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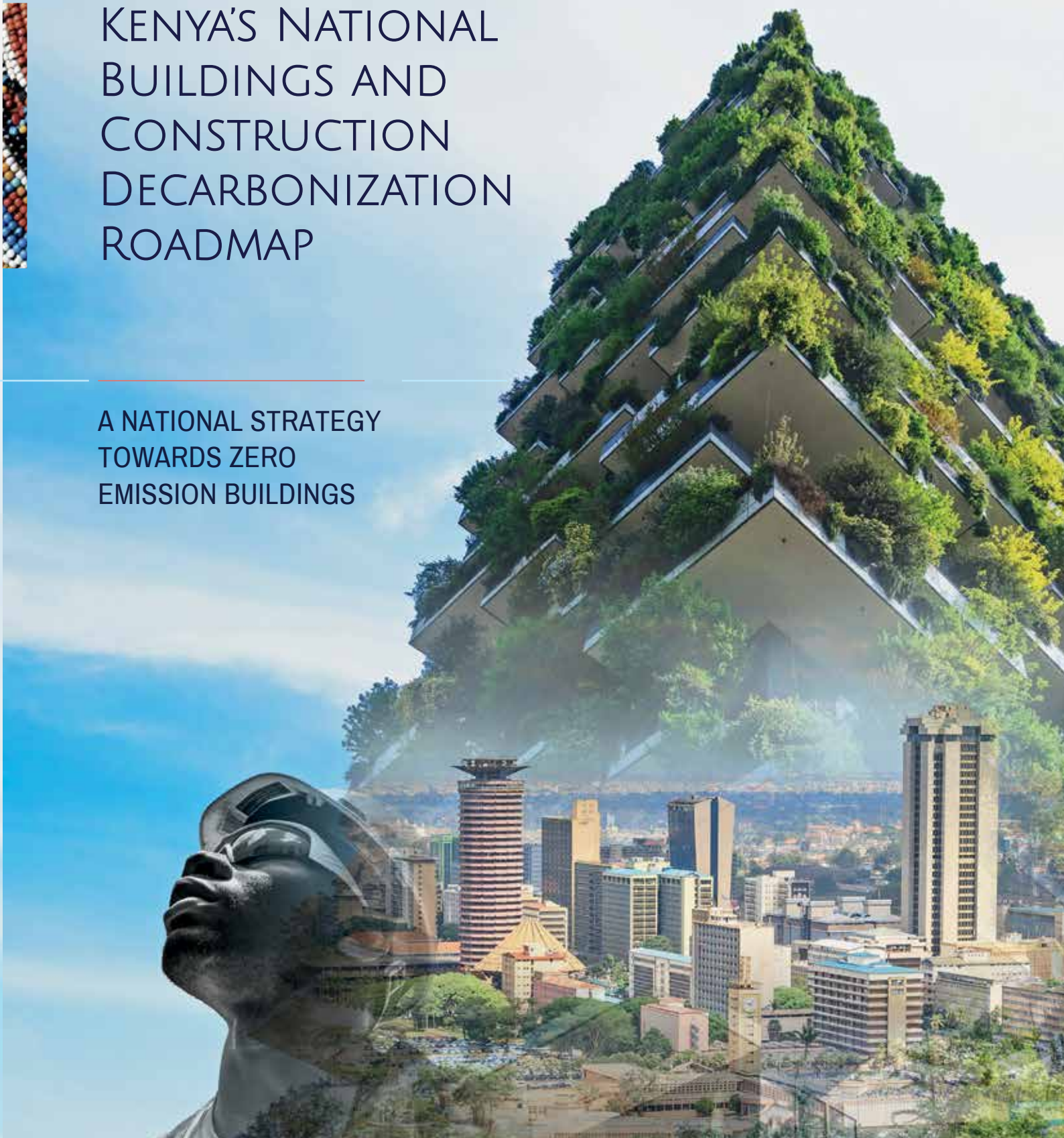
# KENYA'S NATIONAL BUILDINGS AND CONSTRUCTION DECARBONIZATION ROADMAP

## A NATIONAL STRATEGY TOWARDS ZERO EMISSION BUILDINGS



# Kenya's National Buildings and Construction Decarbonization Roadmap:

## A National Strategy Towards Zero Emission Buildings

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| | | |
|---|---|---|
| **AAK** | - | Architectural Association of Kenya |
| **BAPPEDA** | - | Badan Perencanaan Pembangunan Daerah (Translation: Regional Development Planning Agency) |
| **BORAQS** | - | Board of Registration of Architects and Quantity Surveyors |
| **CBI** | - | Climate bonds Initiative |
| **CCD** | - | Climate Change Directorate |
| **COP27** | - | Conference of the Parties |
| **CSTI** | - | Center for Science Technology and Innovation |
| **EBK** | - | Engineers Board of Kenya |
| **EPRA** | - | Energy and Petroleum Regulatory Authority |
| **ERB** | - | Energy Regulation Board |
| **ETF** | - | Exchange Traded Fund |
| **FDI** | - | Foreign Direct Investment |
| **FSD** | - | Financial Sector Deepening |
| **GBPN** | - | Global Buildings Performance Network |
| **GIS** | - | Geographic Information System |
| **IEA** | - | International Energy Agency |
| **IFC-** | | International Finance Corporation |
| **IPCC** | - | Intergovernmental Panel on Climate Change |
| **IQSK** | - | Institute of Quantity Surveyors of Kenya |
| **JEDI** | - | Justice, Equity, Diversity and Inclusivity |
| **KAM** | - | Kenya Association of Manufacturers |
| **KBA** | - | Kenya Bankers Association |
| **KGBS** | - | Kenya Green /building Society |
| **KIP** | - | Kenya Institute of Planners |
| **KNBS** | - | Kenya National Bureau of Statistics |
| **KPDA** | - | Kenya Property Developers Association |
| **LC3** | - | Limestone Calcined Clay Cement |
| **MECCF** | - | Ministry of Environment, Climate Change and Forestry |
| **MoLPWHUD** | - | Ministry of Lands, Public Works, Housing and Urban Development |
| **MRV** | - | Measurement, Reporting and Verification |

| | | |
|---|---|---|
| **NBDKH** | - | National Buildings Decarbonisation Knowledge Hub |
| **NCWSC** | - | Nairobi aCity Water and Sewerage Company |
| **NDCs** | - | Nationally Determined Contributions |
| **NEMA** | - | National Environment Management Authority |
| **NGOs** | - | Non-Government Organizations |
| **NSDI** | - | National Spatial Data Infrastructure |
| **OBI** | - | Open Buildings Insights |
| **QA/QC** | - | Quality Assurance / Quality Control |
| **SDG** | - | Sustainable Development Goals |
| **TVETs** | - | Technical and Vocational Education and Training |
| **UNEP** | - | United Nations Environment Programme |
| **UNOPS** | - | United Nations Office for Project Services |
| **WiRE** | - | Women in Real Estate |
| **WRI** | - | World Resources Institute |

# LIST *of* DEFINITIONS

**Adaptive management** - learning by doing" through cycles of planning, implementation, monitoring, and evaluation to increase understanding and effectiveness over time

**Decarbonization** - Decarbonization is the process of reducing or eliminating greenhouse gas (GHG) emissions, especially carbon dioxide ($CO^2$), from human activities by shifting from fossil fuels to renewable energy, improving energy efficiency, and capturing carbon, all to combat climate change and reach net-zero emissions.

**On-site renewable energy** - energy generated at the point of use.

**Performance baseline** - a starting point or reference level of current performance, established before changes, used to measure progress and determine if improvements are effective

**Tiered methodology** - a structured, multi-level approach where data gathering and analysis is organized into distinct levels (tiers) to match different needs, capabilities, or complexities.

# FOREWORDS

## Ministry of Lands, Public Works, Housing and Urban Development

Decarbonising the built environment is essential to achieving sustainable development and meeting the country's Nationally Determined Contributions under the Paris Agreement. As one of the largest sources of emissions and a cornerstone of social and economic development, the building and construction sectors present both significant challenges and transformative opportunities.

The State Department of Public Works has demonstrated strong leadership in recognizing the need for a clear, actionable pathway to reduce emissions while continuing to deliver safe, affordable and inclusive infrastructure and housing. By initiating and championing the development of this decarbonisation roadmap, the Department has taken an important step towards aligning sectoral priorities with national climate commitments.

This roadmap was developed through close collaboration with the Global Buildings Performance Network, combining leadership, sectoral expertise, and technical analysis to identify practical interventions that can be implemented at national and county levels. The process emphasized feasibility, equity, and long term impact, ensuring that climate action is integrated into core development objectives.

As implementation moves forward, the Department's continued leadership will be critical in translating this roadmap into tangible outcomes across counties. Through sustained collaboration, capacity building, and coordinated action, this roadmap provides a foundation for delivering low-carbon development that supports economic growth, job creation and climate resilience.

By initiating and championing the development of this decarbonisation roadmap, the Department has taken an important step towards aligning sectoral priorities with national climate commitments.

**Hon. Alice Wahome, E.G.H**
**Cabinet Secretary,**
**Ministry of Lands, Public Works, Housing and Urban Development**

## State Department Of Public Works

Kenya's vision for sustainable development and economic growth is intrinsically linked to the transformation of our built environment. As urbanization intensifies and infrastructure expands, the building and construction sector must evolve to meet Kenya's commitments to a low-carbon, climate-resilient future under the National Climate Change Action Plan, Kenya Vision 2030 and the Paris Agreement.

The Kenya National Decarbonization Roadmap for the Built Environment represents a significant milestone to steer the sector towards significant greenhouse gas reductions. Buildings and construction are major contributors to emissions not only through energy use but also via materials and construction practices. This Roadmap offers a clear, phased approach to minimizing both embodied and operational carbon through innovative low-carbon materials, enhanced energy efficiency, green public procurement and capacity building.

Realizing this vision requires a coordinated effort across Government agencies, private sector, academia, development partners, and communities. The roadmap embodies this collaborative spirit by providing actionable strategies aligned with national policies such as the Low Carbon Climate Resilient Development Strategy, ensuring that decarbonization is integral to all stages of a building's lifecycle—from design and construction to operation and decommissioning.

As a State Department, we reaffirm our commitment to promoting enabling policy environments, strengthening regulatory frameworks, and investing in skills development to drive the transition. This transition will create opportunities for innovation, green jobs, and sustainable economic growth, while safeguarding Kenya's ecosystems and improving quality of life.

This Roadmap is more than a policy directive—it is a decisive call to action for all stakeholders to embrace sustainable practices, uphold Kenya's climate goals, and build resilient infrastructure for future generations. As a team, we will transform the building and construction sector into a cornerstone of Kenya's low-carbon development pathway.

This Roadmap is more than a policy directive—it is a decisive call to action for all stakeholders to embrace sustainable practices, uphold Kenya's climate goals, and build resilient infrastructure for future generations.

**Joel Arumonyang, CBS**
**Principal Secretary**
**State Department for Public Works**

## Arch. George Arabbu Ndege, President, The Architectural Association of Kenya

Kenya's built environment is shaped by the converging pressures of climate change, population growth, rapid urbanization, and systemic failures in development control. These challenges underscore the urgent need to rethink how spaces are planned and how buildings are designed and constructed – not only as physical structures, but as instruments of public safety, social equity, and environmental stewardship.

Current building practices remain largely fragmented and reactive, disproportionately affecting the urban majority – vulnerable, low-income households – who are increasingly exposed to climate risks such as flooding, heat, water scarcity, and other extreme weather events.

Therefore, this roadmap is timely, envisioned as a pathway to safeguarding Kenyans and reaffirming our constitutional right to a clean, healthy, and safe environment. It provides a coherent, nationally-aligned framework to guide the planning, design, construction, operation, and maintenance of buildings towards a near-zero, climate-resilient future. In doing so, it supports a reduction of our emissions by 32%, as outlined in our Nationally Determined Contributions (2020–2030).

The Roadmap further aims to strengthen accountability at a local, regional, and international level, in line with Kenya's Vision 2030, Africa Vision 2063, and the Global ABC's Building Breakthrough Agenda.

The Kenya National Building and Construction Decarbonization Roadmap: A National Strategy towards Zero Emission Buildings presents a practical yardstick for defining progress towards a climate-responsive built environment in Kenya – one that must be actively translated into practice and embedded within the day-to-day activities of construction.

This National Strategy provides a pathway towards formality within an industry that operates approximately 80% irregularly, by recommending the adoption of key sector recommendations aligned with Kenya's robust legal and regulatory frameworks.

This National Strategy provides a pathway towards formality within an industry that operates approximately 80% irregularly, by recommending the adoption of key sector recommendations aligned with Kenya's robust legal and regulatory frameworks.

**George Arabbu**

**President,**

**Architectural Association of Kenya**

## Dr. Peter Graham, CEO, Global Buildings Performance Network

The transition to a low-carbon buildings sector represents one of our greatest challenges as well as the most exciting opportunities. As a creative and growing industry, we have the expertise and tools to redefine how we design, build and operate our built-environment so that it plays its part in tackling climate change, and catalysing sustainable development.

This roadmap provides a shared vision for decarbonising the buildings sector through innovative stakeholder-led bottom-up practices, collaboration, partnerships and accountability. It demonstrates what can be achieved when public and private sectors work together towards a common goal - to create an industry that builds responsibly and sustainably.

The Global Buildings Performance Network are honoured to work alongside government, research institutions, and industry partners to accelerate this transformation. By aligning our actions with Kenya's national goals and focusing on implementable actions and measurable outcomes, we can deliver real change, today and for generations to come.

**Peter Graham,**
**Chief Executive Officer & Executive Director,**
**Global Buildings Performance Network**

By aligning our actions with Kenya's national goals and focusing on implementable actions and measurable outcomes, we can deliver real change, today and for generations to come.

## Arch. Mugure Njendu, Programs Lead Africa Team, Global Buildings Performance Network.

Kenya stands at a defining moment.

