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ASIA LOW CARBON BUILDINGS TRANSITION PROJECT

Life Cycle Assessment for Transitioning to a Low-Carbon Economy

Financing the Building Sector Decarbonization

India Country Report

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ASIA LOW CARBON BUILDINGS TRANSITION PROJECT

Life Cycle Assessment for Transitioning to a Low-Carbon Economy

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Global Green Growth Institute
Jeongdong Building 19F
21-15 Jeongdong-gil
Jung-gu, Seoul 04518
Republic of Korea

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Acronyms and Abbreviations

ALCBT	Asia Low Carbon Buildings Transition
BEE	Bureau of Energy Efficiency
BEEP	Building Energy Efficiency Programme
CEA	Central Electricity Authority
CPCB	Central Pollution Control Board
CREDAI	Confederation of Real Estate Developers' Associations of India
EE	Energy Efficiency
EEFP	Energy Efficiency Financing Platform
ECSBC	Energy Conservation and Sustainable Building Code
ECBC	Energy Conservation Building Code (variant use)
EESL	Energy Efficiency Services Limited
FEEED	Framework for Energy Efficient Economic Development
GFN	Green Finance Network
GHG	Greenhouse Gas
GIZ	German Agency for International Cooperation
GRIHA	Green Rating for Integrated Habitat Assessment
HVAC	Heating, Ventilation, and Air Conditioning
ICAP	India Cooling Action Plan
IFC	International Finance Corporation
IGBC	Indian Green Building Council
LCB	Low-Carbon Buildings
LEED	Leadership in Energy and Environmental Design
MFI	Microfinance Institution
MNRE	Ministry of New and Renewable Energy
MoEFCC	Ministry of Environment, Forest and Climate Change
MoF	Ministry of Finance
MoHUA	Ministry of Housing and Urban Affairs
MoP	Ministry of Power
MRV	Monitoring, Reporting, and Verification
MSME	Micro, Small and Medium Enterprises
MTEE	Market Transformation for Energy Efficiency
NAPCC	National Action Plan on Climate Change
NDC	Nationally Determined Contributions
NGT	National Green Tribunal
NMEEE	National Mission for Enhanced Energy Efficiency
PAT	Perform Achieve and Trade
PNB	Punjab National Bank
RERA	Real Estate Regulatory Authority
RBI	Reserve Bank of India

SBI	State Bank of India
SDAs	State Development Agencies
SLB	Sustainability-Linked Bond
SPCBs	State Pollution Control Boards
TCPO	Town and Country Planning Organization
TERI	The Energy and Resources Institute
UJALA	Unnat Jyoti Affordable LED for All
USD	United States Dollar

Executive Summary

India's building sector is undergoing rapid expansion, driven by urbanization, population growth, and rising housing demand. This sector contributes approximately 8% of national GDP and accounts for nearly 17% of the country's greenhouse gas (GHG) emissions, underlining its critical role in India's climate commitments. Despite the potential for green construction, adoption remains low, with certified green floor space comprising only 2% of new builds in 2020. Addressing this gap is essential to meet India's Paris Agreement targets and achieve its stated goal of net-zero emissions by 2070.

This report presents a comprehensive analysis of the current status, challenges, and opportunities for advancing low-carbon buildings (LCBs) and energy efficiency (EE) in India. It outlines the sector's regulatory landscape, financial ecosystem, and institutional frameworks, identifying significant barriers such as high upfront costs, weak enforcement of EE codes, fragmented regulations, and limited awareness among stakeholders. While policies such as the Energy Conservation and Sustainable Building Code (ECSBC), the National Mission for Enhanced Energy Efficiency (NMEEE), and incentive schemes like the Unnat Jyoti Affordable LED for All (UJALA) and Super Efficient Equipment Programme (SEEP) have laid the groundwork, widespread enforcement and uptake remain uneven across states.

India has made important strides in green finance, ranking second in emerging market green bond issuance. Public and private financial institutions have issued green bonds and sustainability-linked loans for building-related projects. However, the proportion of green finance relative to the broader construction sector remains limited. The report highlights innovative financing tools, such as partial risk guarantees, venture capital funds, and microfinance solutions, as key levers to address the high capital costs of green buildings and improve access, particularly for low-income housing.

Key recommendations include scaling up green building incentives, enforcing nationwide ECSBC compliance, finalizing India's green taxonomy, and enhancing data transparency through digital MRV systems. In parallel, stakeholder engagement, public awareness, and workforce training must be expanded to overcome market perception barriers and build long-term institutional readiness.

With 70% of India's 2030 building stock yet to be constructed, the next five years present a critical opportunity to shape a low-carbon, climate-resilient built environment. Enabling regulation, financing innovation, and cross-sector collaboration can unlock billions in sustainable investment and ensure that India's building sector becomes a global model for green growth.

1. Introduction

India is witnessing a rapid urbanization trend over the past decade, with millions of people demanding residential properties for improved living standards, underpinned by an expanding middle class and growing working-age population. The construction sector is a vital component of the economy, contributing approximately 8% of GDP and employing approximately 40 million people.[1] In 2015, the Indian government launched the "Housing for All by 2022" initiative to provide sustainable and affordable living spaces to millions of Indians, including the allocation of funds for property development.[2] However, India's buildings and construction sector has a massive carbon footprint, responsible for approximately 25-32% of India's total GHG emissions, encompassing both operational (from building energy use) and embodied (from materials and construction).[3]

While the building sector holds significant importance and is forecasted to accelerate growth, it faces significant environmental challenges. In particular, the housing sector creates vast demand for cement. In the financial year 2024, over 420 million metric tons of cement were produced in India — a more than two-fold increase in cement production since 2008.[4] Of the 353 million produced in 2021, the largest demand was from the domestic housing sector requiring a 55% share, with the rest exported to neighbors such as Nepal.

Moreover, the building sector is a significant source of electricity consumption. Statistics from the Government of India claimed that 37% of the country's total annual primary energy consumption is in residential and commercial spaces. This use includes lighting, appliances, heating, and cooling. India experiences the largest global increase in peak electricity load, driven primarily by cooling demand. With increased temperatures from climate change, building-related electricity demand for space cooling is expected to grow more than 4 times to 585 TWh by 2040. In addition, the uneven implementation of energy efficiency standards may lead to a sevenfold increase in CO2 emissions by 2050.[5]

In response, the government designed the India Cooling Action Plan to reduce cooling demand, transition refrigerants, and enhance energy efficiency by 2038. It focuses on future urban infrastructure, with 70% of it yet to be built by 2030, offering significant carbon-saving potential. India aims to reduce the emissions intensity of its GDP by 45% by 2030 compared to 2005 levels through energy efficiency and management but also through reduced emissions in building supply chains. The Energy Conservation Building Code (ECBC) launched in 2007 has been updated in 2024 to Energy Conservation and Sustainable Building Code (ECSBC) that is responsible for setting minimum energy performance standards in new commercial and residential buildings to promote energy efficiency and sustainability in the building sector. Through the NMEEE, India is fully committed to reduce its emissions, contributing to ecologically and socially sustainable practices.

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[1] Markets, R. A. (2024, September 11). India Construction Industry Databook 2024: 10 Year Residential, Commercial, Institutional, and Infrastructure Market Size & Forecasts by Value and Volume. GlobeNewswire News Room. https://www.globenewswire.com/news-release/2024/09/11/2944664/28124/en/India-Construction-Industry-Databook-2024-10-Year-Residential-Commercial-Institutional-and-Infrastructure-Market-Size-Forecasts-by-Value-and-Volume.html#:~:text=Despite%20near%2Dterm%20challenges%20in,rapid%20urbanization%20and%20population%20growth.

[2] Housing for All By 2022 (HFA): A complete guide - Credit Dharma. (2024, December 17). Housing for All by 2022 (HFA): A Complete Guide - Credit Dharma. https://creditdharma.in/home-loan/housing-for-all-by-2022/

[3] RICS (2023). Decarbonising the Built Environment in India. COP 28 Policy Paper. https://www.rics.org/content/dam/ricsglobal/documents/reports/rics-cop28-policy-paper-india.pdf

[4] Jaganmohan, M. (2025). Cement Production Volume in India FY 2008-2024. https://www.statista.com/statistics/420530/production-of-cement-in-india/

[5] GGGI. (2021). Asia Low Carbon Buildings Transition (ALCBT) Project. https://gggi.org/wp-content/uploads/2022/01/Background-Paper_IKI-ALCBT_rg-2-1.pdf

This report provides an assessment of India's building sector, examining the current trends, governance mechanisms, financial landscape, and barriers to decarbonization. The report offers practical recommendations to advance sustainable finance and low-carbon building (LCB) practices, supporting India's progress toward a sustainable and resilient future.

2. Overview of the Building Sector

2.1 Current Status and Trends in the Sector

The Indian building sector has witnessed surging demand for new construction and infrastructure driven by rapid urbanization and improved quality of life. A cultural shift toward sustainable practices underpins this demand for green buildings, alongside the population's increasing vulnerability to climate risks, such as extreme urban heat.[6]

In 2023, India added 9.2 million new residential units, accounting for 28% of new homes in Asia and the Pacific.[7] The total number of homes built in 2023 was the highest since 2017 and is forecasted to grow despite the economic downturn caused by the pandemic.[8] The credit-linked subsidy scheme "Pradhan Mantri Awas Yojana" (Housing for All by 2022) has been crucial in facilitating access to affordable housing for particularly low and moderate-income residents throughout the country – and was recently extended beyond 2024.[9] While the expected growth is 11.2% in 2024, a compound annual growth rate (CAGR) of 9.6% is projected between 2024-2028, with the sector expected to reach an output of USD 302.5 billion by 2028, indicating substantial market growth potential.[10]

From April 2000 to September 2023, India attracted approximately USD 26 billion in foreign direct investment (FDI) for construction development, and another USD 32 billion for construction activities.[11] Foreign investment is expected to continue growing. However, the policy environment to promote green buildings remains underdeveloped, with current frameworks prioritizing rapid growth, energy security, and competitiveness.[12] National green finance frameworks are increasing through innovative tools such as green bonds and sustainability-linked finance, which are enabling private and international capital mobilization. According to the International Finance Corporation (IFC), USD 1.5 trillion in investment is

