comprehensive Assessment and Audit
- ❖ PPP : Public-Private Partnership
- ❖ PROF : Professor
- ❖ PV: Photovoltaic
- ❖ ROI: Return on Investment
- ❖ RCC: Reinforced Cement Concrete
- ❖ RWA: Residential Welfare Association
- ❖ SAPCC: State Action Plan on Climate Change
- ❖ SEC: SAARC Energy Centre
- ❖ SGU: Single Glazing Unit
- ❖ SHS: Solar Home Systems
- ❖ SLCP: Short-lived Climate Pollutants
- ❖ SME: Small and Medium Enterprises
- ❖ SDGs: Sustainable Development Goals
- ❖ SEBI: Securities & Exchange Board of India
- ❖ SPARC: School for promotion of Area Resource Centres
- ❖ SQM: Square Meters
- ❖ TNA: Training Needs Analysis
- ❖ TRL: Technology Readiness Levels
- ❖ TA: Technical Assistance
- ❖ TCO₂: Metric Tonnes of Carbon Dioxide
- ❖ Tn: Trillion
- ❖ ULB: Urban Local Body
- ❖ UDCPR: Unified Development Control and Promotion Regulations
- ❖ UNEP: United Nations Environment Programme
- ❖ USP: Unique Selling Point
- ❖ VGF: Viability Gap Funding

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