As our cities expand, our population grows, and our demand for housing and infrastructure accelerates, the decisions we make today will shape not only our built environment—but our economic resilience, public health, and climate future. Buildings are not just structures of concrete and steel; they are long-term investments that will either lock us into decades of inefficiency and high costs, or propel us toward a low-carbon, competitive, and inclusive economy.

This Decarbonization Roadmap arrives at an opportune time. The building and construction sector is one of the largest contributors to energy consumption and greenhouse gas emissions globally. In Kenya, rapid urbanization and rising housing demand mean that millions of square metres of new floor space will be constructed in the coming years. Without intervention, this growth risks significantly increasing national energy demand, infrastructure strain, and long-term operational costs for households and businesses.

This Roadmap demonstrates that Kenya can meet its development ambitions while bending the emissions curve downward. It outlines a practical, evidence-based pathway to reduce emissions across the building lifecycle—through improved design, energy efficiency, material choices, electrification, and policy alignment. It shows that decarbonization is not a constraint to growth; it is a catalyst for smarter growth.

The financial case is equally compelling. Inefficient buildings carry hidden costs—higher energy bills, increased peak demand on the grid, costly retrofits, and exposure to volatile fuel prices. By contrast, efficient and low-carbon buildings reduce operational expenditure, strengthen energy security, and lower long-term infrastructure investment needs. The Roadmap quantifies these benefits, demonstrating that early action delivers measurable savings while avoiding future lock-in costs.

Importantly, this is not only an environmental agenda—it is an economic and social one.

A transition to low-carbon buildings can stimulate green jobs across the value chain—from manufacturing and construction to engineering, design, and facility management. It can enhance indoor comfort and

> Kenya has an opportunity to build differently—to construct homes, schools, hospitals, and workplaces that are efficient, affordable, and climate-resilient. To future-proof our infrastructure. To demonstrate that sustainable development is not aspirational, but achievable.

health outcomes. It can reduce energy poverty by lowering utility bills. And it positions Kenya as a regional leader in sustainable urban development.

This Roadmap also recognizes that transformation requires coordination. Policy, finance, technical standards, market incentives, and capacity building must move together. By aligning green building standards, regulatory frameworks, and sectoral targets, we can create a coherent ecosystem that accelerates adoption rather than fragments effort. The Roadmap therefore serves not only as a technical guide, but as a platform for collaboration across government, private sector, development partners, and civil society.

The launch of this Roadmap is not the end of a process—it is the beginning of implementation. Its success will depend on shared ownership and decisive action. The pathway is clear. The tools are available. The economic rationale is strong.

Kenya has an opportunity to build differently—to construct homes, schools, hospitals, and workplaces that are efficient, affordable, and climate-resilient. To future-proof our infrastructure. To demonstrate that sustainable development is not aspirational, but achievable.

The choices we make today will stand for generations.

Let us build wisely. Let us build efficiently. Let us build for a low-carbon future.

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**Mugure Njendu**
**Programs Lead - Africa Team,**
**Global buildings Performance Network**

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## ORGANIZATIONS

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# 1 Introduction and Context

## 1.1 Background: Buildings in the Context of Kenya's Climate Agenda

Kenya's $CO^2$ emissions increased from 3.9million tonnes in 1972 to 22.4 million tonnes in 2021, growing at an average annual rate of 3.89%. Of the 22.4 million tonnes, roughly 32% is attributed to the Built Environment (excluding emissions from manufacturing of building products) about 7.168 million tonnes. In response to this, Kenya submitted an updated, more ambitious Nationally Determined Contribution (NDC 1) on December 24, 2020, with a commitment to reduce emissions by 30 percent by 2030 (32 percent with support) relative to the business-as-usual scenario and in line with its sustainable development agenda and national circumstances.

Kenya is also one of the first countries in Africa to enact a comprehensive law and policy to guide national and subnational climate action. The Climate Change Act 2016 and the Climate Change Amendment Act 2023, the National Climate Change Action Plan III 2023-2027, and the long term Low Emissions Development Strategy 2022-2050 which guide low-carbon and climate resilient development in Kenya. Kenya's priorities as articulated through these, and other, instruments to include: adaptation, reducing emissions from deforestation and forest degradation, afforestation and reforestation, landscape restoration, climate-smart agriculture, geothermal and clean energy development, energy efficiency, and drought and flood risk management[1].

The State department for Public Works, at the Ministry of Lands, Public Works, Housing & Urban Development, invited GBPN in mid 2024 to commence development of a National decarbonization roadmap for the buildings sector as part of the Global Buildings Breakthrough Agenda. This roadmap is linked to other major African Countries in both the Declaration de Chaillot and the Global Alliance on Buildings and Climate (Both of which GBPN supports). The Roadmap has brought together a coalition of experts from the Ministry of Lands, Public Works, Housing & Urban Development, Ministry of Energy and Petroleum, Ministry of Devolution, National Construction Authority, Architectural Association of Kenya, Kenya Green Building Society, Institute of Quantity Surveyors of Kenya, Institute of Engineers of Kenya, Kenya Institute of Planners, Kenya Property Developers Association, Kenya Association of Manufacturers, UNEP, Global ABC, UNOPS, Private Sector entities, Sustainable Energy for All, World Resources Institute and local Universities.

The roadmap's objective is to keep Kenya on track to achieve zero-emissions commitments, through mapping a path for Country decarbonization including achieving zero-emissions buildings, and access to sustainable housing for all.

The Situational Analysis and Baseline assessment are the foundation upon which Kenya's National Buildings and Construction Sector Decarbonization Roadmap has been developed. In a context where reliable, disaggregated, and up-to-date data is limited, the baseline serves as a critical diagnostic tool to define where the sector currently stands, identify key sources of emissions, and assess existing policies, practices, and barriers to achieving a net-zero trajectory.

[1] Kenya's Climate Change Profile

While Kenya's building sector has been named responsible for an estimated 32% of national carbon emissions[2], national statistics do not provide detailed data on building stock, energy use, materials flows, or compliance with environmental regulations. The baseline was designed to address this gap by combining primary data collection (through surveys, interviews, and building studies) with secondary literature and stakeholder insights, in order to develop baseline emissions, sector performance, and institutional readiness.

## 1.2 The Role of the Building Sector in National Emissions

The buildings and construction sector is a major contributor to Kenya's greenhouse gas (GHG) emissions, accounting for over 10.7% of total energy-related emissions, with 6.2% from residential buildings, 4.5% from commercial and public buildings, and 18.4% from industrial buildings and industrial processes.[3] The sector's carbon footprint is driven by high energy consumption in building operations such as cooling, lighting, heating and use of appliances, reliance on carbon-intensive materials such as cement and steel and inefficient construction practices.

Despite Kenya's strong renewable energy mix (up to 90%), buildings account for 75% of final energy consumption, with a significant portion of the population still relying on charcoal and biomass for cooking, contributing to deforestation and indoor air pollution. While energy efficiency policies and incentives exist, gaps in enforcement, financing, and market readiness continue to hinder widespread adoption of low-carbon building solutions. Addressing these challenges through sustainable construction materials, green building regulations, and improved energy efficiency measures is crucial for Kenya's decarbonization and climate resilience goals.

## 1.3 Kenya's Commitments: NDCs, Buildings Breakthrough, and 1.5°C Alignment

Kenya has demonstrated strong commitment to global climate action through its Nationally Determined Contributions (NDCs), participation in the Buildings Breakthrough Initiative, and alignment with the 1.5°C temperature goal under the Paris Agreement. These frameworks collectively reflect the country's ambition to transition toward a low-carbon, climate-resilient economy by decarbonizing key sectors, including buildings and construction.

Under its NDC 1, Kenya targets a 32% reduction in greenhouse gas (GHG) emissions by 2030, relative to the business-as-usual scenario. Achieving this requires sectoral transformation, with the buildings and construction sector identified as a critical area for mitigation due to its substantial and growing energy demand. The sector currently contributes approximately 10.7% of total energy-related emissions, driven by high electricity use, reliance on carbon-intensive materials such as cement and steel, and inefficient building designs. Moreover, buildings account for nearly 75% of total final energy consumption in the country, underscoring their central role in Kenya's emission profile and energy transition pathway.

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[2] United Nations Environment Programme. (2023). *2023 global status report for buildings and construction: Towards a zero-emissions, efficient and resilient buildings and construction sector.*

[3] GBPN Situational Analysis (2025).

Decarbonizing Kenya's buildings and construction sector is therefore vital for achieving the 2025–2030 NDC target. Transitioning to energy-efficient building designs, sustainable construction materials, and integrating renewable energy technologies—such as solar and passive design systems—can drastically reduce emissions while improving energy access, affordability, and comfort. Additionally, enforcing green building codes, strengthening policy implementation, offering financial incentives, and building technical capacity will be essential in driving large-scale adoption of low-carbon building practices.

Kenya's engagement in the Buildings Breakthrough Initiative, launched under the Breakthrough Agenda at COP27, further emphasizes its leadership in this space. The initiative seeks to make near-zero-emission and resilient buildings the new norm by 2030, aligning Kenya's domestic efforts with the global 1.5°C pathway. Through such international cooperation, Kenya aims to leverage knowledge exchange, technological innovation, and financing mechanisms that accelerate progress in the built environment.

In aligning its national climate strategy with the 1.5°C global target, Kenya recognizes that decarbonizing the buildings and construction sector not only reduces emissions but also enhances climate resilience, economic competitiveness, and human well-being. Strengthening these commitments and accelerating implementation will be pivotal to achieving both national development goals and global climate objectives.

## 1.4 Rationale for the Roadmap – Linking National Priorities to Global Goals

The development of the Kenya National Buildings and Construction Sector Decarbonization Roadmap is driven by the need to align national development objectives with global climate commitments, while addressing the country's unique social, economic, and environmental priorities. The roadmap provides a strategic framework to guide Kenya's transition toward a low-carbon and climate-resilient built environment, ensuring that growth in the construction sector supports, rather than hinders, national and global sustainability goals.

At the national level, the roadmap directly supports the implementation of key policy instruments, including Kenya's Vision 2030, the National Climate Change Response Strategy (2023–2027), and the Nationally Determined Contributions (NDC 1 & 2), which commit to a 32% & 35% reduction respectively in GHG emissions by 2030. It also complements sectoral frameworks such as the National Energy Efficiency and Conservation Strategy (NEECS), the Green Economy Strategy and Implementation Plan (GESIP), and ongoing initiatives under the Affordable Housing Programme. By embedding low-carbon, energy-efficient, and climate-resilient principles into building design and construction, the roadmap supports Kenya's priorities of sustainable urbanization, economic competitiveness, job creation, and improved living standards.

At the global level, the roadmap positions Kenya as an active contributor to international climate and sustainability agendas. It aligns with the Paris Agreement's 1.5°C pathway, the UN 2030 Agenda for Sustainable Development, particularly Sustainable Development Goals (SDGs) 7, 11, 12, and 13, and the Buildings Breakthrough Initiative under the Breakthrough Agenda launched at COP27. These frameworks emphasize that achieving global climate neutrality requires rapid decarbonization of the built environment—one of the largest sources of energy-related emissions worldwide.

By linking Kenya's national policies with these global objectives, the roadmap enhances coherence across sectors, mobilizes international support, and attracts climate finance and technology partnerships. It serves as a practical tool to guide coordinated action among government, private sector, academia, and civil society, ensuring that Kenya's building sector transformation contributes meaningfully to the global net-zero transition while delivering inclusive and resilient development domestically.

## 1.5 Roadmap Development Process and Stakeholder Engagement Approach

The development of the Kenya National Buildings and Construction Sector Decarbonization Roadmap follows a collaborative, evidence-based, and inclusive approach that integrates technical analysis with participatory stakeholder engagement. This process ensures that the roadmap is both technically robust and contextually grounded—reflecting Kenya's national priorities, subnational realities, and alignment with global climate commitments.

### 1.5.1 Objectives of Stakeholder Engagement

The stakeholder engagement process is designed to;

- Validate findings and assumptions from the baseline emissions assessment.
- Co-develop policy recommendations, sectoral interventions and financing pathways that are practical and scalable.
- Ensure alignment with national development agendas, subnational priorities and international frameworks such as the NDCs, the Buildings Breakthrough and SDG targets.
- Promote inclusion, transparency and ownership among diverse stakeholder groups, particularly traditionally underrepresented voices.
- Establish long-term champions and institutional partners for sustained roadmap implementation.

### 1.5.2 Stakeholder Categories and Roles

- **Government (National and County):** Including the State Department for Public Works and the Council of Governors — to provide input on regulatory reforms, NDC alignment, and devolved implementation strategies.
- **Built Environment Professionals:** Including AAK, KGBS, KPDA,IQSK, IEK, EBK, BORAQS, and KIP — to co-design interventions related to building design, planning codes, and compliance mechanisms.
- **Private Sector:** Comprising developers, contractors, cement manufacturers, and utilities providers — to identify market barriers, investment opportunities, and private-sector driven solutions.
- **Financial Institutions and Green Bond Initiatives:** Including KBA, Acorn, and FSD Kenya — to shape green financing mechanisms, incentives, and risk mitigation frameworks.
- **Civil Society and Community-Based Organizations:** Such as Slum Dwellers International and Women in Real Estate (WIRE) — to ensure inclusivity, representation, and practical applicability of recommendations.
- **Academia and Research Institutions:** Including JKUAT, University of Nairobi, CSTI and Meru University —

to support technical review, scenario modelling, and data validation.

- **International Partners:** Including UN-Habitat, SEforALL and WRI— to provide benchmarking, analytical tools (e.g., OBI), and opportunities for peer learning and regional exchange.