[6] Alison Buckholtz. (2023). Home, Green Home. https://www.ifc.org/en/stories/2023/green-buildings-in-india-are-reducing-emissions
[7] Corinne Gangloff. (2024). New Housing Construction in India Forecast to Rise Over 4% Annually Through 2028. https://www.freedoniagroup.com/press-releases/new-housing-construction-in-india-forecast-to-rise-over-4-annually-through-2028#:~:text=In%202023%2C%20there%20were%20301.3,year%20between%202003%20and%202023.&text=The%20Freedonia%20Group%2C%20a%20division,2400
[8] BW Online Bureau. (2024). 4.35 Lakh Homes Built In 2023 Across Major Indian Cities: Anarock Research. https://www.businessworld.in/article/435-lakh-homes-built-in-2023-across-major-indian-cities-anarock-research-510220#:~:text=Bengaluru%2C%20Hyderabad%2C%20and%20Chennai%20collectively,developers%20are%20prioritizing%20project%20completions
[9] Government of India. (n.d.) PMAY(Urban) – Progress. https://pmay-urban.gov.in/
[10] Research and Markets. (2024). India Construction Industry Databook 2024: 10 Year Residential, Commercial, Institutional, and Infrastructure Market Size & Forecasts by Value and Volume. https://www.globenewswire.com/news-release/2024/09/11/2944664/28124/en/India-Construction-Industry-Databook-2024-10-Year-Residential-Commercial-Institutional-and-Infrastructure-Market-Size-Forecasts-by-Value-and-Volume.html#:~:text=Despite%20near%2Dterm%20challenges%20in,rapid%20urbanization%20and%20population%20growth
[11] Statista. (2024, August 30). Inflow of FDI into construction sector in India 2000-2023. https://www.statista.com/statistics/421456/banks-assets-india/
[12] Yash Kashyap and Dhruba Purkayastha. (2023). Policy Brief: Policies and Enabling Environment to Drive Private Investments for Industrial Decarbonization in India. https://www.climatepolicyinitiative.org/publication/policies-and-enabling-environmentto-drive-private-investments-forindustrial-decarbonization-in-indiaidentifying-priority-actions-for-decarbonizingsteel-and-cement-sectors/

required to decarbonize construction sector across emerging markets, with India accounting for a significant portion due to its large population size and growing housing demand.[13]

In 2023, the U.S. Green Building Council (USGBC) and Green Business Certification Inc. (GBCI) announced that India was ranked first globally in the number of LEED Zero green building projects, outperforming both the US and China.[14] Green-certified office buildings nearly doubled between 2016 and 2023, from 39.1 million square meters to about 60% of India's top-grade office stock.[15] This growth can be attributed to several key policy initiatives, such as the Energy Conservation Act (EC Act), which supports standardization of labelling applications and identification of energy-intensive establishments;[16] the ECBC, which sets standards for energy-efficient building design and construction; and the Green Rating for Integrated Habitat Assessment (GRIHA) framework, which provides a framework for sustainable construction.[17] The ECSBC, which mandates efficiency requirements for commercial and residential buildings, is currently enforced in 25 out of 36 states, leaving nearly a third of states outside of its current umbrella. Nevertheless, certified green floor space in 2020 represented just 2% of new builds, highlighting an underdeveloped green building market.[18] The Indian Green Building Council (IGBC) provides a geographic map that tracks the number of green structures in India by state:[19]

[13] IFC. (2020). India Green Building Market Maturity Snapshot 2020. https://edgebuildings.com/wp-content/uploads/2023/11/IFC0077-2023-India-Green-Building-Market-Maturity-Sheet.pdf
[14] India emerges as a global leader in LEED zero projects. (2023, June 14). Green Business Certification Inc. https://www.gbci.org/india-emerges-global-leader-leed-zero-projects
[15] Badal Yagnik. (2023). Leading the Charge: KPMG in India and Colliers' Report on 'Sustainable real estate. https://www.colliers.com/en-in/news/press-release-sustainable-real-estate-kpmg
[16] Bureau of Energy Efficiency, Government of India. (n.d.). Buildings Background. https://beeindia.gov.in/en/buildings-1
[17] Sasha Menon, (2024). The Role of Data in Decarbonizing Construction in India: A Path to a Greener Future. https://www.autodesk.com/blogs/construction/the-role-of-data-in-decarbonizing-construction-in-india-a-path-to-a-greener-future/
[18] IFC. India Green Building Market Maturity Snapshot 2020.
[19] Indian Green Building Council. (2024). Home. https://igbc.in/

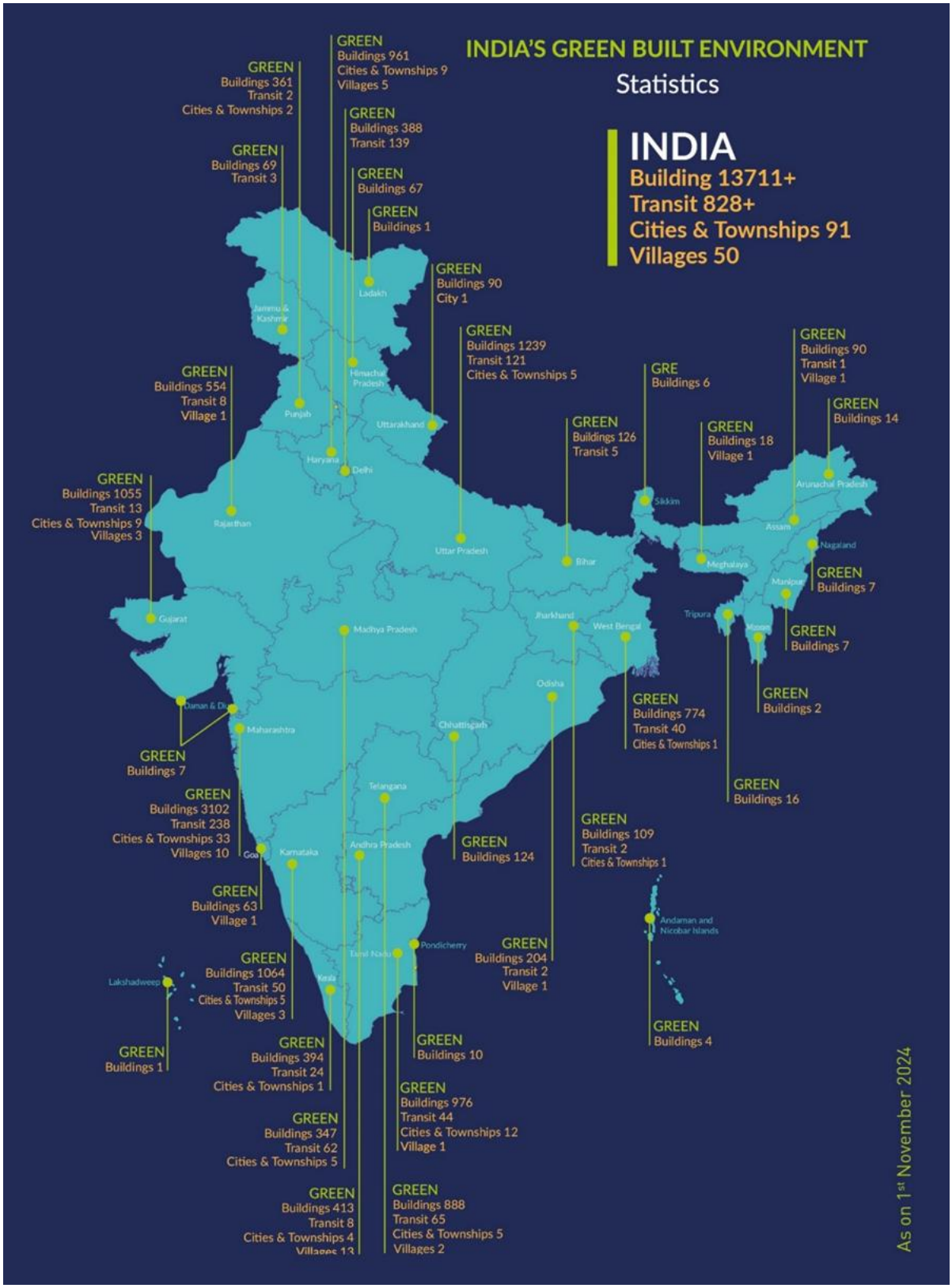

Figure 1. India Green Building Environment

Source: IGBC (2024)[20]

[20] Indian Green Building Council. India's Green Built-Environment Statistics.

According to the Economic Times, the Indian real estate sector aims complete decarbonization by 2050, with a projected market value of USD 5.8 trillion by 2047. Notably, approximately 70% of the buildings needed by 2030 are yet to be constructed, making sustainability an urgent priority in the coming years. However, challenges persist in scaling adoption of green building practices, including limited awareness of their tangible benefits (i.e., reduced emissions, improved health, enhanced EE), low understanding of the financial implications for developers, particularly around financing options and expected returns on green investments. There is also a shortage of skilled professionals capable of leading sustainable practices and decarbonization efforts in the sector.[21]

Under the NMEEE, part of India's National Action Plan on Climate Change (NAPCC), the government is pursuing four flagship initiatives to strengthen the market for energy efficiency through innovative business models:

- **Perform Achieve and Trade (PAT)** - improving efficiency in energy-intensive sectors (including commercial buildings)
- **Energy-Efficiency Financing Platform (EEFP)** - building stakeholder capacity
- **Market Transformation for Energy Efficiency (MTEE)** - promoting efficient appliances
- **Framework for Energy Efficient Economic Development (FEEED**) - developing fiscal instruments for EE investments

While these initiatives have laid a foundation for policy landscape, their implementation and impact remain uneven, with varying levels of uptake across states and sectors. Challenges persist in achieving scale, ensuring enforcement, and institutionalizing outcomes.

Complementing these efforts, the Building Energy Efficiency Programme (BEEP), a national initiative by the Ministry of Power (MoP), enabled energy retrofits in over 10,000 public buildings using Energy Service Company (ESCO) models, particularly during 2017–2022. Large-scale national initiatives such as UJALA and the Standards & Labeling (S&L) program have also contributed significantly to improving energy efficiency in the building sector.

[21] Shariq Khan. (2024). Growing real estate sector can give a boost to green building segment: Johnson Controls. https://economictimes.indiatimes.com/small-biz/sustainability/growing-real-estate-sector-can-give-a-boost-to-green-building-segment-johnson-controls/articleshow/112824849.cms?from=mdr#google_vignette

2.2 Key Stakeholders

India has a vast network of key stakeholders that are highly important for engagement and forwarding LCB and EE initiatives. These actors include federal government-level ministries and agencies, state-level authorities, public, private, and microfinance institutions, as well as leading private sector real estate developers or suppliers:

Table 1. Overview of Key Stakeholders in India's Building and Energy Efficiency Sectors

Stakeholder	Description	Website
Federal Government Institutions		
Ministry of Environment, Forest and Climate Change (MoEFCC)	• Nodal agency in the central government responsible for planning, promotion, coordination, and oversight of environmental and forestry policies and programs • Responsible for implementing India Cooling Action Plan (ICAP) and Carbon Markets	https://moef.gov.in
Ministry of New and Renewable Energy (MNRE)	• Nodal agency for all matters relating to new and renewable energy • Promotion of roof-top solar	https://mnre.gov.in/en/
Ministry of Finance (MoF)	• Oversees financial regulations, budgeting, taxation, and policies to support economic development, including fiscal measures for sustainable finance and green investment	https://financialservices.gov.in/beta/en
Ministry of Power (MoP)	• Ministry responsible for evolving general policy in the field of energy	https://powermin.gov.in/
Bureau of Energy Efficiency (BEE)	• Statutory body under MoP to enforce and facilitate the implementation of the EC Act, including ECSBS	https://beeindia.gov.in/en/about-bee
Ministry of Housing and Urban Affairs (MoHUA)	• Apex authority to formulate policies, sponsor and support programs, and coordinate the activities of various ministries	https://mohua.gov.in/cms/mandate.php

	and nodal authorities relating to housing and urban affairs issues	
Town and Country Planning Organization (TCPO)	• Technical advisory body that provides advice on urban and regional planning and monitors and evaluates central government schemes and development policies • Exists at the local-level as TCPOs	Main website unavailable; local TCPO websites available
Government and Local Authorities (municipalities)	• Sub-national government authorities relating to matters on energy, housing, and technology, including local authorities	
Reserve Bank of India (RBI)	• Official reserve bank that regulates the monetary system and ensures financial stability	https://rbi.org.in
Central Public Works Department (CPWD)	• Agency for public infrastructure planning, design, and construction; also implements green building norms for government projects	https://cpwd.gov.in/
Buildings Materials & Technology Promotion Council (BMTPC)	• Autonomous organization under MoHUA promoting sustainable and cost-effective building materials and construction technologies	https://www.bmtpc.org/
Central Building Research Institute (CBRI)	• R&D institution under the Council of Scientific and Industrial Research (CSIR), focusing on advancing building materials, disaster-resilient structures, and green building innovation	https://cbri.res.in/
Real Estate Regulatory Authority (RERA)	• Regulates and promotes transparency and accountability in India's real estate sector under the RERA Act	https://www.rera.delhi.gov.in/
Energy Efficiency Services Ltd. (EESL)	• Joint venture under MoP that implements large-scale EE programs including UJALA and BEEP	https://eeslindia.org/en/

State Designated Authorities for the ECSBC		
Ladakh Power Development Department	• State authority responsible for power infrastructure and energy policy implementation in the Union Territory of Ladakh	https://lpdd.ladakh.gov.in/
Jammu and Kashmir Power Development Department	• Oversees ECSBS implementation across Jammu and Kashmir	https://pdd.jk.gov.in/
Himachal Pradesh Directorate of Energy	• Implements and monitors ECSBS compliance in Himachal Pradesh	https://doehimachal.nic.in/
Punjab Energy Development Agency	• Leads ECSBS implementation in Punjab	https://www.peda.gov.in/
Uttarakhand Renewable Energy Development Agency	• Leads ECSBS adoption in Uttarakhand	https://ureda.uk.gov.in/
New Delhi Energy Efficiency & Renewable Energy Management Centre	• Coordinates ECSBS implementation in the National Capital Territory of Delhi	https://eerem.delhi.gov.in/
Haryana Renewable Energy Development Agency	• Agency responsible for ECSBS implementation across Haryana	https://hareda.gov.in/
Rajasthan Renewable Energy Corporation Ltd	• Leads ECSBS implementation in Rajasthan	https://energy.rajasthan.gov.in/rrecl/
Uttar Pradesh New and Renewable Energy Development Agency	• Oversees ECSBS implementation in Uttar Pradesh	https://upneda.org.in/
Gujarat Energy Development Agency	• Spearheads ECSBS adoption in Gujarat	https://geda.gujarat.gov.in/

Daman Electricity Department	• Manages ECSBS implementation in the Union Territory of Daman	https://dded.gov.in/
Madhya Pradesh Urja Vikas Nigam	• Leads ECSBS implementation across Madhya Pradesh	https://mprenewable.nic.in/
Maharashtra Energy Development Agency	• Implements the ECSBS initiative across Maharashtra	https://www.mahaurja.com/
Goa Electricity Department	• Manages ECSBS implementation across the coastal state of Goa	https://www.goaelectricity.gov.in/
Lakshadweep Electricity Department	• Oversees ECSBS implementation across the Lakshadweep archipelago	https://powerlak.gov.in/
Karnataka Renewable Energy Development Limited	• Leads ECSBS implementation across Karnataka	https://kredl.karnataka.gov.in/english
Kerala Energy Management Centre	• Spearheads ECSBS adoption in Kerala	https://keralaenergy.gov.in/
Telangana State Renewable Energy Development Corporation	• Implements ECSBS across Telangana	https://tgredco.telangana.gov.in/
Andhra Pradesh State Energy Conservation Mission	• Manages ECSBS implementation throughout Andhra Pradesh	https://www.apsecm.ap.gov.in/
Tamil Nadu Generation & Distribution Corporation Limited	• Leads ECSBS implementation across Tamil Nadu	https://www.tnpdcl.org
Puducherry Renewable Energy Agency	• Manages ECSBS implementation in the Union Territory of Puducherry	https://reap.py.gov.in/public-information
Bihar Renewable Energy Development Agency	• Oversees ECSBS implementation throughout Bihar	https://breda.bih.nic.in/

Jharkhand Renewable Energy Development Agency	• Implements ECSBS across Jharkhand	https://www.jreda.com/
West Bengal State Electricity Distribution Company Limited	• Spearheads ECSBS adoption across West Bengal	https://www.wbsedcl.in/
Chhattisgarh State Renewable Energy Development Agency	• Leads ECSBS implementation throughout Chhattisgarh	https://creda.co.in/
State Designated Agency Odisha, Department of Energy	• Manages ECSBS implementation across Odisha	https://eicelectricityodisha.nic.in/ECONS/Conservhome.aspx
Energy & Power Department, Government of Sikkim	• Manages ECSBS implementation across the state of Sikkim	https://sikkimpower.co.in/
Arunachal Pradesh Renewable Energy Development Agency	• Oversees ECSBS implementation throughout Arunachal Pradesh	https://apeda.nic.in/
Inspectorate of Electricity, Government of Meghalaya,	• Leads ECSBS implementation across Meghalaya	https://iel.meghalaya.gov.in/
Government of Assam	• Implements ECSBS through designated departments across Assam	https://assam.gov.in/
Nagaland Old Assembly Secretariat	• Spearheads ECSBS adoption across Nagaland	https://nla.nagaland.gov.in/history/
Manipur State Power Distribution Company Limited	• Leads ECSBS implementation across Manipur	https://mspcl.in/
Tripura State Electricity Corporation Limited	• Manages ECSBS implementation throughout Tripura	http://www.tsecl.in/
Power & Electricity Department, Government of Mizoram	• Oversees ECSBS implementation across Mizoram	https://power.mizoram.gov.in/

Electricity Department Andaman & Nicobar	• Implements ECSBS across the island territory of Andaman & Nicobar	https://vidyut.andaman.gov.in/
Private Sector		
Mahindra Lifespaces Developers Ltd.	• Green building developer with 2040 carbon neutrality goals	https://www.mahindralifespaces.com/
Signature Global (India) Ltd.	• Leading real estate developer	https://www.signatureglobal.in/about-us.php#vission-mission
Confederation of Real Estate Developers' Associations of India (CREDAI)	• National industry body representing over 13,300 real estate developers across India	https://credai.org/home/
DLF Ltd.	• One of largest real estate companies in India	https://www.dlf.in/
L&T Infra	• Major infrastructure and real estate developer	https://www.larsentoubro.com/
Hiranandani Group	• Prominent real estate group	https://www.hiranandani.com/
Financial Institutions		
State Bank of India (SBI)	• Largest public sector bank in India	https://onlinesbi.sbi/
Small Industries Development Bank of India (SIDBI)	• Principal financial institution for promotion, financing, and development of the Micro, Small and Medium Enterprises (MSME) sector	https://www.sidbi.in/en/about
Axis Bank	• Leading private-sector bank	https://www.axisbank.com/
HDFC Bank	• Leading private-sector bank	https://www.hdfcbank.com/
ICICI Bank	• Leading private-sector bank	https://www.icicibank.com/
Kotak Mahindra	• Leading private-sector bank	https://www.kotak.com/en/home.html

Punjab National Bank (PNB)	• Leading public-sector bank	https://www.pnbindia.in/
Bank of Baroda	• Leading public-sector bank	https://www.bankofbaroda.in/
Equitas Small Finance Bank	• Top microfinance institution	https://www.equitasbank.com/
Bandhan Bank	• Top microfinance institution	https://bandhanbank.com/
Bharat Financial Inclusion Limited	• Top microfinance institution	https://www.bfil.co.in/
Regional Rural Banks	• Small rural cooperative banks sponsored by large public/private banks	https://financialservices.gov.in/beta/list-rrbs-functioning-country
NGOs, Research/Academia, and Industry Associations		
Indian Green Building Council (IGBC)	• Part of the Confederation of Indian Industry (CII), a council established to enable a sustainable built environment for all in India	https://igbc.in/about-us
Confederation of Real Estate Developers' Associations of India (CREDAI)	• Apex body of private real estate developers in India, working with private and public stakeholders to transform the landscape of Indian real estate	https://credai.org/
The Energy and Resources Institute (TERI)	• Not-for-profit independent institute advancing the transition towards sustainability, including in energy-efficiency and efficient building practices	https://www.teriin.org/mission-and-goals
Indian Society of Heating, Refrigerating and Air Conditioning Engineers (ISHARE)	• Advocacy and research group for advancing HVAC and refrigerant technologies and providing awareness	https://ishrae.in/about-ishare
School of Planning and Architecture	• National institute specialized in planning, architecture, and design, serving innovative concepts for the real estate industry	https://spa.ac.in/