### 1.5.3 JEDI Inclusion

- To ensure equitable participation and representation, the following measures are integrated throughout the engagement process:
- A minimum of 30% participation by women and youth across all consultation forums.
- 2–3 dedicated consultation slots per session for civil society and end-user representatives.
- Translation of key consultation materials into Kiswahili and/or visually accessible formats such as infographics.
- Provision of logistical and financial incentives for community-based participants and persons with disabilities (PWDs) to facilitate equitable participation.
- A JEDI consultant was also engaged for the roadmap development to ensure an iterative process of achieving inclusivity including rounds of reviews and going back to the field to plug identified gaps.

## 1.6 Alignment with Global ABC and International Frameworks

### 1. Action and Focus Areas:

| Global ABC Action Areas | GBPN Focus Areas |
|---|---|
| Strategic Priorities | Energy Efficiency |
| Spatial and Urban Development | Spatial and Urban Development |
| Existing Buildings | Existing Buildings |
| New Buildings | New Buildings |
| Construction Supply Chain | Construction Supply Chain |
| | Enabling Factors |

*Table 1-1: Global ABC's Action Areas and GBPN's derived Focus Areas*

**Source: GBPN (2025).**

GBPN's alignment with the core action areas of the Global ABC ensures our roadmap speaks the same language as international frameworks and contributes directly to the Buildings Breakthrough and Paris-aligned goals. Additionally, the roadmap pays specific attention to Enabling Factors as an enabler for all the other action areas. This allows specific consideration of the systemic conditions that determine whether strategies succeed, such as:

i. **Policy & governance systems:** addressing enforcement gaps, regulatory conflicts, and digitization.
ii. **Capacity building:** training fundi's, professionals, and regulators for better compliance and innovation uptake.

iii. **Data and knowledge infrastructure:** filling critical local data gaps through data gathered from local stakeholders and validated through tools like the Carbon Metric Tool and Open Building Insights.
iv. **Stakeholder coalitions:** industry, academia, and government co-creating the roadmap, ensuring ownership and buy-in.

In this way GBPN pairs sectoral action areas with the enabling systems, that is: policy, capacity, data, and stakeholder ownership. This turns the roadmap, which is essentially a strategy, into lasting implementation.

## 2. Objectives of the roadmap processes.

| Global ABC | GBPN |
|---|---|
| **Zero embodied carbon** | **Establish a measurable emissions baseline** for the building and construction sector, including both operational and embodied emissions, using tiered estimation methods where national data is limited. |
| **Zero operational carbon** | **Map current building practices, material flows, energy use, and technology adoption** across different typologies (e.g., new vs. existing buildings, formal vs. informal, public vs. private), to understand where emissions are concentrated. |
| **Adaptation** | **Identify policy, regulatory, and institutional gaps** that hinder decarbonization, including enforcement challenges, outdated codes, weak coordination, and limited data systems. |
| **Inclusion & Wellbeing** | **Assess enabling and constraining factors,** such as financing availability, public awareness, professional capacity, digital tools, and supply chain readiness. |
| | **Generate inclusive, stakeholder-informed insights**, incorporating the lived experiences and perspectives of industry actors, government agencies, community groups, and vulnerable populations, in line with justice, equity, diversity, and inclusion (JEDI) principles. |
| | **Create a monitoring and reporting foundation for evaluating progress** over time and supporting Kenya's commitments under the Paris Agreement, the 2025–2030 NDCs, and the Buildings Breakthrough Agenda. |

*Table 1-2: Global ABC and GBPN Roadmap Objectives*

**Source: GBPN (2025).**

The Global ABC has set the 'what' of decarbonisation—zero carbon, adaptation, inclusion—in the development of The Kenya Roadmap GBPN has detailed the 'how': a data-driven, stakeholder-owned, and implementation-ready pathway tailored to Kenya's realities.

**How the GBPN Roadmap process aligns global ambition with national delivery**

- **Evidence foundation:** the process begins with local data (situational analysis and baseline assessment) ensuring national-specific credibility.
- **Gap diagnosis:** delves deep into specifically Kenyan regulatory and institutional bottlenecks.
- Enabling factors: explicitly integrates financing, capacity building, policy enforcement and digitalization into the roadmap.

- **Stakeholder inclusivity:** co-creation process with industry, academia, government, and communities, embedding JEDI principles.
- **Monitoring & accountability:** sets up a system to track progress and enforce accountability.

## 3. Roadmap development approach.

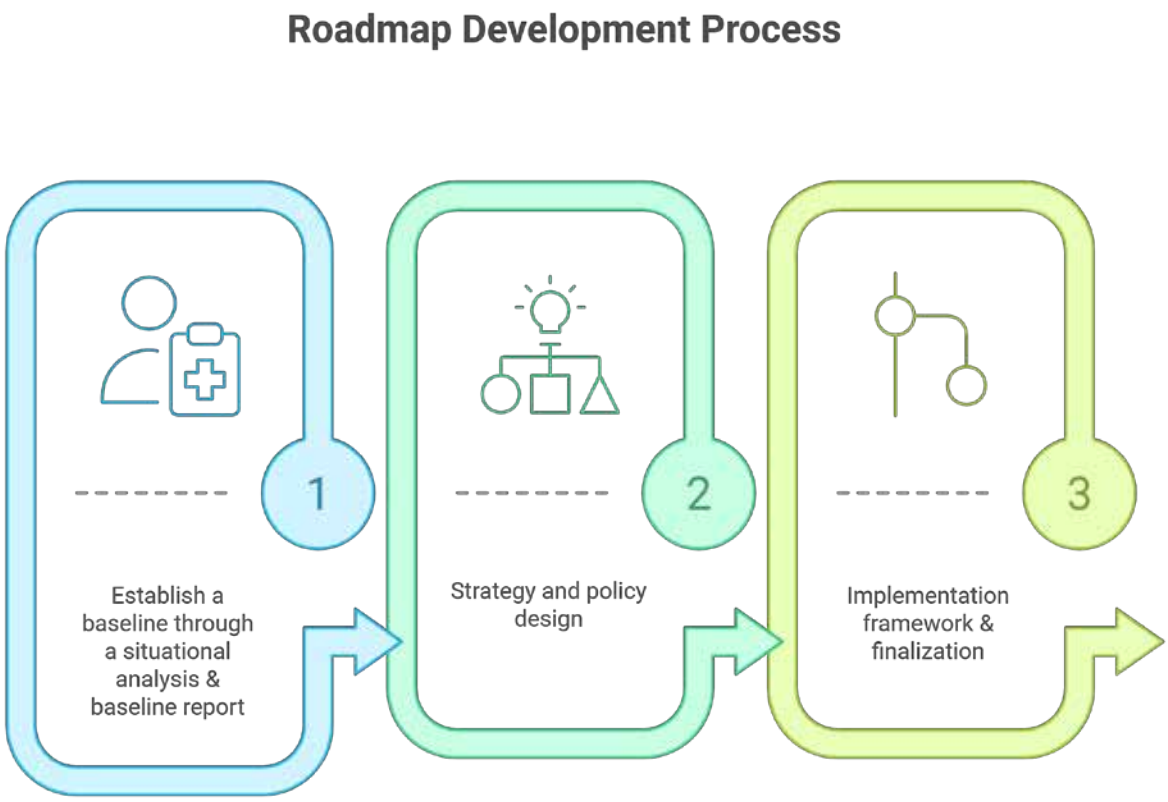



*Figure 1-1: GBPN's Roadmap Development Process*

**Source: GBPN - Graphic by Napkin AI (2025).**

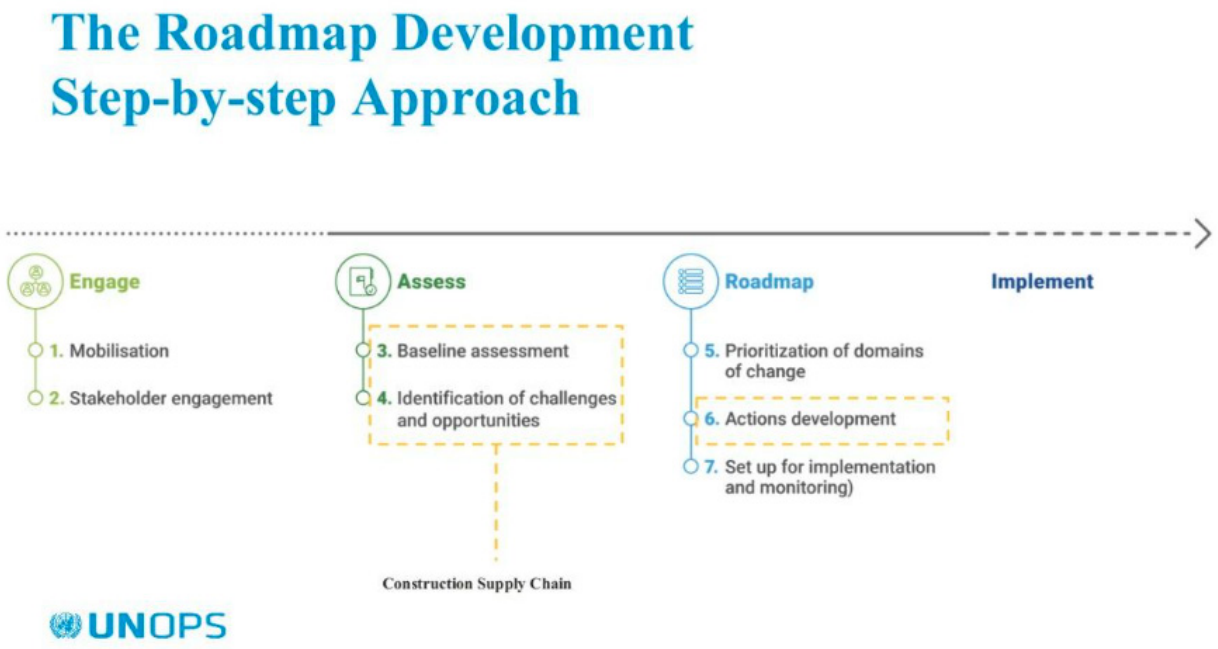



*Figure 1-2: UNEP's Guidance on the process for development of Climate Action Roadmaps*

**Source: UNOPS (2024).**

| Feature | Global ABC Roadmap Process Guidance | GBPN Kenya Application and Contextualisation |
|---|---|---|
| Global alignment & ambition | Alignment to international frameworks (Paris Agreement, NDCs, Buildings Breakthrough, zero-emissions targets) and use of global guidance. | Ensures that national policies, local regulatory environments, and Kenya's international commitments are woven together and that ambition is locally validated. |
| Stakeholder engagement | Advocates engagement of broad expert and sector consultations. | Adopts a continuous, deep engagement with a wide coalition (industry, academia, government, civil society), including data validation and prioritization with the same stakeholders, ensuring ownership. |
| Baseline assessments & data-driven diagnostics | Outlines establishment of baselines, diagnostics of emissions, materials, etc. | Investment in local data: localized emission factors, mapping of local supply chains, actual vs policy practices; fills local data gaps; validates with stakeholders. |
| Use of Tools / Innovation | Provides frameworks, global tools, guides; step-by-step guides. | Leverages digital tools and platforms, works with SEforALL, GBPN's own Carbon Metric Tool, local pilots/innovation; also places emphasis on digitization and enforcement systems (local tools/ specificity). |

| | | |
|---|---|---|
| Focus on Implementation & Monitoring | Sets out monitoring, defines indicators, and aims to cascade roadmaps to national/ subnational levels. | Outlines preparation for early implementation projects, aligns actions to NDC updates, validates baseline, and sets monitoring frameworks. |
| Living / iterative document | Views roadmaps as living documents for revision; emphasizes periodic update. | Incorporates iteration (baseline, validation, priority-setting, early actions), refines based on feedback; relies on strong local feedback loops. |
| Enabling factors / implementation gaps | Acknowledges adaptation, inclusion, resilience, supply chain etc as critical to decarbonization. | Addresses Kenya's context in enforcement, regulatory overlaps, capacity gaps, digital systems. |

*Table 1-3: Global ABC's and GBPN's Roadmap Development Process Alignment*

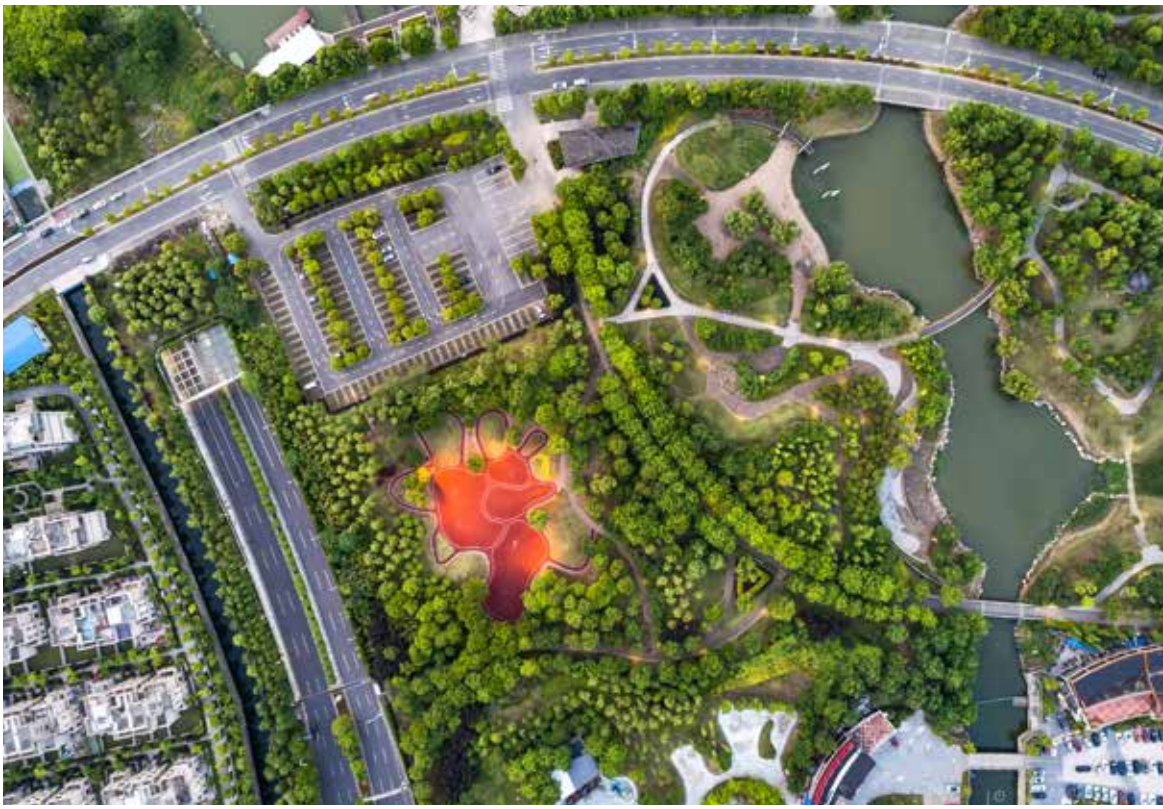
**Source: GBPN (2025).**

## 4. Key Features of the GBPN Kenya Roadmap Development Approach

- **Ownership & Legitimacy:** Deep engagement of stakeholders,actors and institutions (during baseline validation, workshops, working groups), who will implement the roadmap.
- **Contextual Relevance:** Specificity of local data, local institutional realities, supply chain specifics, and enforcement challenges.
- **Implementation Orientation:** Built-in preparation for implementation, with identification of early actions, indicator development, and alignment with NDC and national policy.
- **Inclusive & Transparent Process:** Workshops provide transparency; validation of data means less risk of mismatch between what's planned and what's practical.
- **Tool Integration & Innovation:** Use of various analytic tools, digital platforms, and international collaborations anchored to local conditions helps maintain technical quality and ensures consistency with global standards.