Prayas (Energy Group)	• Research and advocacy group working on energy, policy access, and efficiency	https://energy.prayaspune.org/
Council on Energy, Environment and Water (CEEW)	• Think tank providing technical analysis and policy advice on clean energy and buildings	www.ceew.in
CEPT University	• Leading academic institution with strong research in climate-responsive architecture and sustainable urban development	https://cept.ac.in/news/cept-signs-mou-with-tnuhdb
GRIHA Council	• National rating body for green buildings in India, supported by TERI and MoEFCC	www.grihaindia.org
Malaviya National Institute of technology (MNIT) Jaipur	• Technical institute contributing to energy efficiency and sustainable design research	www.mnit.ac.in
Climate Policy Initiative (CPI)	• Global research group working on tracking climate finance and evaluating low-carbon investment strategies – develops innovative finance and policy solutions for green growth and transition plans in India	www.climatepolicyinitiative.org/the-regions/cpi-in-india/
International Partners		
Global Green Growth Institute (GGGI)	• Since 2018, GGGI's efforts in green investments, policy advisory, and capacity building across renewable energy, energy efficiency, and sustainable landscapes have accelerated India's progress towards its national targets and global environmental goals. GGGI is currently leading the implementation of the ALCBT project to catalyze LCB transition of the country.	https://gggi.org/
World Green Building Council (WorldGBC)	• A global network fostering sustainable building practices to combat climate change and improve building performance	https://worldgbc.org/

German Agency for International Cooperation (GIZ) GmbH	• Provides technical expertise and funding to promote sustainable development and green infrastructure worldwide	www.giz.de/en/html/index.html
International Finance Corporation (IFC)	• A World Bank Group member driving private sector investment in sustainable and green buildings through financing and advisory services	www.ifc.org/en/home
United Nations Environment Programme (UNEP)	• Advocates for environmentally sustainable building policies and practices to reduce the global carbon footprint	www.unep.org
Green Climate Fund (GCF)	• Supports developing countries in mitigating and adapting to climate change by financing green infrastructure projects	www.greenclimate.fund
Global Environment Facility (GEF)	• Provides grants for projects that address global environmental challenges, including sustainable urban development	www.thegef.org
Royal Institution of Chartered Surveyors (RICS)	• Establishes global standards for sustainable land, property, and construction practices	www.rics.org
Coalition for Disaster Resilient Infrastructure (CDRI)	• Enhances climate and disaster resilience in infrastructure through global partnerships and knowledge-sharing	www.cdri.world
International Energy Agency	• Guides global energy policies, including energy efficiency in buildings, to promote sustainability and energy security	www.iea.org
World Resources Institute (WRI)	• Global research organization supporting cities, climate, and energy transition – includes technical work on building decarbonization and green finance strategies	www.wri.org
Sustainable Energy for All (SEforALL)	• International platform promoting universal energy access and energy efficiency, with workstreams on cooling, buildings, and sustainable finance	www.seforall.org

Swiss Agency for Development and Cooperation (SDC)	• Supports international cooperation efforts, including energy efficiency in buildings, to promote sustainable development and climate resilience globally.	https://www.deza.eda.admin.ch/en

2.3 Governance Mechanisms for Energy Efficiency and Sustainability in the Building Sector

The table below provides an overview of key laws and regulations that relate to EE and sustainability in the building sector:

Table 2. Overview of Governance Mechanisms Pertaining to Building and EE Sectors

Item	Description
Energy Conservation Act	• Enacted in 2002 to reduce the energy intensity of the Indian economy[22]
Standards and Labelling Programme	• Launched in 2007 to provide consumers with information about the energy-saving and the cost-saving potential of labelled appliances[23]
Energy Conservation and Sustainable Building Code (ECSBC)	• Launched 2006 and amended in 2017, it defines norms of energy performance for various buildings in different climatic regions[24]
National Mission for Enhanced Energy Efficiency (NMEEE)	• Policy mechanism that aims to increase energy efficiency in various economic sectors of India[25]

[22] Energy Efficiency, Government of India. (n.d.). Energy Efficiency. https://powermin.gov.in/en/content/energy-efficiency
[23] Bureau of Energy Efficiency, Government of India. (2018). About Standards and Labelling Program (S&L). https://udit.beeindia.gov.in/standards-labeling/#:~:text=The%20Standards%20and%20Labelling%20program,potential%20of%20the%20labelled%20appliances
[24] Bureau of Energy Efficiency, Government of India. (n.d.) Energy Conservation Building Code. https://beeindia.gov.in/en/energy-conservation-building-code-ecbc
[25] IEA. (2021). National Mission for Enhanced Energy Efficiency. https://www.iea.org/policies/7449-national-mission-for-enhanced-energy-efficiency

National Action Plan on Climate Change (NAPCC)	• National strategy to enable the country to adapt to climate change and enhance the ecological sustainability of India's development path[26]
Perform Achieve and Trade (PAT)	• Market-based mechanism under NMEEE for enhancing cost-effectiveness in improving the Energy Efficiency Intensive industries through certification of energy saving which can be traded[27]
Market Transformations for Energy Efficiency (MTEE)	• Accelerates the shift to energy-efficient appliances in designated sectors through innovative measures to make the products affordable[27]
Energy Efficiency Financing Platform (EEFP)	• Facilitates creation of mechanisms that can help finance demand side management programmes in all sectors by capturing future energy savings[27]
Framework for Energy Efficient Economic Development (FEEED)	• Framework for the development of fiscal instruments that promote energy efficiency[27]
Super-Efficient Equipment Programme	• Programme designed to bring accelerated market transformation for super-efficient appliances by providing financial stimulus at critical points of intervention[28]
Smart Cities Mission	• A centrally sponsored scheme launched by the government to promote cities that provide core infrastructure, clean and sustainable environment and a decent quality of life through 'smart solutions'[29]
Government of India's Cooling Action Plan (ICAP)	• Launched in 2019, the plan seeks to reduce colling demands across sector, reduce refrigerant demand, reduce cooling energy requirements, and recognise 'cooling and related areas' as an area of national research[30]
HCFC Phaseout Management Plan (HPMP)	• India's national plan, introduced in 2023 under Montreal Protocol, to phase out ozone-depleting HCFCs, focusing on promoting low-GWP alternatives and EE cooling systems[31]

[26] Ministry of Information and Broadcasting, Government of India. (2021). National Action Plan on Climate Change. https://static.pib.gov.in/WriteReadData/specificdocs/documents/2021/dec/doc202112101.pdf
[27] Ministry of Power, Government of India. (n.d.). Energy Efficiency. https://powermin.gov.in/en/content/energy-efficiency
[28] IEA. (2021). Super Efficient Equipment Programme (SEEP). https://www.iea.org/policies/2615-super-efficient-equipment-programme-seep
[29] Government of India. (2015). About Smart Cities. https://smartcities.gov.in/about-the-mission
[30] IEA. (2021). India Cooling Action Plan (ICAP). https://www.iea.org/policies/7455-india-cooling-action-plan-icap
[31] Government of India: Press Information Bureau (2023). Montreal Protocol: Fixing the Ozone Layer and Reducing Climate Change. https://pib.gov.in/PressReleseDetail.aspx?PRID=1957968&reg=3&lang=

Unnat Jyoti Affordable LED for All (UJALA)	• Flagship scheme introduced in 2015 to promote widespread adoption of EE LED lighting, leading to major energy use and carbon emissions reductions[32]

A combination of regulatory policies, market-based mechanisms, and financial incentives shape India's governance mechanisms in the energy efficiency and building sustainability space. While these efforts have helped lay the groundwork for energy efficiency and LCB practices, their effectiveness is determined by factors that include enforcement capacity, financial mobilization, and institutional coordination.

A key strength of India's governance framework is its comprehensive policy landscape, including initiatives like the EC Act, the ECSBC, and the NMEEE. These policies provide a structured approach to reducing energy consumption in buildings and aligning the sector with national climate commitments. The PAT scheme, a market-based mechanism, has further encouraged energy-intensive industries to improve efficiency by allowing them to trade energy-saving certificates, making it a flexible and cost-effective solution.

Financial instruments such as the EEFP and the FEEED have been introduced to support the expansion of EE investments. These platforms help mitigate financial risks by mobilizing private capital and offering partial risk guarantees for EE projects. Additionally, initiatives like the Smart Cities Mission and the ICAP act as broader urban sustainability initiatives, highlighting the government's intent to mainstream EE into long-term infrastructure planning.

Despite these strengths, gaps in implementation and enforcement remain critical challenges. While policies like the ECSBC provide national-level guidance, enforcement is delegated to state and municipal authorities, leading to inconsistent adoption. Currently, 25 states out of 36 have adopted ECSBC mandates into their building regulations. Even where it is adopted, weak enforcement and the lack of penalties for non-compliance undermine its effectiveness. There is also lack of awareness about the ECSBC among the stakeholders at the state level.

Financing constraints and limited private sector engagement present additional barriers. Despite previous efforts to introduce green financing mechanisms, uptake in the building sector is relatively low. Developers and financial institutions often perceive LCBs as high-risk investments due to longer payback periods and high upfront capital costs. The absence of direct government subsidies, tax incentives, or concessional lending rates for green construction projects further limits the scaling up of LCBs.

[32] India Brand Equity Foundation (n.d.). UJALA Yojana. https://www.ibef.org/government-schemes/ujala-yojna

3. Alignment with International Climate Frameworks

India is aligning its national policies with international climate frameworks such as the Paris Agreement, particularly through its Nationally Determined Contribution (NDC) targets. The updated NDC submitted in 2022 outlines a goal to reduce the emissions intensity of its GDP by 45% by 2030 from the 2005 level and to achieve about 50% of cumulative electric power installed capacity from non-fossil fuel-based energy sources by 2030, with the help of international financial institutions.[33] While India does not yet have a dedicated roadmap or clear strategies for the building sector, the government has identified it as a key component of national contributions.

Further, India has voluntarily adopted various international certification standards such as LEED and EDGE, in addition to establishing domestic standards such as GRIHA and IGBC, to align with international climate frameworks. However, according to the Climate Action Tracker, the governments' policies, actions and climate change contribution targets are rated as insufficient, given India's projected growth in its share of global emissions.[34] At COP26 in 2021, Prime Minister Narendra Modi announced 2070 as the net-zero target for India.