Overall Takeaway: The Global ABC Roadmap methodology provided the necessary global framework and milestones, which GBPN's through the Kenyan roadmap process has translated into a sector-owned, data-grounded, and implementation-ready roadmap thereby bridging the gap between global ambition and local action.

# 2 METHODOLOGY



## 2.1 Overview of the GBPN Tiered Methodology

Kenya has a significant data gap in regards to building performance, construction practices and material use, both in conventional and green buildings. This makes it **difficult to evaluate** the impact of existing policies, track energy efficiency trends, or identify priority areas for intervention. As a result, **decision-makers, developers, and researchers operate with limited visibility,** slowing down the country's transition to a more sustainable and resilient built environment. This, therefore, necessitated the **creation of a baseline.**

The baseline assessment focused on Keny**a's buildings and construction sector, with the aim of quantifying emissions, identifying policy and implementation gaps, and informing sector-specific interventions** for decarbonization. The scope of the assessment was national, **encompassing both urban and rural contexts and including formal and informal construction.**

Establishing a measurable, reportable, and verifiable (MRV) baseline for carbon emissions in Kenya's buildings and construction sector, despite data gaps, required a **multi-faceted approach** combining best available data, modelling, and stakeholder engagement.

To achieve this, a tiered methodology that balances Kenya's limited sectoral data with the need for actionable, measurable, and verifiable emissions estimates was adopted.

## 2.2 Data Collection and Baseline Development

### 2.2.1 Methodology

To support the tiered methodology, a suite of digital tools, structured instruments, and qualitative methods were employed to collect, triangulate, and validate data across the six thematic working groups of the roadmap process[4]. The methodology was split into three tiers:

1. National level estimation using proxies
2. Disaggregated data and context specific estimation
3. Project and site specific data (selective application)

[4] *Baseline Methodology Document*, Global Building Performance Network (2025).

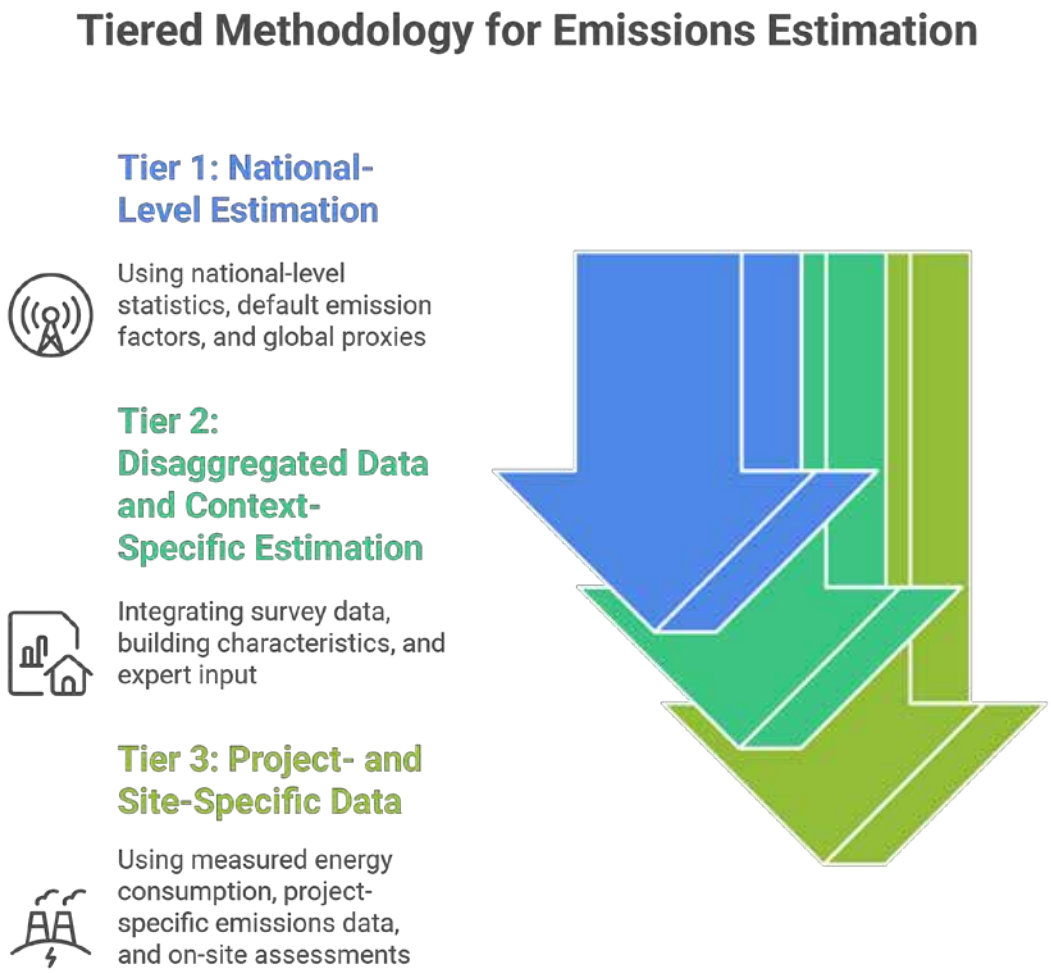



*Figure 2-1: Flow diagram of tiered methodology used.*

**Source: GBPN - Graphic by Napkin AI (2025).**

## Tier 1: National-Level Estimation Using Proxies

At the most basic level, Tier 1 estimates were developed using **national-level statistics, default emission factors, and global proxies** to generate high-level emissions profiles for different building categories. Tools and data sources included:

1. **IEA and EPRA** energy data for electricity consumption by sector,
2. **UNEP's 2023 Global Status Report for Buildings and Construction** for default energy intensities,
3. **Grid emission factors** for Kenya to calculate $CO_2$ outputs,
4. **National housing data and Open Buildings dataset (Google AI)** to estimate building floor areas by typology.

This tier allowed for **countrywide, reportable, and measurable** baseline estimates across residential, commercial, and institutional buildings.

## Tier 2: Disaggregated Data and Context-Specific Estimation

To refine the Tier 1 figures, the assessment applied Tier 2 methods, integrating **survey data, building characteristics, and expert input** to develop more accurate, sector-specific insights. Tools included:

1. The Carbon Metric Tool (Monash University and GBPN) to estimate embodied carbon of typical building materials and processes,
2. Custom-designed Google Form surveys targeting key stakeholder groups across six working groups: energy efficiency, new and existing buildings, urban planning, construction materials & supply chain, and enabling factors,
3. Semi-structured key informant interviews (KIIs) with stakeholders from government agencies, private developers, manufacturers, professional bodies, academic institutions, and civil society,
4. Published building studies and energy audits from local institutions and partners to derive Kenya-specific intensity factors,
5. GIS data and planning documents (OBI Tool by SEforALL) to understand spatial distribution and urban typologies.

Tier 2 methods enabled more contextualised estimates and sector-level diagnostics, accounting for Kenya's diversity in building types, climate zones, and construction practices.

## Tier 3: Project- and Site-Specific Data (Selective Application)

Where available, Tier 3 methodologies were used to support high-resolution data analysis through **measured energy consumption, project-specific emissions data, and on-site assessments.** This was selectively applied through:

1. **Case studies of buildings and facilities** identified through stakeholder partnerships (e.g., with Crown Paints, the Belgian Embassy, Acorn Holdings),
2. **Engagement with ongoing institutional monitoring efforts** (e.g., Meru University research on sustainable concrete, NHC)
3. **Direct interviews and walkthrough assessments** where stakeholders shared building-level consumption or performance data.

Though applied on a limited basis, Tier 3 approaches served as a foundation for establishing best practice benchmarks and identifying future areas for detailed MRV system development.

**Why a Tiered Approach?**

The tiered approach allows for accurate, scalable estimation of emissions in a context where national building stock data is incomplete. It provides:

**Flexibility:** Combines national estimates (Tier 1), sectoral data (Tier 2), and detailed building-level analysis (Tier 3).

**Practicality:** Balances Kenya's current data constraints with international reporting standards.

**Credibility:** Aligns with IPCC, UNEP GlobalABC, and CRUX guidance for measurable, reportable, verifiable (MRV) outputs.

**Progressiveness:** Enables Kenya to improve data depth over time without delaying urgent climate action.

Overall, this multi-method approach enabled the team to develop a comprehensive snapshot of Kenya's building sector emissions and readiness for decarbonization, forming a solid foundation for strategy development in the next phase of the roadmap process.

### 2.2.2. Data Sources

| | Primary Data Sources | Secondary Data Sources |
|---|---|---|
| 1. | Sector-specific Google Form surveys developed for each working group theme | Government reports (e.g., Kenya National Energy Efficiency and Conservation Strategy, EPRA statistics) |
| 2. | Semi-structured key informant interviews (KIIs) with institutional and community representatives | International references (e.g., Carbon Metric Tool Outputs, UNEP Global Status Reports, IEA energy data) |
| 3. | Workshop outputs and stakeholder feedback from the roadmap's participatory meetings | Academic publications, grey literature, and planning documents |
| 4. | Field-based data from selected building and material case studies | Building code and policy documents relevant to energy, materials and land use. |

*Table 2-1: Data Sources*

**Source: GBPN Baseline Assessment Report**

### 2.2.3. Limitations and data gaps identified

While conducting the Baseline Assessment, there were gaps identified such as:

- **Limited data on the building sector emissions**
  - Kenya doesn't have consistent **national datasets** on embodied carbon or operational emissions in buildings.
  - **Informal construction** is widespread, and **undocumented or unregulated**, resulting in a large segment of the sector being 'invisible'.

- **Little implementation of green building frameworks.**
  - **Adoption of green certification systems (like EDGE, LEED)** is still limited, pricey, and mostly focused on **commercial developments.**
  - Policy-wise, Kenya's **Energy and Building Code** (developed with support from IFC and others) is relatively new and still in implementation stages.

- **Limited access to professionals or key informants**
  - High-level stakeholders might be **difficult to reach, or reluctant to share proprietary information,** especially if it may be made public.
  - **Time constraints, hierarchical culture, and the need for formal requests** or approvals can slow down the process of accessing the individuals.
  - **Interviews might require local networks or encounter gatekeepers**

- **Knowledge and capacity gaps among professionals.**
  - Professionals may not be fully trained in the latest sustainability tools or standards, knowledge gaps can affect both **survey responses** and **the quality of insights** during interviews.
  - The concept of "green buildings" might still be interpreted in basic terms (e.g., natural lighting or solar panels), **missing full lifecycle or systems thinking.**

- **The conflict between international and local standards**
  - **Global sustainability metrics** may not align well with **local construction practices or economic realities** since Kenya and other countries do not share the same climate, local materials or policies.
  - **Language barriers or technical vocabulary** when engaging local contractors, government staff or residents might present a challenge in understanding and interpretation.

## 2.3. Stakeholder and Working Group Structure

The baseline assessment employed a multi-stakeholder, mixed-methods approach, combining primary and secondary data to capture a wholistic picture of Kenya's building and construction sector. The process was guided by the participation of six thematic working groups and informed by a broad range of sector actors. The working groups were constituted in line with the Global ABC framework and contextualised to Kenya's main sectors within the building and construction industry (See Stakeholders in Annex 1).