4. Finance Landscape in the Building Sector

India's financial ecosystem is well-developed, and it is increasingly integrating green and sustainable finance elements. Total bank assets at the end of 2023 were USD 2.87 trillion,[35] equivalent to 80.4% of GDP. The leading private sector banks have significantly higher market capitalization than the public sector banks. In 2023, these were HDFC Bank at USD 150.25 billion and ICICI Bank at USD 86.26 billion, while the public banks were State Bank of India at USD 66.19 billion and Bank of Baroda at USD 13.53 billion.[36] To support the large rural population, there were approximately 96,508 smaller rural cooperative banks in India in 2023, compared to 1,534 urban cooperative banks and only tens of foreign, private, or public banks.[37] Regional rural banks nonbank financial companies are facing challenges in providing credit to green sectors (including green buildings) due to a lack of understanding in appraising and underwriting green project proposals and loans. This presents as a barrier to lending to commercial real estate and residential housing sectors in the effort to scale up LCB practices.

[33] NDC Partnership. (2022). India. https://ndcpartnership.org/country/ind
[34] Climate Action Tracker. (2024). India. https://climateactiontracker.org/countries/india/
[35] Statista. (2024b, August 30). Value of bank assets in India FY 2013-2023. https://www.statista.com/statistics/421456/banks-assets-india/
[36] India: Leading public sector banks in India as of May 2025, by market cap | Statista. https://www.statista.com/statistics/944665/india-leading-public-sector-banks-based-on-market-capitalization/
[37] Statista. (2024b, August 30). Number of banks in India 2023, by type. https://www.statista.com/statistics/1021852/india-number-of-scheduled-banks-by-type/

The building sector is gaining significant green finance traction, with growing investment, government incentives, and specialized financial products to facilitate the green transition. According to the Climate Policy Initiative (CPI),[38] mitigation finance reached an average of USD 50 billion annually for 2021/22 despite economic disruptions due to the pandemic. Energy efficiency accounted for 35% of total mitigation flows, including the housing sector. Private domestic finance made up the bulk of flows for energy efficiency at around USD 16.5 billion. For international finance, public flows were greater but only at USD 0.3 billion compared to clean energy or clean transportation.

Further, Indian public and private banks have developed capacities to issue green bonds and more recently sustainability-linked bonds (SLBs). For example, in 2015, Yes Bank was the first to issue a green bond of USD 150 million to finance renewable energy projects. Axis Bank followed suit in 2016, issuing green bonds worth USD 500 million, allocating up to USD 150 million for the green building sector. PNB Housing Finance Limited similarly issued USD 75 million, all towards green buildings. SBI recently issued three green bonds for LCB worth USD 800 million between 2018 and 2020. Moreover, in 2024, the IFC invested USD 75 million in an SLB issued by NDR Infrastructure Investment Trust to develop sustainable warehousing infrastructure. While this is not the building sector, as part of the construction sector, there is an opportunity for SLB expansion. India ranks second for green bond issuance in emerging markets from 2012 to 2023.[39]

Microfinance is also a large and growing segment of the financial landscape, including green microfinance. Non-Bank Financial Companies specializing in Microfinance (NBFC-MFI) contribute a significant portion to the total loan disbursal landscape, making up roughly 41% of the loans as of September 2023. Meanwhile, private banks have higher loan delinquency rates than the NBFC-MFI institutions indicating the success of MFI in the finance industry.[40] Recently, the German Development Bank KfW and the IFC co-founded the Microfinance Initiative for Asia (MIFA) with a value of USD 175 million. The fund will target exclusively micro-borrowers in Asian countries, looking to purchase renewable energy systems or energy-efficient technologies.[41]

To provide additional support for the green transition and climate finance commitments, the government - has drafted a climate finance taxonomy framework by categorizing technologies, projects, and activities for adaptation, mitigation, and transition. As part of this, Sectoral Technical Committees (TCs), including one for the Building Sector with 11 organizations such as CPI, are being formed to align with national priorities, promote indigenous technologies, and ensure proportionality for Small Medium Enterprises (SMEs). The draft framework is under public consultation now.

The taxonomy will serve as a key guide to directing and mobilizing private resources towards the green building sector. However. the draft taxonomy does not explicitly address embodied carbon or provide standardized methodologies for its investment, presenting a key area for enhancement. This holds particular importance given the growing importance of whole-life carbon accounting in building-sector decarbonization.

[38] Climate Policy Initiative. (2025, January 20). Landscape of Green Finance in India 2024. https://www.climatepolicyinitiative.org/publication/landscape-of-green-finance-in-india-2024/
[39] Statista. (2025, January 13). Cumulative value of emerging market green bond issuance 2012-2023, by country. https://www.statista.com/statistics/1290909/emerging-market-green-bond-issuance-by-country/?__sso_cookie_checker=failed
[40] Kiran Samudrala, Shruti Joshi, Vandana Panchal, Ashwini Ingale, Sudipto Saha, Akash Shrivastava, and Satyan Kumar. (2023). Microfinance India Report 2023. https://assets.equifax.com/marketing/india/assets/mfi-india-report-2023.pdf
[41] Econoler. (n.d.). Reinforcing Microfinance to Encourage Green Investments in Small Businesses and Low-income Households in India. https://econoler.com/en/news/reinforcing-microfinance-to-encourage-green-investments-in-small-businesses-and-low-income-households-in-india/

Despite the efforts, green building finance still constitutes a small portion of total lending to the building sector as of 2020.[42] The government lacks directed policies to signal ambition for expanding the green building industry, which could facilitate green finance flows, both domestic and international. This includes the climate finance taxonomy.[43] India's financial ecosystem is sophisticated and well-developed; thus, such initiatives can further drive it towards providing affordable green housing for the rapidly growing population.

4.1 Available Financing Products

There are numerous public and private financial products available for consumers and developers in the building sector. While some products are targeted at sustainability initiatives, others serve as general schemes for accessibility to energy-efficiency technologies or new homes. For example, several government funds are available to use towards energy efficiency or green buildings. Although earlier efforts under the Framework for Energy Efficient Economic Development (FEEED) included instruments such as the Partial Risk Guarantee Fund for Energy Efficiency (PRGFEE) and the Venture Capital Fund for Energy Efficiency (VCFEE), these have since been discontinued.[44] Meanwhile, the government initiative "Pradha Mantri Awas Yojana" (Housing for All by 2022) – a credit subsidy to build a home – was initially set until 2022, but extended until the end of 2024, and again revised until the end of 2029.[45]

Residents can take up green financing loans such as the Green Home Loan from the SBI for homes rated by the IGBC. In addition, the National Housing Bank's SUNREF program provides funding to the green housing sector by refinancing home buyers and developers of eligible green building projects. Bank of Maharashtra provides green home loans based on the eligibility of the housing project by certification, whether LEED, IGBC, or GRIHA-labelled, and the level of rating.[46] These are also feasible for green home improvements. Aavas Financiers Limited is another example of an institution that offers home loans to buy property and home construction loans through its Green Housing Program.[47]

Developers can partake in green bonds or sustainability-linked bonds to finance green construction projects, whether it is residential or commercial property. Yes Bank, for example, issued the first green bond and used proceeds to finance renewable and green energy projects across the country.[48] CLP Wind Farms India was another key player, using green bond proceeds to finance solar energy plants.[49] Public-private partnerships or developer collaboration with financial institutions can provide access to green housing projects at preferable terms and reduce overall costs for real estate development. This highlights the expansion of available financial product uptake for sustainable development purposes.

Housing and green microfinance are also essential products, despite the growth of government subsidy opportunities such as the Pradhan Mantri Awas Yojana (PMAY). Swarna Pragati Housing Microfinance Pvt. Ltd. is a housing microfinance institution that provides micro-mortgage loans to economically weaker and low-income groups.[50] Habitat for Humanity, a not-

[42] Edge Buildings. (n.d.). Green Building Market Snapshots 2022/2023 Baseline. https://edgebuildings.com/wp-content/uploads/2023/11/MAGC-Research-Market-Maturity-Snapshots-Baseline-Synthesis-Report.pdf
[43] Sarthak Shukla. (2024). Sustainable Finance Taxonomy for India: Just another taxonomy or a 'just' taxonomy? https://in.boell.org/en/sustainable-finance-taxonomy
[44] Ministry of Power, Government of India. (n.d.). Energy Efficiency. https://powermin.gov.in/en/content/energy-efficiency#:~:text=A.&text=Partial%20Risk%20Guarantee%20Fund%20for,for%20PRGFEE%20has%20been%20constituted.
[45] Shivangi Sarkar. (2024). Pradhan Matri Awas Yojana 2024 Extended for 5 Years: How to Apply Online. https://www.herzindagi.com/society-culture/pradhan-mantri-awas-yojana-2024-how-to-apply-online-article-300689
[46] Bank of Maharashtra. (n.d.). https://bankofmaharashtra.in/maha-super-green-housing-loan-scheme-green-building
[47] Aavas Financiers Limited. (n.d.). Our Quest for a Sustainable Tomorrow. https://www.aavas.in/green-home
[48] YES Bank. (n.d.). Climate Action in Financial Institutions, Principles for Mainstreaming Climate Action. https://www.mainstreamingclimate.org/wp-content/uploads/2021/10/P3_YES-BANK-1.pdf
[49] Climate Bonds. (2018). India Country briefing July 2018. https://www.climatebonds.net/data-insights/publications/india-country-briefing-july-2018
[50] Swarna Pragati Housing Microfinance Pvt. Ltd. (n.d.). Overview. https://www.sphm.co.in/company-overview

for-profit, similarly mobilizes capital for a MicroBuild Fund, which enables housing microfinance for low-income families. The fund has a total of over USD 230 million across 62 institutions in 33 countries, including in India.[51] Similarly, Micro Green Housing Private Limited is a housing finance company operating from the state of Maharashtra that provides green housing microfinance and small loans for technology or sustainable materials improvements.[52]

5. Barriers and Gaps Surrounding Decarbonizing the Building Sector

5.1 Barriers and Gaps

Aside from general barriers faced by the global green building sector, such as financing costs and lack of skills, India faces unique, country-specific and even region-specific barriers, with challenges differing across areas, for example, the Northeast and other regions. The following are examples of collective barriers and gaps surrounding the green building sector in India:

High Initial Costs

Cost-effectiveness is a critical factor in the adoption of green buildings. Despite their numerous benefits, high initial expenses, including green building technology and premium procurement prices, pose significant challenges, making it difficult to persuade stakeholders to support green building projects. Research highlights high initial costs as a primary barrier to green building implementation in China, with similar trends observed across other parts of Asia, including India. High green building premiums and technology expenses, coupled with the need for integrated designs incorporating energy-efficient technologies, significantly increase costs compared to conventional buildings, discouraging potential investors.[53]