### 2.3.1. Working Group Structure

Each working group was co-led by both government and private sector, giving a holistic view of industry (See Stakeholders in Annex 1.1). The 6 Working Groups include:

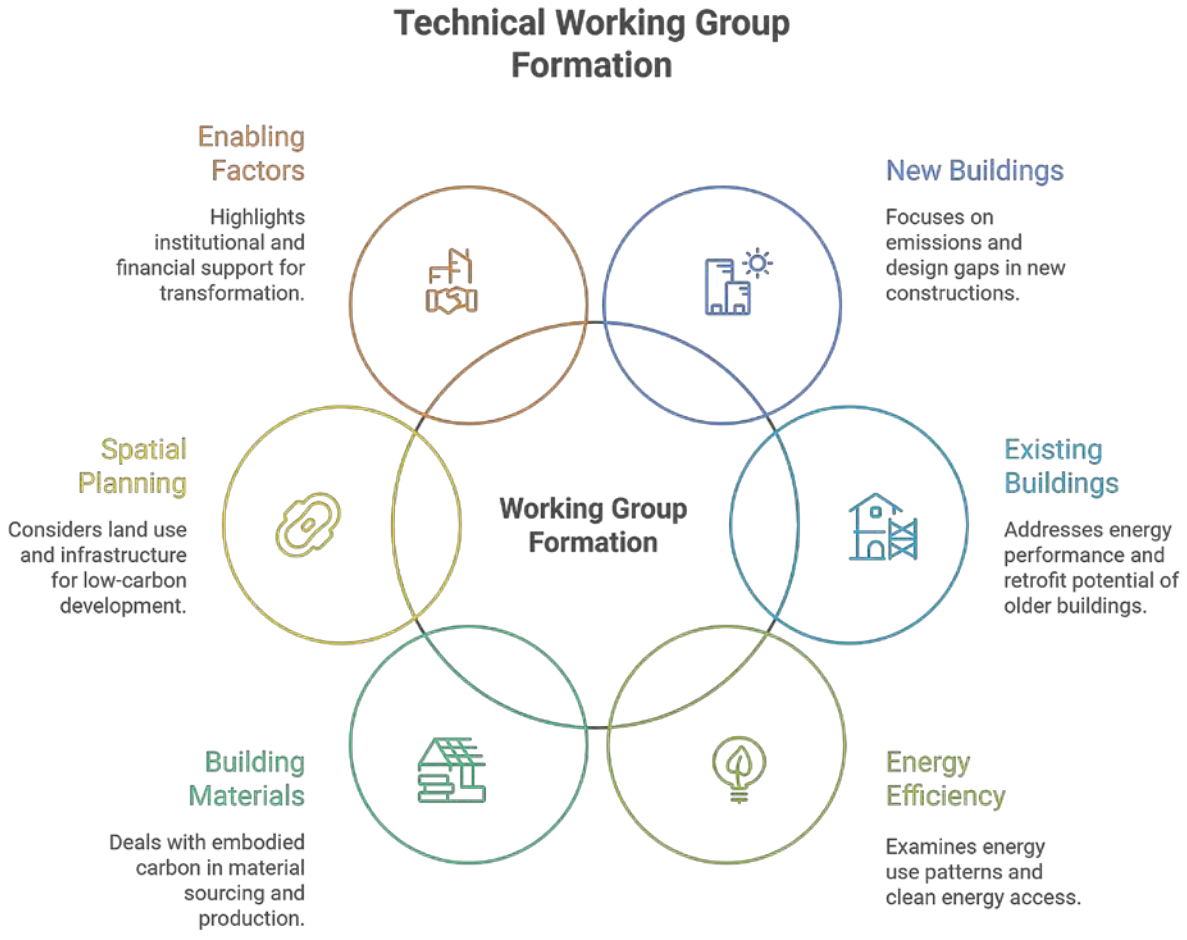



*Figure 2-2: Working group structure*

**Source: GBPN x Napkin AI (2025).**

1. **New Buildings** – Emissions and policy gaps associated with recently constructed buildings (5 years and under) and current design practices.
2. **Existing Buildings** – Energy performance, retrofit potential, and operational challenges in older building stock (5 years and over).
3. **Energy Efficiency** – Building-level energy use patterns, appliance standards, and access to clean energy solutions.
4. **Building Materials and Construction Supply Chain** – Embodied carbon from material choices, sourcing, production processes and transportation.
5. **Spatial and Urban Development**– Land use, density, infrastructure provision, and their role in enabling or constraining low-carbon development.
6. **Enabling Factors** – Institutional frameworks, finance, capacity, codes, and incentives critical for sector-wide transformation.

### 2.3.2. Stakeholder Groups

**Stakeholder Groups Consulted:**

The following stakeholder categories were engaged through surveys, key informant interviews, and working group meetings:

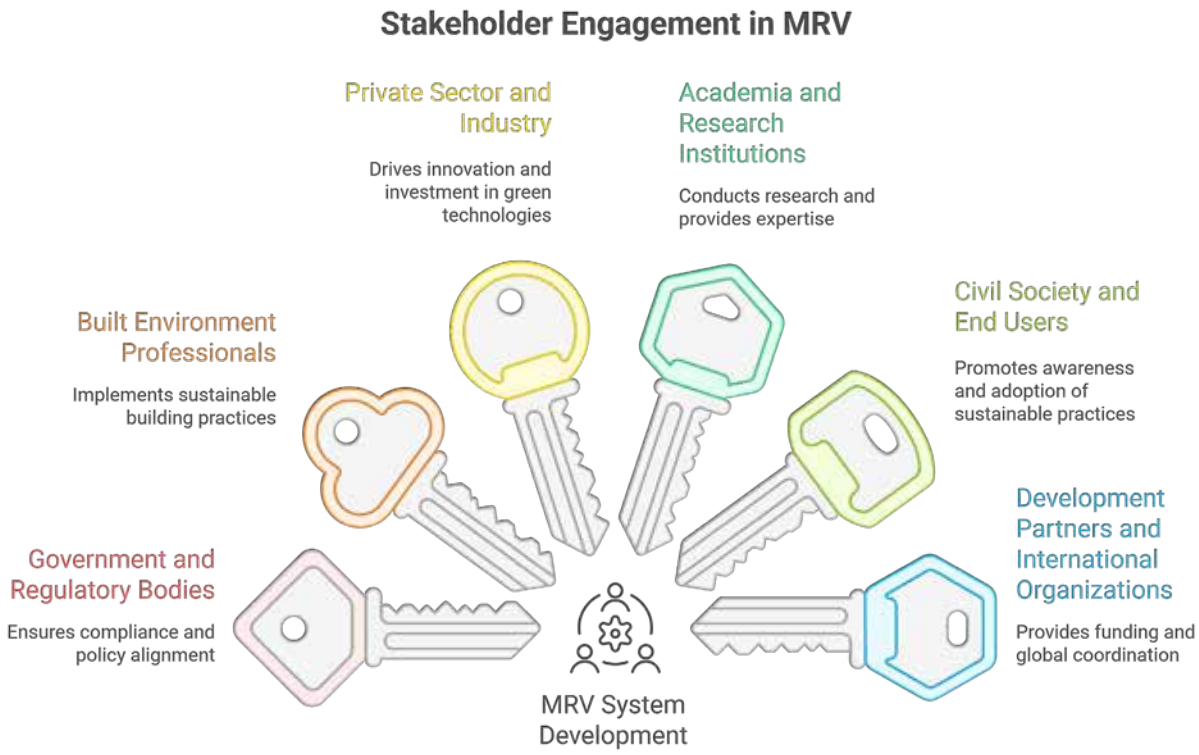



*Figure 2-3: Summary of the stakeholders engaged with during the process.*

**Source: GBPN x Napkin AI (2025).**

1. **Government and Regulatory Bodies:** Including the State Department for Public Works, National Construction Authority (NCA), Energy and Petroleum Regulatory Authority (EPRA), National Housing Corporation (NHC), select county officials among others..
2. **Built Environment Professionals:** Represented by associations such as the Architectural Association of Kenya (AAK), Institution of Engineers of Kenya (IEK), Kenya Green Building Society (KGBS), Quantity Surveyors, urban planners, and private architectural and engineering firms.
3. **Private Sector and Industry:** Including developers (KPDA), contractors, material manufacturers (KAM) (e.g., cement, steel, paints), energy providers, and real estate firms.
4. **Academia and Research Institutions:** Such as Meru University, and JKUAT, which contributed research data and technical validation.
5. **Civil Society and End Users:** Community-based organizations like Slum Dwellers International (SDI), women- and youth-led networks (e.g., WIRE), and disability rights organizations provided grassroots perspectives.
6. **Development Partners and International Organizations:** Including UN-Habitat, SEforALL, and others that offered comparative insights and technical guidance aligned with global frameworks.

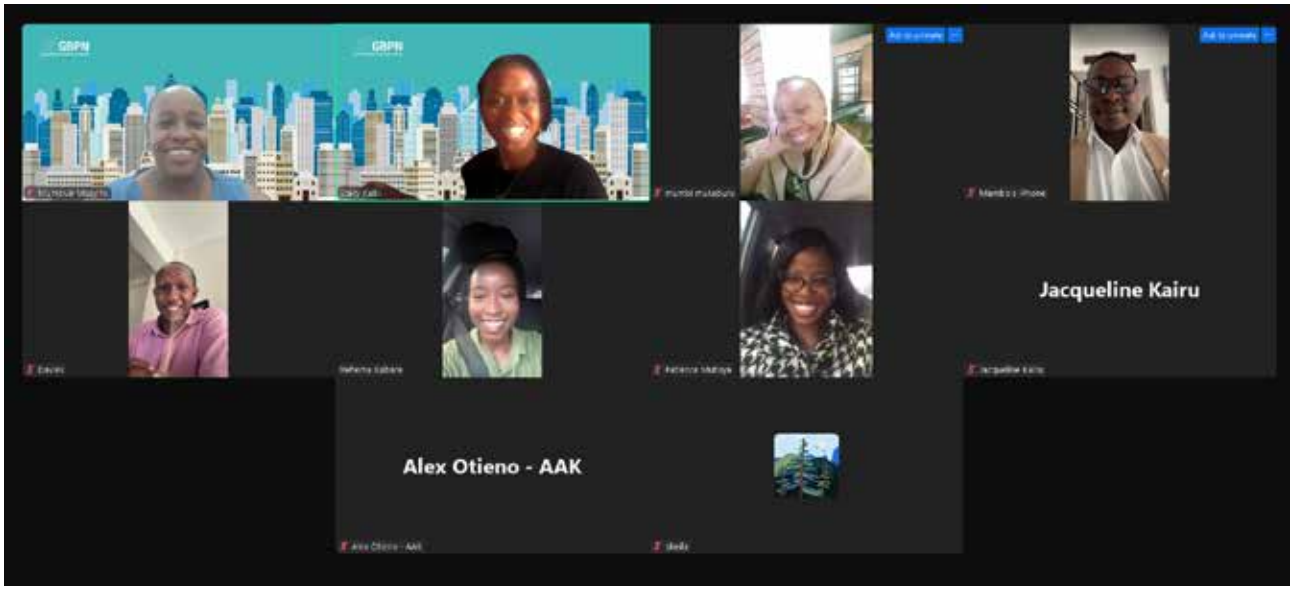



*Figure 2-4: Virtual Working Group Meeting to discuss Roadmap Development*

**Source: GBPN (2025).**


*Figure 2-5: Physical Workshop with all Working Group members to discuss Roadmap Development*

**Source: GBPN (2025).**

## 2.4. Use of Collaborative Tools (GBPN Carbon Metric, SEforALL Open Buildings Insights, etc.)

### 2.4.1. Carbon Metric Tool

The Carbon Metric Tool is a **data driven framework** developed by GBPN and Monash University. It is designed to **measure and compare the carbon performance** of buildings across **different regions and regulatory contexts.**

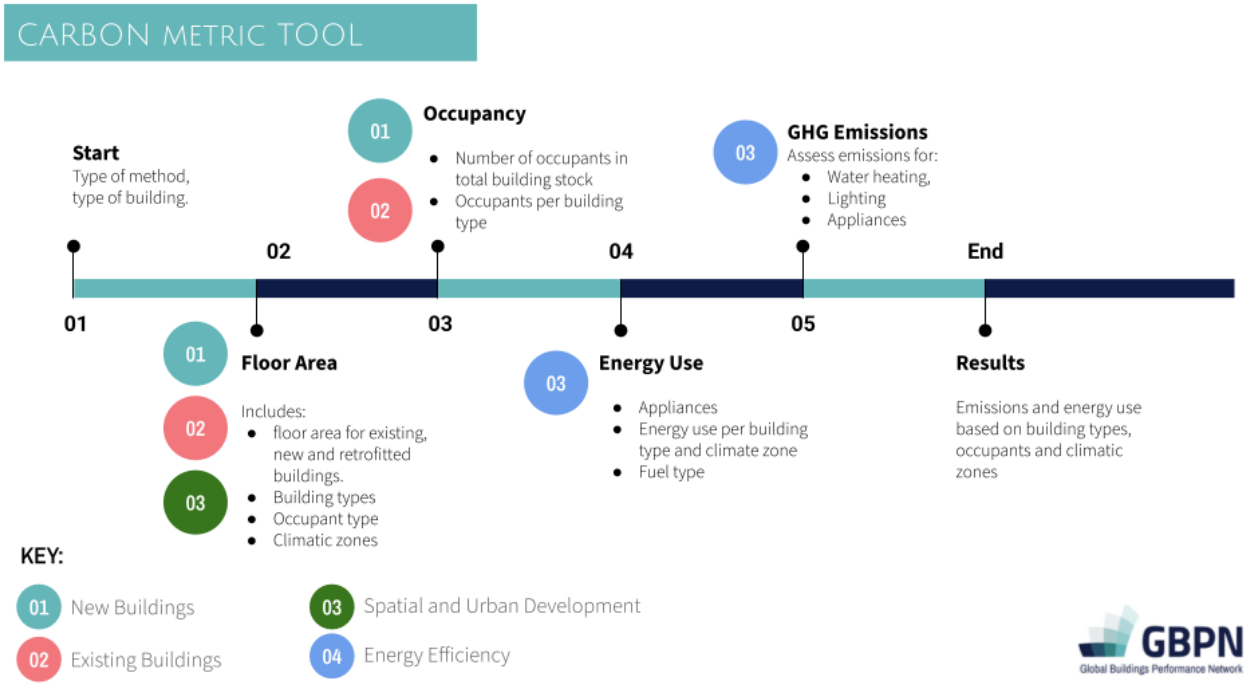



*Figure 2-6: Carbon metric tool process*

**Source: GBPN (2025).**

It was designed to **support evidence based decision making** in building decarbonization by providing a standardized approach for carbon emission assessment [5].