The payback period of such investments is another critical consideration for stakeholders. However, this challenge can be addressed through measures such as soft loans and energy improvement mortgages, which emphasize the potential savings achieved through energy efficiency measures. Additionally, "green leases" for certified green buildings can attract higher rental incomes and enhance property resale values, providing further financial incentives to overcome the barrier of high capital costs.[54]

Lack of Labelling of Green Products and Materials

The lack of standardized labelling for green products and materials is a major barrier that requires attention. Labelling, as a market-based mechanism, reduces search, experience, and credence costs without relying on command-and-control approaches. It does not mandate producers to follow specific production methods or compel consumers to purchase certain products. Instead, it offers transparent information about production attributes, leaving decisions to market dynamics of demand and supply. Labelling helps communicate

[51] Habitat for Humanity. (n.d.). MicroBuild Fund. https://www.habitat.org/our-work/terwilliger-center-innovation-in-shelter/microbuild
[52] Micro Green Housing Finance. (n.d.). About Us. https://microgreenhf.com/about-us/
[53] Sayani Saha, Rahul Hiremath, P. Sanjay. (2022). Barriers to adoption of green buildings – a review. https://www.proquest.com/openview/98788d56b7aaa39e923379d3bb08139d/1?pq-origsite=gscholar&cbl=2045095
[54] Pleasa Serin Abraham and Haripiya Gundimeda. (2018). 'Greening' the Buildings – An Analysis of Barriers to Adoption in India. https://digitalcommons.lmu.edu/cgi/viewcontent.cgi?article=1228&context=cate

environmental attributes to consumers, enabling the market to reflect their valuation of these features. This addresses the issue of a "missing market" in green buildings and provides long-term economic benefits through market-driven solutions.[55]

Lack of Regulations, Monitoring Schemes, and Enforcement

India's green building sector is hindered by the absence of a unified regulatory framework and enforcement mechanisms. Variations in state-level regulations, coupled with inadequate monitoring systems, create inefficiencies and discourage private sector investment. Weak enforcement of building codes and regulations specifically is a significant barrier to green building adoption. Key codes in the country, such as the National Building Code (NBC) and the ECSBC, establish minimum requirements for energy-efficient design and construction.

The ECSBC, developed based on ANSI/ASHRAE/IESNA standards, is primarily applicable to commercial buildings with a connected load of 100 kW or greater, or a contract demand of 120 kVA or more, which includes a wide range of large commercial and institutional buildings. Inadequate enforcement and lack of penalties for non-compliance hamper its effectiveness. While highly urbanized states with active real estate sectors are applying the code, consistent enforcement with robust evaluation mechanisms is essential for wider adoption of green building practices.[59]

Lack of Stakeholder Involvement, Collaboration, and Influence

Policymakers and governments play a vital role in promoting green building development through incentives, knowledge dissemination, and support for green initiatives by involving key stakeholders. While existing incentive schemes often lack immediate impact, sustained efforts can create a conducive environment for industry growth.

A significant barrier remains the "human challenge," involving insufficient education and awareness among stakeholders, including governments, developers, buyers, tenants, corporates, and clients. Stakeholders vary across countries with their roles often influenced by local contexts and building structures. The lack of information and understanding about sustainable practices among stakeholders often hinders adoption, as seen across other regions, as stakeholders are largely unaware of green alternatives, emphasizing the need for targeted collaboration and engagement.[56]

Lack of Productivity, Technological Uptake, and Expertise

India's construction sector faces low productivity levels due to continued reliance on outdated technologies and methods. Resistance to adopting modern tools and practices further hinders efficiency and innovation, particularly in sustainable construction. Additionally, sustainability-related training is essential to developing expertise in green buildings, but the lack of skilled professionals and information remains a challenge.

To address this, the ALCBT project is delivering the LCB Training Program across project countries including India. The training program enhances local technical expertise in LCB design, construction, operation, and financing, empowering professionals in the building sector. [57] The IGBC also offers workshops, training programs, and exams to familiarize

[55] Pleasa Serin Abraham and Haripiya Gundimeda. (2018). 'Greening' the Buildings – An Analysis of Barriers to Adoption in India. https://digitalcommons.lmu.edu/cgi/viewcontent.cgi?article=1228&context=cate

[56] Mayur Shirish Jain and Jubarak Kakati. (2024). A statistical approach to evaluate the effect of obstacles on green building development in Northeast India. https://www.sciencedirect.com/science/article/pii/S2772655X23000745#:~:text=The%20results%20revealed%20that%20poor,to%20Northeast%20India's%20GBD%20challenges

[57] Asia Low Carbon Buildings Transition (ALCBT) Project. https://alcbt.gggi.org/

professionals with green building practices. These credentials, though not tied to specific green ratings, enable professionals to contribute effectively to green building projects.[58]

Additional Barriers Unique to India

India also grapples with barriers such as long payback periods for green building technologies, schedule delays for construction projects, cost overruns due to inadequate planning and poor resource management, limited public motivation, and an uncertain supply of green materials. These issues, alongside inadequate research and development efforts and poor enforcement of green building codes, create significant hurdles for the sector. Comprehensive strategies addressing these challenges, including financial incentives, public awareness campaigns, and greater investment in research and innovation, are critical for advancing India's green building agenda.

5.2 Low Carbon Opportunities

There are several viable LCB opportunities that developers in India can explore:

Table 3. Opportunities for LCB Development in India

Intervention	Potential Impact	Key Measures
Prefabricated and Modular Construction	Prefabricated housing entails factory-based production and assembly of building components, supported by integrated systems covering design and construction. This ensures technological innovation, high-quality output, efficient assembly, and reliable customer support, building strong trust with end users.[59] Prefabrication can reduce workloads on developers and provide a cost-effective, factory-made alternative for mass low-cost sustainable housing. Similarly, modular construction involves off-site production of housing components, allowing buildings to be assembled on-site like LEGO blocks.[60]	Simplifying building designs off-site using basic, sustainable materials to facilitate construction and assembly process.
Energy Efficiency Retrofits	Adopting energy-efficient technologies in existing buildings can result in significant energy savings. Replacing conventional lighting with LED systems and upgrading HVAC systems greatly reduces energy usage.	Installing EE lighting, such as LEDs, in residential and commercial buildings. Upgrading HVAC systems to more efficient models.
Sustainable Construction Materials	Utilizing low-carbon construction materials can significantly reduce	Promoting the use of recycled steel and low-carbon cement in construction projects.

[58] Pleasa Serin Abraham and Haripiya Gundimeda. (2018). 'Greening' the Buildings – An Analysis of Barriers to Adoption in India. https://digitalcommons.lmu.edu/cgi/viewcontent.cgi?article=1228&context=cate
[59] Japan Prefabricated Construction Suppliers and Manufacturers Association. (n.d.). What is Prefab Housing? https://www.purekyo.or.jp/bukai/jyutaku/english/index.html
[60] Sankyo Frontier. (n.d.). What are Modular Buildings? https://sankyofrontier-global.com/blog/what-are-modular-buildings/

	embodied carbon emissions in new building.	Incorporating renewable materials, such as engineered wood, in building designs. Encouraging material efficiency and waste-reduction practices during construction.
Passive Design Strategies and Circular Superinsulators	Optimizing building orientation, natural ventilation, and reflective or green roofs can significantly reduce cooling demand and energy use. Similarly, the use of superinsulators from recycled materials such as paper or even denim can improve energy efficiency and contribute to waste reduction while minimizing heatwave impacts in hot regions and improving insulation in cold regions.[61]	Incorporating shading devices, reflective materials, and green roofs into building designs. Utilizing natural ventilation and EE windows to improve cooling performance. Encouraging cellulose-based insulation material design to promote circular economy.
Renewable Energy Integration	Provided India's abundant sunlight, solar rooftop installations can improve the building's energy usage. Solar panels can also be utilized to heat water systems, such as cisterns and main water lines. Certain regions of India, especially in the West, also see high wind speeds, which could benefit from residential/commercial small wind turbine installations.[62]	Installing photovoltaic (lower-cost) or thermal solar panels for electricity usage reductions or water-heating systems. Installing residential wind turbines for an entire building or residential complex, or similarly for whole commercial space.
Smart Building Technologies	Smart technologies can optimize energy use, reduce waste, and improve EE by monitoring and adjusting energy consumption in real-time. Leverage the government's Smart Cities Mission.	Deploying energy management systems and Internet of Things (IoT)-enabled devices to track and control energy usage. Adopting automated building systems to improve operational efficiency.
Regenerative Practices	Biophilic designs within buildings, as seen in Singapore's Marina Bay Sands, can be adapted for Indian high-density urban housing, integrating living green	Covering outdoor and indoor walls, ceiling, rooftops, covering with living plant material to reduce sunlight

[61] Climatizer Insulation. (n.d.). Sustainable Insulation in the Fight Against Climate Change. https://climatizer.ca/sustainable-insulation/#:~:text=Unlike%20other%20insulation%20types%2C%20cellulose%20insulation%20is,ink%20and%20other%20unwanted%20materials%20and%20treating

[62] Gaurav Singh. (2024). Home Wind Energy Solutions in India – Harness the Power. https://blog.feniceenergy.com/home-wind-energy-solutions-in-india-harness-the-power/

	spaces for improved air quality and reduced need for cooling.[63] Similarly, bio-algae facades can have a comparable thermal effect through photosynthesis, reducing energy costs.[64] Additionally, projects that integrate urban forests can also improve livability and air quality in cities like Delhi and Mumbai.	penetration, reduce cooling costs, and absorb CO2 emissions.

6. Regulatory and Institutional Framework

6.1 Role of Regulatory Bodies and Their Enforcement Capacity

India has a well-developed regulatory framework governing the building sector, involving multiple central and state-level agencies responsible for enforcing energy efficiency, environmental protection, and emissions control measures. However, despite the sector's significant carbon footprint and economic importance, there are no dedicated climate change institutions for the building sector. Furthermore, there are persistent gaps in enforcement capacity, inter-agency coordination, and the translation of policy into practice, particularly at the state and municipal levels.

Addressing these challenges will require a combination of regulatory strengthening and market-aligned instruments. One promising approach is to leverage public procurement mandates, for example, requiring guaranteed offtake of certified green building materials and technologies in all public retrofits and new constructions. Such mandates could catalyze demand for sustainable materials, enhance compliance incentives, and provide long-term market signals for the private sector. Strengthening institutional capacity and aligning implementation with national green finance objectives will be essential to unlocking the full potential of India's regulatory architecture for LCBs.