### 2.4.2. Open Buildings Insights Tool

The Open Buildings Insights Tool was developed by Sustainable Energy for All in collaboration with IBM. It is an interactive online platform that visually consolidates data on a map, provides building information e.g location, height, number of floors, roof image, footprint area and use. This categorization is key to determine the energy needs of an area. The tool's use was very instrumental in the Tier 3 estimation based on Project and site specific data. It facilitated the development of a baseline for energy demands and emissions.

**Damilola Ogunbiyi, CEO and Special Representative of the UN Secretary-General for Sustainable Energy for All, and Co-Chair of UN-Energy said: "....** *The Open Building Insights (OBI) Tool…. will help energy planners overcome critical data gap challenges to inform energy access and energy transition interventions, and better deliver results for those most in need."*

[5] GBPN Carbon Metric Assessment Presentation

## 2.5. Validation, Review, and Feedback Mechanisms

The validation and review process for the Kenya National Buildings and Construction Sector Decarbonisation Roadmap has been deliberately structured to reflect international best practice, while remaining rooted in the country's local realities. Globally, initiatives such as the Global ABC Roadmap [6], the European Whole-Life Carbon Roadmap, and the Fiji Low-Carbon Development Strategy emphasise iterative stakeholder engagement, evidence-based modelling, and expert peer review to ensure credibility, inclusivity, and implementation readiness.

In Kenya, this approach has been mirrored through a tiered, multi-stakeholder process described in the previous section (See Section 2.3), which was convened and coordinated by GBPN in collaboration with the State Department for Public Works and a wide range of partners across government, academia, and industry. The process has involved:

a) **Technical working groups** that have co-developed baseline data, emission factors, and priority actions, ensuring evidence generation is sector-driven *(See Annex 1).*
b) **Peer review by an expert panel**, bringing together professionals from practice, academia, policy, research and industry to validate assumptions and refine recommendations *(See Annex 1.2)*.
c) **Stakeholder validation workshops** conducted to assess the relevance and feasibility of proposed interventions, mirroring the participatory methods employed in other international roadmaps *(See Annex 1.1).*
d) **Collaboration with global partners** such as Sustainable Energy for All (leveraging the Open Building Insights tool) and WRI for Sub-nationals engagement, to enhance data credibility and align outputs with the Buildings Breakthrough and Paris Agreement frameworks.
e) **Subnational consultations** with county governments and professional associations, ensuring that the roadmap resonates with regional contexts and is implementable through devolved governance structures.

[6] Climate Action Roadmaps for Building and Construction Guide

*Figure 2-7: Roadmap Co-creation workshop with the Council of Governors in Naivasha*

**Source: GBPN x WRI x CoG (2025).**

Through these deliberate mechanisms, Kenya's roadmap validation process not only aligns with but strengthens global best practice, by integrating bottom-up co-creation, technical rigour, and contextual localisation.

This ensures that the final roadmap is both **globally credible and locally actionable, owned by Kenya's industry, and designed for long-term adaptability.**

*Figure 2-8: Kahawa Soweto Residents during a Focus Group Session*

**Source: GBPN (2025).**

## 2.6. Integration with Subnational and Sectoral Planning

Global precedence has shown that successful decarbonisation of the buildings and construction sector depends on embedding national strategies within subnational and sectoral planning systems. National roadmaps developed in countries such as Australia, France, and India demonstrate that implementation gains traction when counties, cities, and key industry sectors translate high-level targets into actionable local plans.

The EU Whole-Life Carbon Roadmap, for example, links national goals to city-level building codes and regional procurement standards, while the Fiji Low-Carbon Development Strategy integrates provincial authorities into the identification of climate-smart construction priorities. Similarly, the Global ABC Regional Roadmaps for Africa and Asia emphasise multi-level governance as a foundation for effective implementation, aligning local development control processes, professional practices, and industry supply chains with overarching national climate goals.In the Global South, several countries have demonstrated how multi-level and cross-sectoral collaboration accelerates implementation.

*Figure 2-9: Eco energy illustration*

**Source: Freepik (2025).**

In India, the Buildings Energy Efficiency Roadmap (2019)[7] decentralised enforcement by empowering states to adapt and implement the Energy Conservation Building Code (ECBC) through local planning agencies.

[7] Energy Efficiency Roadmap, Bhutan

Indonesia's Low-Carbon Development Initiative (LCDI, 2021)[8] integrated provincial development plans into national emission models, ensuring regional planning authorities (BAPPEDA) directly informed emission-reduction priorities.

South Africa's Climate Change Bill and Just Transition Framework (2022) institutionalised subnational climate response plans and multi-sectoral working groups under the Presidential Climate Commission, enabling coordinated climate action across sectors such as construction, energy, and transport. Similarly, Mexico's NDC Implementation Roadmap for Buildings (2020) and Colombia's Net-Zero Buildings Roadmap (2022) brought together municipalities, academia, and industries to localise national climate goals through city-level planning, building code enforcement, and private-sector innovation.

In Kenya, this principle of multi-level integration has been embedded within the roadmap development process.

Recognising that counties hold the constitutional mandate for planning, development control, and enforcement, the roadmap process has deliberately engaged subnational actors through consultations and partnerships with the:

- Council of Governors (CoG),
- County Departments of Lands, Housing, and Physical Planning,
- County-based professional chapters of the Architectural Association of Kenya (AAK) and Institution of Engineers of Kenya (IEK).

This has ensured that county perspectives on material sourcing, construction permitting, informal building activity, and infrastructure development are reflected in the national roadmap priorities.

At the sectoral level, the roadmap has convened dedicated working groups representing materials producers, architects and engineers, academia, and contractors. These groups have contributed to identifying decarbonisation levers specific to their value chains, such as low-carbon material standards, green

*Figure 2-10: People shaking hands in agreement*

**Source: Freepik (2025).**

[8] A Green Economy For A Net Zero Future: How Indonesia Can Build Better After Covid-19 With The Low Carbon Development Initiative

procurement practices, and circular construction systems. This approach mirrors global best practice by moving beyond top-down policy alignment to sector-driven implementation planning, ensuring that emission reduction actions are practical and anchored in market realities.

The outcome of this integration has been **twofold:**

1. **First**, it has created **strong ownership among counties and professional sectors**, positioning them as active implementers rather than passive beneficiaries of the national roadmap.
2. **Second,** it has **strengthened the implementation pathway**, enabling the outlined roadmap actions to be directly embedded into County Integrated Development Plans (CIDPs), urban planning frameworks, and sectoral performance contracts.

This alignment enhances the roadmap's credibility and its durability, by ensuring that decarbonisation becomes a coordinated, whole-of-system effort that is both locally grounded and nationally coherent.

# 3 Baseline Assessment

## 3.1 Sector Overview and System Boundaries

The baseline assessment focused on Kenya's buildings and construction sector, with the aim of quantifying emissions, identifying policy and implementation gaps, and informing sector-specific interventions for decarbonization. The scope of the assessment was national, encompassing both urban and rural contexts and including formal and informal construction. The most recent year with partial data was adopted (2023).

The assessment covered six interrelated thematic areas, each represented by a dedicated technical working group:

1. **New Buildings** – Emissions and policy gaps associated with recently constructed buildings and current design practices (5 years and under).
2. **Existing Buildings** – Energy performance, retrofit potential, and operational challenges in older building stock (5 years and over).
3. **Energy Efficiency** – Building-level energy use patterns, appliance standards, and access to clean energy solutions.
4. **Building Materials and Construction Supply Chain** – Embodied carbon from material choices, sourcing, and production and transportation processes.
5. **Spatial and Urban Development** – Land use, density, infrastructure provision, and their role in enabling or constraining low-carbon development.
5. **Enabling Factors** – Institutional frameworks, finance, capacity, codes, and incentives critical for sector-wide transformation.

The scope was inclusive of both operational and embodied emissions, capturing the full lifecycle impacts of buildings. It also integrated cross-cutting considerations such as resilience, equity, and data systems. This comprehensive approach ensures that the roadmap is built on a wholistic understanding of the emissions landscape and the systemic barriers to transformation.

**Building Sectors Reviewed**


*Figure 3-1: Building sector illustration*

**Source: GBPN - Graphic by Napkin AI (2025).**

### 3.1.1 New Buildings


*Figure 3-2: New buildings sector baseline illustration*

**Source: GBPN - Graphic by Napkin AI (2025).**

For more information on the baseline of the new buildings sector, refer to the GBPN Baseline Assessment Report for Kenya's Building and Construction Sector.

### 3.1.2 Existing Buildings

Efforts to green existing buildings in Kenya are still at a novel stage. **Retrofitting initiatives are limited** and typically undertaken on a case-by-case basis, often in high-end commercial or institutional buildings. Individual building owners and property managers are the primary decision-makers, with **limited government incentives, enforcement or policy pressure to retrofit**.

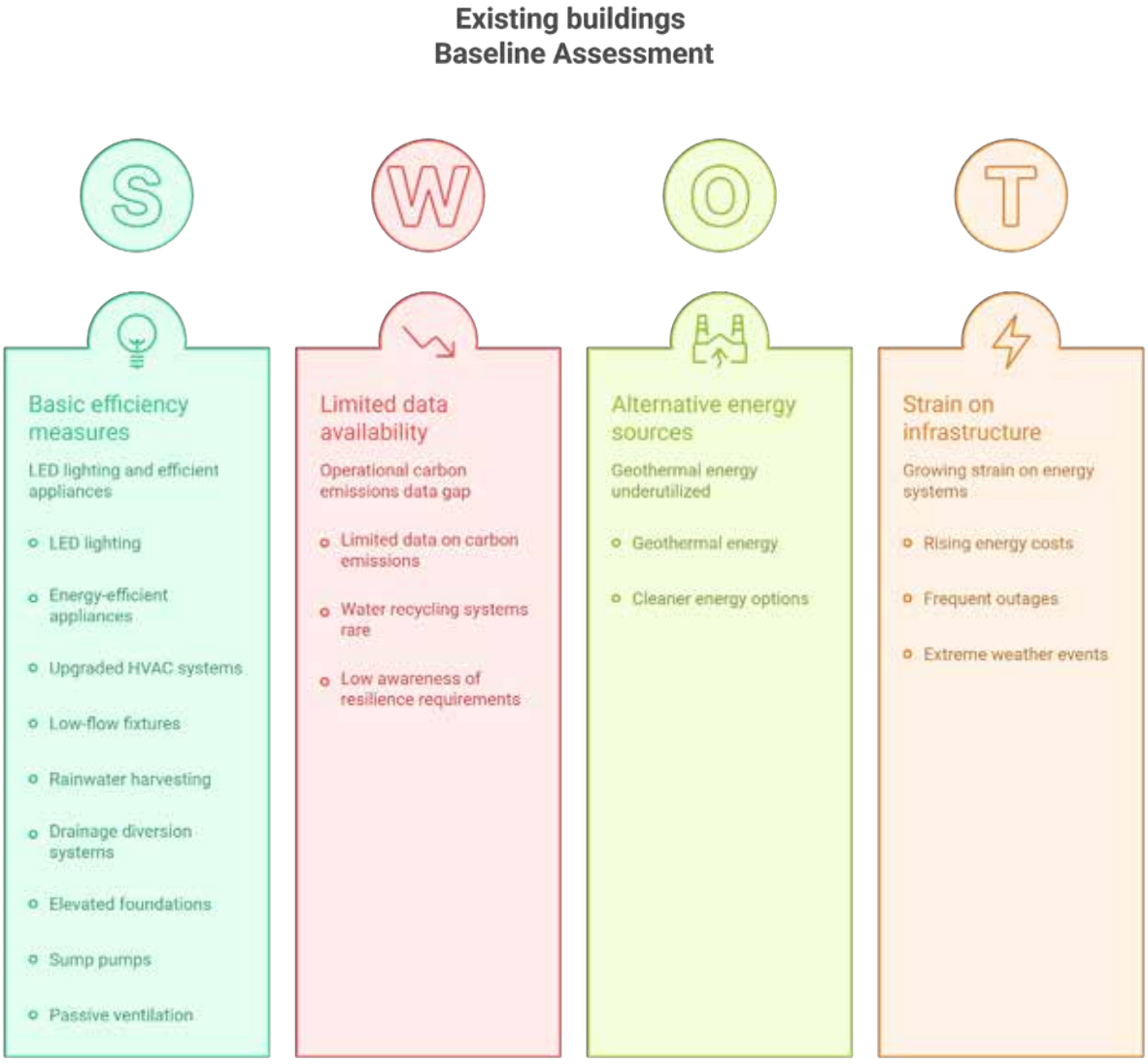



*Figure 3-3: Existing buildings sector baseline illustration*

**Source: GBPN - Graphic by Napkin AI (2025).**

There is a **significant lack of awareness among building owners, property managers, and occupants** regarding the environmental impact of existing buildings and the benefits of decarbonization. Moreover, there is a **clear gap in accessible, affordable financing instruments** tailored to retrofitting and sustainable upgrades. This extends to certification schemes; while important for benchmarking and market recognition, they are often **viewed as too expensive and bureaucratic.**

Finally, many property owners and managers **prefer to stick with familiar systems and materials,** even when more sustainable alternatives are available.

### 3.1.3 Construction Supply Chain and Building Materials

According to baseline data collected, it indicates that grid electricity and diesel generators dominate energy consumption in the production processes of the construction supply chain, while on-site renewable energy use is minimal. There is a lack of low-carbon emissions reporting and awareness, and the heavy reliance on non-renewable sources suggesting limited progress toward sustainability and vulnerability to rising energy costs or supply disruptions.

A low number of producers conduct lifecycle carbon analysis for the building materials, indicating a lack of awareness of and consideration of environmental impact and ultimately a lack of sustainable material choices. The use of low-carbon, alternative or recycled materials remains minimal and very few materials contain reused or recycled content. Additionally, the low uptake of sustainability certifications among respondents highlights a gap in formal commitment to sustainable practices.