The following are the key regulatory and oversight bodies currently engaged in or relevant to the governance of the green building sector in India:

Ministry of Environment, Forest and Climate Change (MoEFCC)[65]

The MoEFCC implements policies and programs to conserve natural resources, biodiversity, forests, and wildlife while preventing pollution and protecting the environment. It is guided by principles of sustainable development focusing on human well-

[63] Living Architecture Monitor. (n.d.). Biophilic Design Sweeps Through Singapore's Buildings as Property Owners Go Green. https://livingarchitecturemonitor.com/news/biophilic-design-sweeps-through-singapores-buildings-as-property-owners-go-green

[64] Mary Ben Bonham and Kyoung Hee Kim. (2022). Biofacades: Integrating Biological Systems with Building Enclosures. https://www.facadetectonics.org/articles/biofacades-integrating-biological-systems-with-building-enclosures

[65] Ministry of Environment, Forest and Climate Change, Government of India. (n.d.). Introduction. https://www.moef.gov.in/introduction

being. The ministry serves as the nodal agency for international environmental cooperation and manages multilateral agreements such as the Global Environment Facility. Moreover, it administers several environmental, anti-pollution, and wildlife laws, and manages research on the respective topics of concern. It has a robust enforcement capacity. The National Green Tribunal (NGT) was established under the MoEFCC to handle environmental disputes and enforce legal rights. Aside from that, it regulates industrial emissions, conducts impact assessments, and enforces legal compliance to safeguard ecosystems and ensure ecological balance.

Ministry of Power (MoP)[66]

The MoP formulates and implements energy policies. It oversees the development, coordination, short-, medium-, and long-term energy policies across sectors, regions, and inter-country power flows. In addition, it oversees the Central Electricity Authority (CEA), the Central Electricity Regulatory Commission, and the Bureau of Energy Efficiency. Its enforcement capacity extends to the execution of power development schemes, rural electrification programs, and the management of certain institutions.

Bureau of Energy Efficiency (BEE)[67]

The BEE is responsible for developing policies and strategies within the EC Act framework to reduce the energy intensity of the Indian economy. It sets energy performance standards for efficient energy consumption, including in the building sector, and can certify energy managers, and auditors, as well as mandate energy audits. BEE, although responsible for notifying codes and guidelines, has no enforcement mandate. As the building sector is a state subject, the compliance mechanism is primarily overseen by State Designated Agencies (SDAs), Urban Development Departments (UDD), and city planners.

Ministry of Housing and Urban Affairs (MoHUA)[68]

The MoHUA is the apex authority of the Government of India for formulating policies, coordinating activities, and monitoring programs related to housing and urban development. Its responsibilities include urban planning, real estate regulation, housing policies, and urban transport systems. The ministry enforces regulations through its jurisdiction over public premises, government lands, urban housing policies, and urban water supply systems. It also oversees key administrative bodies such as the Central Public Works Department (CPWD), Housing & Urban Development Corporation (HUDCO), National Building Construction Cooperation Ltd. (NBCC), and Smart City Mission and State Public Works Departments (SPWD)..

Ministry of New and Renewable Energy (MNRE)[69]

The MNRE is responsible for developing and deploying renewable energy technologies to address India's energy needs and enhance energy security. It sets international-level standards, facilitates research and development, and guides the deployment of renewable energy systems across rural, urban, industrial, and commercial sectors. The ministry also maps and assesses renewable energy resources to ensure the quality and cost-competitiveness of renewable energy products. It has some enforcement capacity, providing technical and financial support

[66] Ministry of Power, Government of India. (n.d.). Responsibilities. https://powermin.gov.in/en/content/responsibilities
[67] Ministry of Power, Government of India. (n.d.). BUREAU OF ENERGY EFFICIENCY https://beeindia.gov.in/en/programmes/buildings-0#:~:text=The%20building%20sector%20in%20India,codes%20to%20suit%20local%20conditions
[68] Ministry of Housing and Urban Affairs, Government of India. (n.d.). About us. https://mohua.gov.in/cms/mandate.php
[69] Ministry of New and Renewable Energy, Government of India. (n.d.). Introduction. https://mnre.gov.in/en/about-department/introduction/

to stakeholders, promoting international accreditation of energy systems, and striving to meet India's clean energy targets.

Ministry of Finance (MoF)[70]

The MoF oversees the banking, financial services, and insurance sectors, and administering their respective laws, particularly in promoting financial inclusion. It supports key financial institutions involved in MSMEs, infrastructure, and housing. The MoF deals with legislative matters of other regulatory bodies such as the RBI, and ensures compliance with financial laws, monitors public sector banks and insurance companies, manages debt recovery, and implements policies to support economic and social development.

Reserve Bank of India[71]

The RBI is India's central banking authority, responsible for enacting monetary policy, maintaining financial stability, and supervising financial institutions. It ensures price and monetary stability and fosters inclusive economic growth. The RBI enforces compliance through regular inspections, licensing, and directives under the main financial legislation. It has several key enforcement capabilities. Mainly, it can impose penalties, revoke licenses, and take over the management of non-compliant financial institutions.

Central Pollution Control Board (CPCB)[72]

The CPCB, a statutory organization under MoEFCC, serves as a technical arm for environmental regulation. It ensures the prevention, control, and abatement of water and air pollution in India through the monitoring and management of water resources and air quality. The board enforces compliance with air and water quality standards by industries and urban bodies, leveraging authority under national environmental laws. It also oversees climate-related programs such as the National Air Monitoring Programme (NAMP) and Water Quality Monitoring (WQM) to regulate air and water quality across India. Additionally, the CPCB advises the central government and coordinates the activities of State Pollution Control Boards (SPCBs), resolving disputes among them and ensuring adherence to pollution standards.

National Green Tribunal (NGT)[73]

The NGT is a specialized judicial body that addresses environmental disputes and enforces environmental rights. Its primary functions include adjudicating cases related to environmental protection, conservation of forests and natural resources, and providing relief and compensation for damages to individuals and property. Moreover, the tribunal operates independently of the Code of Civil Procedure, 1908, applying natural justice to cases, reducing pressure on the higher courts, and acting swiftly.

Real Estate Regulatory Authority (RERA)[74]

The RERA oversees operations in the real estate industry, including buying, selling and protecting consumers from illegal activities. It regulates real estate agents and projects, maintains a project database, and enforces builders, property allotees, and agent obligations. The authority holds enforcement powers to adhere to relevant guidelines.

[70] Ministry of Finance, Government of India. (n.d.) Overview. https://financialservices.gov.in/beta/en/page/overview
[71] Reserve Bank of India, Government of India. (n.d.). About us. https://www.rbi.org.in/
[72] Ministry of Environment, Forest, and Climate Change, Government of India. (n.d.). Central Pollution Control Board. https://moef.gov.in/central-pollution-control-board
[73] National Green Tribunal, Government of India. (n.d.). About us. https://www.greentribunal.gov.in/about-us
[74] Varsha Mahendra Singh. (2023). RERA Authority – Duties & Functions. https://vakilsearch.com/blog/duties-functions-of-rera-authority/

State Pollution Control Boards (SPCBs)[75]

The SPCBs are empowered to act as the regulating authorities for Union Territories on behalf of the CPCB to implement and enforce environmental legislation. The primary roles of the SPCBs include advising the state governments, defining and enforcing pollution standards, such as norms of emissions in industrial plants, and the automobile industry, and monitoring and inspecting compliance and performance.

State Designated Agencies (SDAs)[76]

The SDAs are appointed by state governments under the Energy Conservation Act, 2001, to implement energy conservation and efficiency initiatives at the state level. Their responsibilities include promoting energy efficiency awareness, coordinating with the BEE, supporting capacity-building activities, and facilitating energy audits, demonstration projects, and demand-side management programs.

6.2 Enforcement Capacity and Challenges

While India's ministries and agencies are responsible for parts of the regulatory framework, a lack of specific climate change regulation restrains government action at all levels. Rather, legacy regulation focuses on environmental and social impacts such as air and water quality, and sectoral efficiencies such as energy use. Policies are outdated or contain gaps across state levels. The enforcement capacity, therefore, faces structural challenges, alongside serious operational challenges that limit its effectiveness.[77] For example, the Pollution Control Boards are understaffed, under capacity, and lack financing to enforce climate change action.[78] The boards also lack penalization authority relying on the courts for imposing fines, creating procedural delays and enforcement gaps.[79] Moreover, the Electricity Act does not address a need for limits on production or consumption.[80]

The National Green Tribunal, while established to handle environmental disputes, is restricted to civil remedies and cannot address criminal liability. These limitations are compounded by systemic issues including insufficient data collection, weak monitoring capacity, a lack of transparency and accountability among authorities, and poor coordination among government agencies. Widespread corruption among high-level officials is a key issue in enforcement, allowing individuals to avoid punishment for serious environmental violations. [81] The institutional framework is further hampered by the absence of a comprehensive enforcement and prosecution policy specifically for environmental cases, as well as the dispersed nature of regulatory authority across multiple bodies.[82]

[75] Central Pollution Control Board, Government of India. (n.d.). Functions. https://cpcb.nic.in/functions/
76 Bureau of Energy Efficiency, "State Designated Agencies," Ministry of Power, Government of India. https://beeindia.gov.in/en/state-designated-agencies
[77] Shyam Sundar. (2023). Challenges in implementing environmental laws and policies in India. https://doi.org/10.12944/cwe.18.3.27
[78] Chandra Bhushan and Tarun Gopalakrishnan. (2021). Environmental Law and Climate Action. https://shaktifoundation.in/wp-content/uploads/2021/12/Environmental-Laws-and-Climate-Action.pdf
[79] Ashwani Pant and Santosh Kumar. (2018). ENVIRONMENTAL LAW ENFORCEMENT AND NEED FOR REFORMING THE LIABILITY REGIME IN INDIA: AN AGENDA TO REVISIT. https://www.dehradunlawreview.com/wp-content/uploads/2020/06/5-Environmental-law-enforcement-and-need-for-reforming-the-liability-regime-in-India-an-agenda-to-revisit.pdf
[80] Bhushan and Gopalakrishnan. Environmental Law and Climate Action.
[81] Sundar, Challenges in implementing environmental laws and policies in India.
[82] Ashwani Pant and Santosh Kumar. (2018). ENVIRONMENTAL LAW ENFORCEMENT AND NEED FOR REFORMING THE LIABILITY REGIME IN INDIA: AN AGENDA TO REVISIT. https://www.dehradunlawreview.com/wp-content/uploads/2020/06/5-Environmental-law-enforcement-and-need-for-reforming-the-liability-regime-in-India-an-agenda-to-revisit.pdf

6.3 Institutional Arrangements for Monitoring, Reporting, and Verification (MRV)

India's existing institutional arrangements for MRV are multi-faceted, addressing diverse sectors and emphasizing the integration of policy, technology, and stakeholder engagement. The MoEFCC, through the Development Monitoring and Evaluation Systems Division, serves as the primary authority overseeing climate change-related MRV systems.[83] Sectoral initiatives complement this role, ensuring specialized oversight.