High production costs, a lack of advanced technology, and insufficient government incentives are the primary obstacles hindering the local production of sustainable building materials. While most suppliers lack formal sustainability certifications, the materials themselves have typically undergone testing or quality certification from recognized regulatory bodies like KEBS.

An adoption of strategies to reduce material waste from the industry indicates a moderate level of engagement with circular economy principles. The dominant waste management practice is on-site recycling and reuse, demonstrating a practical and cost-effective approach to minimizing construction waste. There is an awareness of sustainable provisions in the National Building Code, with a shared view that these measures are moderately effective, suggesting room for improvement in policy enforcement or clarity.

The cost of sustainable materials is on average, 20% more than that of conventional materials, which highlights a cost premium. These kinds of materials include: bamboo, timber, bio-based products and low-carbon cement alternatives. The main cost drivers are: limited local supply, high production costs, low demand and economies of scale. There is also a low client demand for sustainable materials due to cost sensitivity, despite the knowledge of the long-term benefits, like energy savings and incentives.

However, there is a willingness from end users to adopt these sustainable materials if government incentives and long-term operational cost savings are adopted. Other suggested incentives are carbon credits, green loans, sustainability-linked financing and tax rebates. The key financial barrier is high upfront capital investment and a market still focused on short-term cost over long-term value.

### 3.1.4 Energy Efficiency

The energy-efficiency measures mostly implemented are LED Lighting, followed by energy-efficient appliances. They are easy to install, show a fast result in electric bill reduction and are more familiar to consumers. Smart metering, passive design, motion sensors and solar water heating have a slow uptake. The major challenge of implementing energy efficiency measures is the high upfront (initial) costs.

Smart metering requires infrastructure upgrades, communication networks and data management systems, which may be costly initially. Passive design needs to be climate-responsive, requiring architectural expertise which is costly. Motion sensors may require modifying electrical systems or smart home hubs and can also be perceived as a luxury. Solar water heating is expensive and needs maintenance which clients are wary of in terms of reliability and expertise

High efficiency HVAC systems have not been attempted as they are perceived as expensive in terms of labour & expertise and loading. Moreover, in the Kenyan Climatic context the need for HVAC systems can be addressed through proper passive design in new buildings. Their need however remains for specific building types such as healthcare facilities, and manufacturing or processing buildings with fumes or exhaust air that needs to be removed. Additionally, as Kenya's climate is tropical, building insulation is not a necessity since the main construction material -(masonry) used has a high thermal mass, therefore providing thermal insulation for interior spaces.

Most of the buildings use on-site renewable energy in the form of solar which is readily available. For storage, there are battery storage systems in place for excess energy generated or to act as a backup. However, 80% of buildings do not sell their excess on-site generated energy to the grid. In the past 3 years, 80% of buildings have not undergone an energy audit which would explain why only 20% of them have EDGE certifications.

However, there is awareness about Kenya's energy efficiency policies, despite the high number of unaudited buildings in the country. The biggest gaps are lack of enforcement mechanisms and weak incentives promoting their adoption. Smart grid systems and building integrated photovoltaics seem to be the most expected technology. Finally, 60% of professionals anticipate Kenya is partially ready for a shift to net-zero buildings.

### 3.1.5 Spatial Planning & Urban Development

Less than 50% of the urban population have access to public transport within a 10-minute walk, due to the poor public transport coverage. This means that for people to access public transport they have to use a last-mile connection such as a motorbike or tuktuks. This addition of extra transportation causes an increase in carbon emissions with regard to an individual's whole commute, the lack of last mile connections also emerged as a reason Kenyans buy their own personal vehicles to save themselves the trouble.

The lack of properly defined sidewalks for walking, as well as a lack of cycling lanes deters people from adopting these options and pushes them to take up motorised transportation. The increase in personal vehicles leads to

the heavy congestion on Kenyan roads. The existing water and electricity supply networks poorly accommodate the on-going urban expansion posing a potential hindrance to building operations, street services such as lighting and proper drainage. This is likely going to result in more stringent water rationing practices compared to the ones in place currently from the Nairobi County Water and Sewerago Company (NCWSC).

Stormwater management and flood protection practices seem to be widely adopted while water conservation, recycling and urban cooling strategies are the least applied. This suggests that there are some areas that have begun applying these sustainability standards into their planning, while other urban centers have done nothing to address these issues.

Many residents within informal settlements lack legal ownership of land, which informs the kind of structures they put up; temporary shelters. Upgrading these shelters is therefore not considered a priority as the residents have no assured tenure. The lack of tenure also hampers the adequate allocation or planning for services such as roads, water and electricity.

Despite efforts in affordable housing, green infrastructure, and climate resilience, local governments rarely involve communities meaningfully. Residents often have little knowledge of programs such as improved public transport, mixed-use zoning, or green spaces. Initiatives like walkable communities and climate adaptation are often designed without grassroots input.

Early warning systems are the primary policy tool used to reduce climate vulnerability. However, their effectiveness depends on community awareness, timely communication, and integration with local response mechanisms.

### 3.1.6 Enabling Factors

Kenya has developed several policies and frameworks that encourage the decarbonization of the built environment, including commitments made under the Climate Change Act, the Green Economy Strategy and Implementation Plan (GESIP), and the country's NDCs. These instruments provide an important foundation for sustainable transformation in the building sector. However, their effectiveness remains moderate due to weak enforcement, slow policy adoption, and a lack of alignment between national directives and county-level implementation.

Green finance offerings have grown in recent years, with some banks and development institutions providing sustainability-linked loans and project-based climate finance. Still, there is a split perception regarding the actual availability and accessibility of these products. Barriers such as high upfront costs, limited affordability for most developers and property owners, and investor unfamiliarity with green building returns continue to impede widespread adoption.

Market demand for green-certified buildings is growing, especially within the commercial and institutional sectors, where long-term operational cost savings are a strong motivator. Energy efficiency improvements are a key driver of investment decisions. However, widespread uptake is constrained by persistent cost concerns and hesitancy stemming from unclear returns and limited end-user awareness of the long-term benefits.

A significant barrier to scaling decarbonization efforts is the shortage of skilled professionals. Despite the availability of training in sustainable design and green construction concepts, there remains a pronounced skills gap in key areas such as energy modeling and performance simulation, green construction practices, and smart building technologies. This disconnect points to a broader challenge in aligning academic training and industry needs, and highlights the need for structured capacity building programs and stronger academia-industry linkages.

However, the willingness to adopt these practices is often tempered by cost-related concerns and a lack of accessible, locally relevant information on the tangible environmental and financial benefits of decarbonization. Without stronger incentives, better guidance, and more demonstrable success stories, market momentum remains limited to specific segments.

## 3.2 Emission Baseline (2023) – Operational and Embodied Carbon

### 3.2.1 New Buildings Emissions and energy performance baseline:

Tier 1 represents the baseline estimate of carbon emissions, with approximately 3.45 $MtCO_2$ from embodied sources(materials production, transport and construction processes) and 0.5 $MtCO_2$ from operation use (energy consumed during building operation). Tier 2 reflects a more refined assessment that incorporates improved efficiency standards and the use of the Carbon Metric Tool to better account for local material impacts.

As a result, embodied emissions are reduced to around 3.0$MtCO_2$, while operational emissions decline to about 0.3$MtCO_2$, indicating the positive impact of enhanced building efficiency and more accurate measurement methodologies.

| | | | |
|---|---|---|---|
| 1. New Buildings | Tier 1: Embodied: ~3.45 $MtCO_2$ Operational: 0.5 $MtCO_2$ | Tier 2: Operational: 0.3 $MtCO_2$ Embodied: 3.0 $MtCO_2$ | Tier 2 refines embodied via Carbon Metric Tool for local materials; lower operational use due to recent efficiency standards |

*Table 3-1: Emissions and energy performance baseline in the new buildings sector*

**Source: Author (2025).**

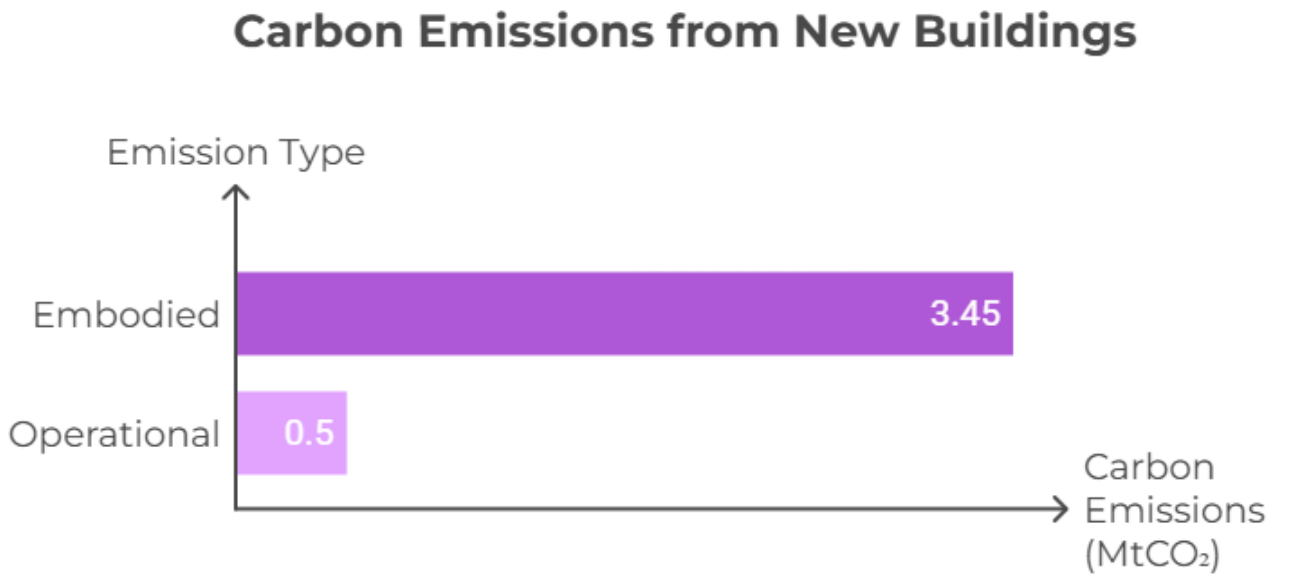



*Figure 3-4 : Illustration of carbon emissions from the new building sector.*

**Source: GBPN - Graphic by Napkin AI (2025).**

### 3.2.2 Existing Buildings Emissions and energy performance baseline.

Tier 1 estimates operational emissions at approximately 5.0 $MtCO_2$, representing the baseline energy use of both formal and informal building stocks. In Tier 2, emissions are refined to about 4.6 $MtCO_2$ after adjusting the Energy Use Intensity (EUI) based on more detailed survey data.

These adjustments account for factors such as appliance efficiency, maintenance practices, and occupant behaviour, providing a more accurate reflection of actual energy consumption patterns across different types of existing buildings.

| | | | |
|---|---|---|---|
| Existing Buildings | Tier 1: Operational: 5.0 $MtCO_2$ | Tier 2:4.6 $MtCO_2$ | *Energy use higher in informal vs formal building stock; Tier 2 adjusts EUI using survey data on appliance, maintenance, and behavioural patterns |

*Table 3-2 : Emissions and energy performance baseline in the existing buildings sector*

**Source: GBPN (2025).**

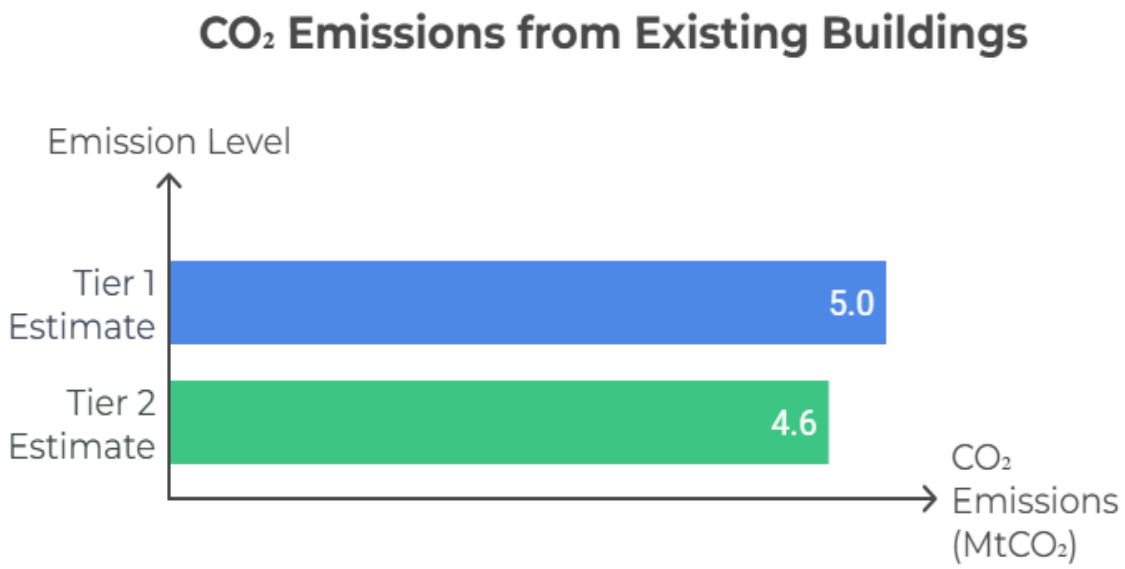



*Figure 3-5: Illustration of carbon emissions from the existing building sector.*

**Source: GBPN - Graphic by Napkin AI (2025).**

### 3.2.3 Building Materials & Construction Supply Chain Emissions and energy performance baseline:

Tier 1 estimates embodied emissions at approximately 3.45 $MtCO_2$, representing the baseline impact from material production and construction processes. In Tier 2, emissions are refined to about 3.2 $MtCO_2$ by incorporating localized embodied carbon factors.