In the energy sector, the CEA and BEE are central to MRV. The CEA monitors power generation and collects data for calculating absolute emissions and emissions intensity. Renewable Energy Certificates (RECs) are managed by the Power System Operation Corporation (POSOCO) under a robust MRV framework. The PAT scheme under the BEE also includes an integrated MRV system to track energy efficiency in energy-intensive industries. Moreover, advanced initiatives, such as the Ujwal DISCOM Assurance Yojana (UDAY) dashboard and Vidyut Pravah mobile application, ensure real-time tracking of electricity generation and consumption, facilitating transparency and informed decision-making.[84]

In the building sector, the ECSBC is the cornerstone policy for MRV. The ECSBC sets minimum energy performance standards for new commercial buildings and major retrofits. The code emphasizes reducing electricity consumption through better insulation, efficient HVAC systems, and high-performance building envelopes. State governments, urban local bodies, and designated agencies are responsible for its enforcement. Data on energy use and compliance is collected at local levels and reported to central agencies. [85]

India's MRV system for buildings also integrates voluntary green rating mechanisms like GRIHA and LEED to promote sustainable construction practices. These systems monitor parameters like energy use intensity, water efficiency, and material sustainability. Additionally, urban bodies in cities like Delhi and Bengaluru have incorporated energy efficiency requirements in building bylaws, scaling up ECSBC compliance and expanding MRV efforts.

However, the institutional arrangement for MRV still has serious gaps. Data fragmentation, limited technical capacity, and underdeveloped enforcement frameworks are some of the challenges in the national government and across state authorities. Despite this, there are ongoing capacity-building initiatives – such as the GHG Platform India and India GHG Program – that aim to improve data accessibility and equip stakeholders with tools for emissions management. These efforts are critical for aligning the energy and building sectors with India's climate commitments under the Paris Agreement.[86]

The ALCBT Project supports BEE in establishing a robust data system and institutional framework that enables effective monitoring, reporting, and evaluation of building sector energy performance. This effort will lay the foundation for evidence-based policymaking and long-term success of India's energy efficiency programs in the built environment.

[83] Ministry of Environment, Forest and Climate Change, Government of India. (n.d.). Development Monitoring and Evaluation (DME). https://moef.gov.in/development-monitoring-and-evalution-dme
[84] Council on Energy, Environment and Water. (2018). Domestic Measurement, Reporting, and Verification. https://www.ceew.in/publications/domestic-measurement-reporting-and-verification
[85] Initiative for Climate Action Transparency. (n.d.). Strengthening National MRV Systems – Options and Approaches for India. https://climateactiontransparency.org/wp-content/uploads/2022/05/Deliverable-4-Final-recommendations-for-MRV-approaches-and-institutional-coordination-of-MRV-for-mitigation-actions-and-policies-Buildings-Efficiency-Report.pdf
[86] Shakti Sustainable Energy Foundation. (n.d.). Measuring and Tracking GHG Emissions. https://shaktifoundation.in/wp-content/uploads/2017/12/MRV-Brochure-23-nov.pdf

7. Recommendations and Next Steps to Address Financing Barriers and Unlock Low-Carbon Opportunities

India's building sector, while pivotal to its economic and urban growth, faces considerable challenges in transitioning toward sustainable and low-carbon practices. Addressing these barriers requires an integrated approach that combines financial mechanisms, regulatory enhancements, capacity building, and community engagement. The following strategic recommendations build upon research findings and provide actionable solutions to unlock low-carbon opportunities and overcome financing barriers:

Government Action and Enabling Environment

Strengthening government support and regulatory frameworks is essential to advancing LCB practices. The government must enhance supervision and enforcement of existing policies such as the ECSBC, making compliance mandatory nationwide by involving state-level authorities and supporting it with robust monitoring mechanisms. Incentive measures, such as tax rebates and subsidies for green-certified projects, can complement these efforts and reduce the financial burden on developers and homeowners. Additionally, streamlining inter-agency coordination and integrating energy efficiency standards into state and municipal regulations will ensure uniform implementation across regions.

Financial Incentives

Financial incentives and innovative financing mechanisms should be scaled up to address the high initial costs associated with green buildings. Existing products such as green mortgages, green loans, and partial risk guarantees provide direct financial relief to stakeholders, while sustainability-linked bonds and green bonds mobilize capital from private and international sources. However, the scale and accessibility of these remain insufficient. To bridge funding gaps, India should engage additional multilateral development banks and international financing bodies to secure concessional funding for low-carbon initiatives, particularly for retrofitting existing buildings and developing renewable energy integration.

Training and Awareness Raising

Education, training, and public awareness campaigns are critical to building trust and capacity in the green building sector. Targeted training programs for developers, architects, and construction professionals should focus on sustainable practices and technologies. Institutions such as BEE, IGBC, and GGGI can expand training programs to equip stakeholders with the necessary expertise. Moreover, public awareness campaigns should emphasize the tangible benefits of LCB, such as reduced energy costs, improved health outcomes, and higher property values. Enhanced awareness will encourage greater acceptance and demand for sustainable construction practices among both consumers and developers.

Stakeholder Engagement and Collaboration

Community engagement and local participation are vital for the success of green building projects. Actively involving local communities in planning and execution not only fosters acceptance but also ensures that projects are tailored to specific regional needs. For example, community-driven initiatives can emphasize locally sourced sustainable materials and climate-resilient designs, which align with India's diverse cultural and environmental contexts. Empowering communities to take ownership of green building initiatives will enhance long-term sustainability and scalability.

Investment Frameworks – Green Taxonomy

Finally, while already in progress, developing a comprehensive green finance taxonomy will provide clarity and structure for stakeholders in the green building ecosystem. The green taxonomy, aligned with global standards, will guide financial institutions and investors in channeling resources toward certified green projects. Combined with expanded use of sustainability-linked and green bonds, this framework will strengthen India's position as a leader in green finance while addressing the unique challenges of the building sector.

By integrating these strategic recommendations, India can effectively overcome financing barriers and capitalize on its low-carbon opportunities. Strengthened government support, robust financial mechanisms, enhanced awareness, and active community involvement will collectively drive the green building sector toward a sustainable and resilient future, contributing significantly to the nation's climate goals.

Financial Sector Engagement for Sustainable Financing for the Building Sector

India's building sector faces significant financial barriers, including limited access to green loans, insufficient financial incentives for sustainable construction, and high perceived investment risks related to low-carbon materials and technologies. To address these challenges, the ALCBT Project supports the establishment of a Green Finance Network (GFN), which can play a pivotal role in facilitating green bond issuances, risk-sharing mechanisms, and the development of dedicated financial products tailored to decarbonizing the building sector. Additionally, the GFN will advocate for policy reforms, incentives, and the integration of green financing mechanisms into India's regulatory frameworks, including the ECSBC and Smart Cities Mission.

Beyond financing, the ALCBT Project will support the GFN through capacity-building initiatives for financial institutions, real estate developers, and policymakers while establishing a robust impact measurement system to track financial outcomes. By leveraging innovative financial instruments, stakeholder engagement, and policy advocacy, the GFN seeks to accelerate India's transition toward a low-carbon, sustainable building sector within the broader ALCBT framework.

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About ALCBT Project

The Asia Low Carbon Buildings Transition (ALCBT) Project seeks to significantly reduce GHG emissions by catalyzing nationwide transition towards low carbon buildings in Cambodia, India, Indonesia, Thailand, and Vietnam. In India, the project is being implemented across three states Kerala, Haryana and Uttar Pradesh under the guidance of the Ministry of Housing and Urban Affairs and with support of the state-designated agencies. The project addresses regulatory, capacity, and financing gaps that prevent large scale adoption of low carbon buildings and build technical GHG emission reduction targets from building materials and operations, particularly from cooling, complementing regional and global initiatives. The ALCBT project implementation is led by the Global Green Growth Institute (GGGI) in partnership with the ASEAN Centre for Energy (ACE), Energy Efficiency Services Limited (EESL), and HEAT International. It is supported by the German Federal Ministry for Economic Affairs and Climate Action under the International Climate Initiative.

About GGGI

The Global Green Growth Institute (GGGI), headquartered in Seoul, Republic of Korea is a treaty-based international, inter-governmental organization dedicated to supporting and promoting strong, inclusive and sustainable economic growth in developing countries and emerging economies.

About ACE

The ASEAN Centre for Energy (ACE) is an intergovernmental organization within the Association of Southeast Asian Nations' (ASEAN) structure that represents the 10 ASEAN Member States' (AMS) interests in the energy sector.

About EESL

Energy Efficiency Services Limited (EESL) is a super energy service company that seeks to unlock energy efficiency market in India, estimated to at Rs. 74,000 crore that can potentially result in energy savings of up to 20 percent of current consumption, by way of innovative business and implementation models.

About HEAT International

HEAT International is an independently acting consulting firm with 30 years of experience in the field of climate, heating & cooling, and transport. HEAT's goal is to support countries in their effort to mitigate emissions and to implement transformative pathways towards zero GHG emission solutions.

Any person who believes they may be harmed by an IKI project or who wish to report corruption or the misuse of funds, can lodge a complaint to the IKI Independent Complaint Mechanism at IKI-complaints@z-u-g.org. The IKI complaint mechanism has a panel of independent experts who will investigate the complaint. In the course of the investigation, we will consult with the complainant so as to avoid unnecessary risks for the complainant. More information can be found here.

GGGI

ASIA LOW CARBON BUILDINGS TRANSITION PROJECT

Life Cycle Assessment for Transitioning to a Low-Carbon Economy

HQ Address:
Global Green Growth Institute
19F Jeongdong Building 21-15,
Jeongdong-gil Jung-gu, Seoul
Republic of Korea 04518

Office in India:
The Global Green Growth Institute
M-6 Haus Khas, Third Floor, Aurobindo
Marg. New Delhi – 110068
Contact: india@gggi.org
+91 +91 1140501471

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