This adjustment accounts for the use of regionally appropriate materials—such as earth-based alternatives compared to cement-heavy mixes—and references data from the Inventory of Carbon and Energy (ICE) resulting in a more accurate and context-specific estimation of material-related emissions.

| | | | |
|---|---|---|---|
| Building Materials & Construction Supply Chain | Tier 1: Embodied: ~3.45 $MtCO_2$ | Tier 2: 3.2 $MtCO_2$ | Adjusted for localised embodied factors (e.g., earth materials vs cement-heavy mixes) using ICE & Sri Lanka refs |

*Table 3-3: Emissions and energy performance baseline in the building materials sector*

**Source: Author (2025).**

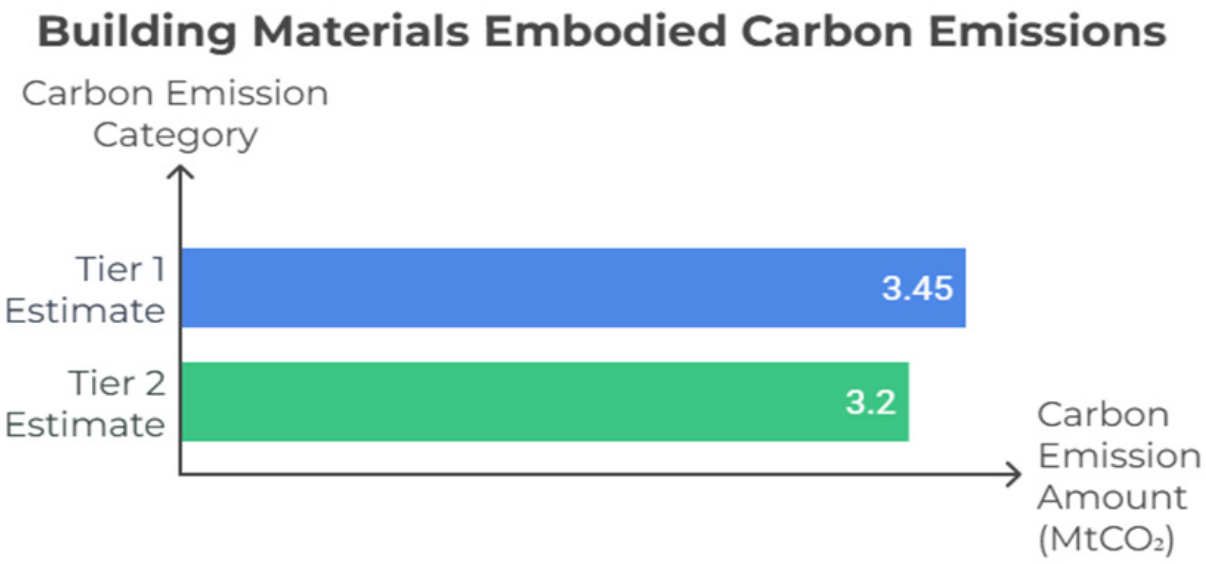



*Figure 3-6: Illustration of carbon emissions from the building materials sector.*

**Source: GBPN - Graphic by Napkin AI (2025).**

### 3.2.4 Energy Efficiency emissions and energy performance baseline:

Tier 1 estimates total operational emissions across all buildings at approximately 6.6 $MtCO_2$, representing the baseline energy consumption from conventional sources. In Tier 2, emissions are reduced to around 6.0 $MtCO_2$ through the integration of energy efficiency measures and a gradual shift toward cleaner energy use.

The 10% reduction is achieved through actions such as enforcing Minimum Energy Performance Standards (MEPS), adopting efficient lighting and appliances, and promoting the uptake of renewable and low-carbon energy technologies. These interventions not only lower energy demand but also accelerate the transition toward a more sustainable and resilient built environment.

| | | | |
|---|---|---|---|
| Energy Efficiency (all buildings) | Tier 1: Operational: ~6.6 $MtCO_2$ total base | Tier 2: 6.0 $MtCO_2$ | Tier 2 assumes 10% energy savings from efficiency measures (e.g. MEPS, lighting, appliances), reducing baseline consumption |

*Table 3-4: Emissions and energy performance in the energy efficiency sector.*

**Source: Author (2025).**

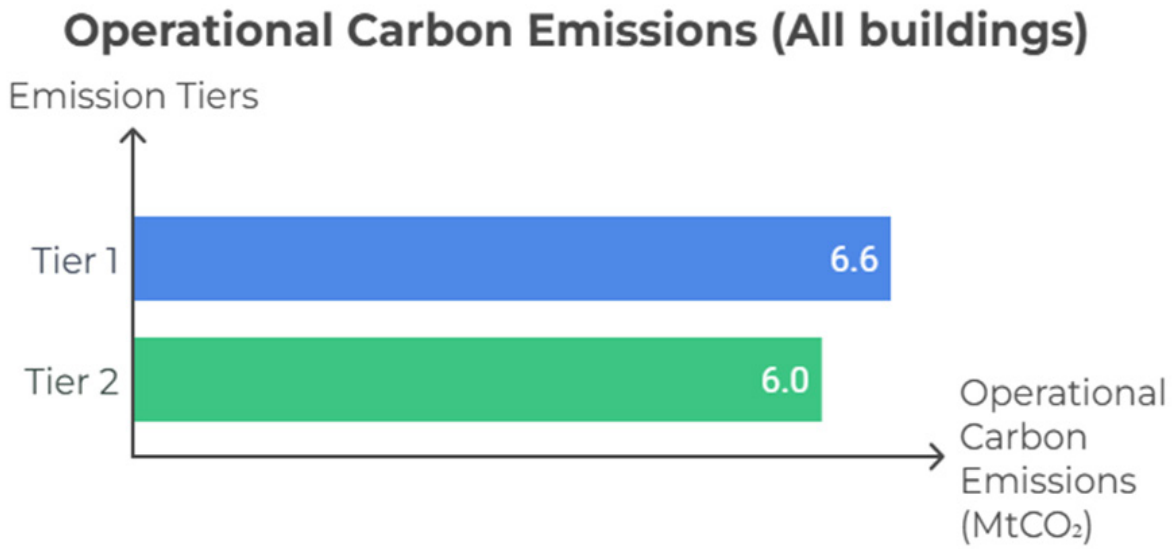



*Figure 3-7: Illustration of carbon emissions from the energy efficiency sector.*

**Source: GBPN - Graphic by Napkin AI (2025).**

### 3.2.5 Spatial & Urban Development emissions and energy performance baseline:

The emissions associated with urban planning activities are integrated within the broader sectoral emission estimates. This category specifically assesses the potential to reduce Energy Use Intensity (EUI) through enhanced spatial planning and sustainable urban development strategies. Under the Tier 2 scenario, a 5% reduction in EUI is projected, attributable to the implementation of integrated land-use planning, compact and mixed-use urban forms, and improved transport and infrastructure systems.

Additional contributing measures include the incorporation of passive design principles, increased access to clean energy infrastructure, and the promotion of green and resilient urban spaces. Collectively, these interventions support optimized energy consumption patterns, reduced transport-related emissions, and the creation of more sustainable, resource-efficient urban environments.

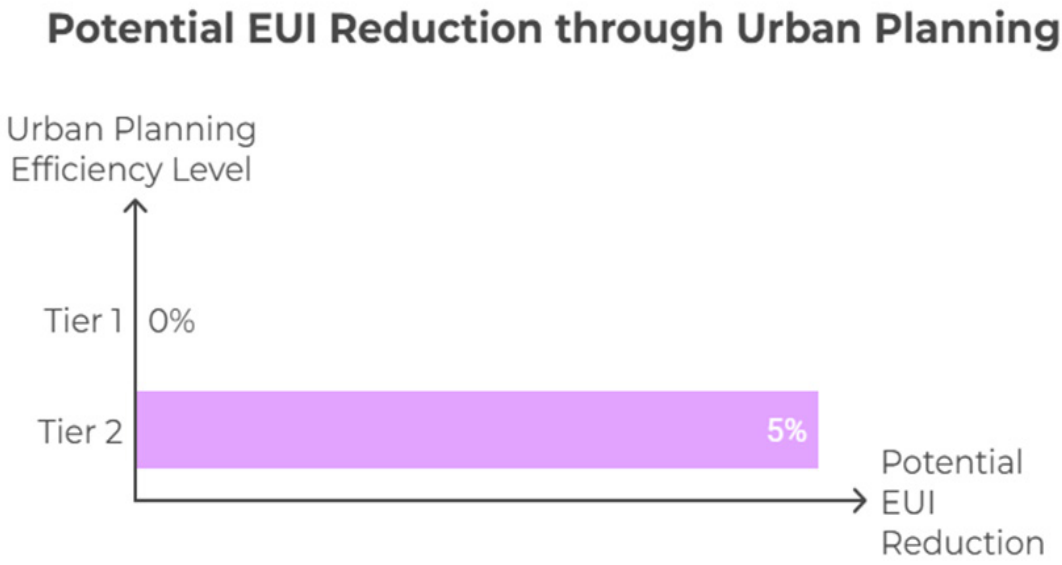



*Figure 3-8: Potential EUI reduction in Urban Planning.*

**Source: GBPN - Graphic by Napkin AI (2025).**

### 3.2.6 Enabling Factors emissions and energy performance baseline:

Enabling factors are viewed as a facilitator that supports emissions reduction across all sectors. Enabling Factors serve to sustain and scale technical measures across sectors via better policy, financing, and monitoring frameworks.

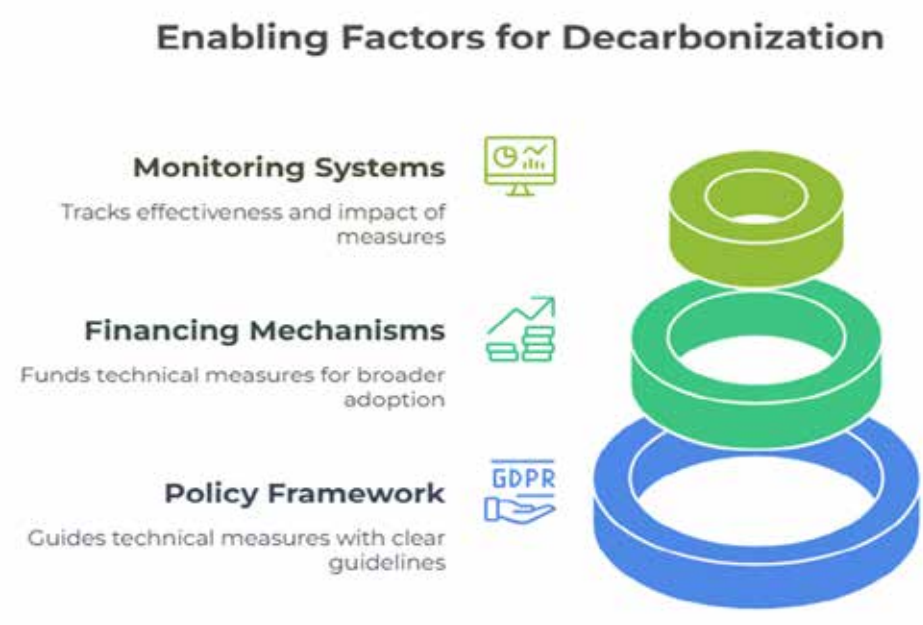



*Figure 3-9: Illustration of enabling factors for decarbonization.*

**Source: GBPN - Graphic by Napkin AI (2025).**

## 3.3 Building Typologies and Use Profiles

55% of the global population lives in urban areas. Nearly 90% of this population is in Asia and Africa. According to KNBS, 31.2% of the Kenyan population lives in urban areas while 60% lives in informal settlements indicating a rising level in urbanisation in Kenya. By 2030, the level is projected to increase to at least 50%.

Urbanisation is dominant in Nairobi, Kisumu, Mombasa, Eldoret and Nakuru which account for an estimated 70% of the country's GDP and the majority of the urban population[9]. Unfortunately, most of the urban areas are not properly planned, only about 30% are. Furthermore, urbanisation comes with its own challenges such as poor governance, lack of capacity and investments. Other challenges include:

- Inadequate infrastructure and services e.g. water, sanitation, health and education
- Rise in urban crime
- Poor housing and growth of informal settlements
- Environmental degradation
- High unemployment rates
- Increased prevalence of urban poverty and inequality

Urbanization has led to a growth in population which has, in turn, raised the demand for housing within the country. According to Habitat for Humanity, the estimated demand for housing annually in Kenya is about 250,000 units, but the estimated supply of units is at 50,000 units highlighting a deficit in supply. According to the World Bank, the deficit may continue to rise due to some constraints in both demand and supply and is made even worse due to a high urbanization rate of 4.4%[10].

Looking at AAK's report on the Status of the Built Environment- 2024, residential developments account for 69% of the total approved projects, commercial - 15%, mixed use - 7% and the final 9% is accounted for by other works (infrastructure like roads and social amenities). The rise in residential projects by 15% compared to the previous year highlights the ever-increasing need for housing while commercial buildings also recorded a 4% increase from 2023 [11]. However, despite the increase in these areas, the infrastructure needed to support them has gone down from 11% in 2023 to 7% in 2024 which poses some risks towards urban areas such as:

- Congestion
- Poor service delivery
- A decline in the livability of the area

[9] The Architectural Association of Kenya. (2024). Status of the Built Environment Report. Architectural Association of Kenya.

[10] Kenya Needs 2 Million More Low-income Homes: Building Them Would Boost Its Economic Growth. (2017, 04). World Bank.

[11] The Architectural Association of Kenya. (2024). Status of the Built Environment Report. Architectural Association of Kenya.

## 3.4 Material Supply Chain Mapping (Cement, Steel, Timber, Bricks, etc.)

The built environment sector is the largest emitter of CO2 and accounts for at least 37% of global emissions with the production of concrete, steel and aluminium taking 6% while glass and bricks take 2-4% of the total emissions[12]. The following chart shows the percentage of carbon emitted during construction:

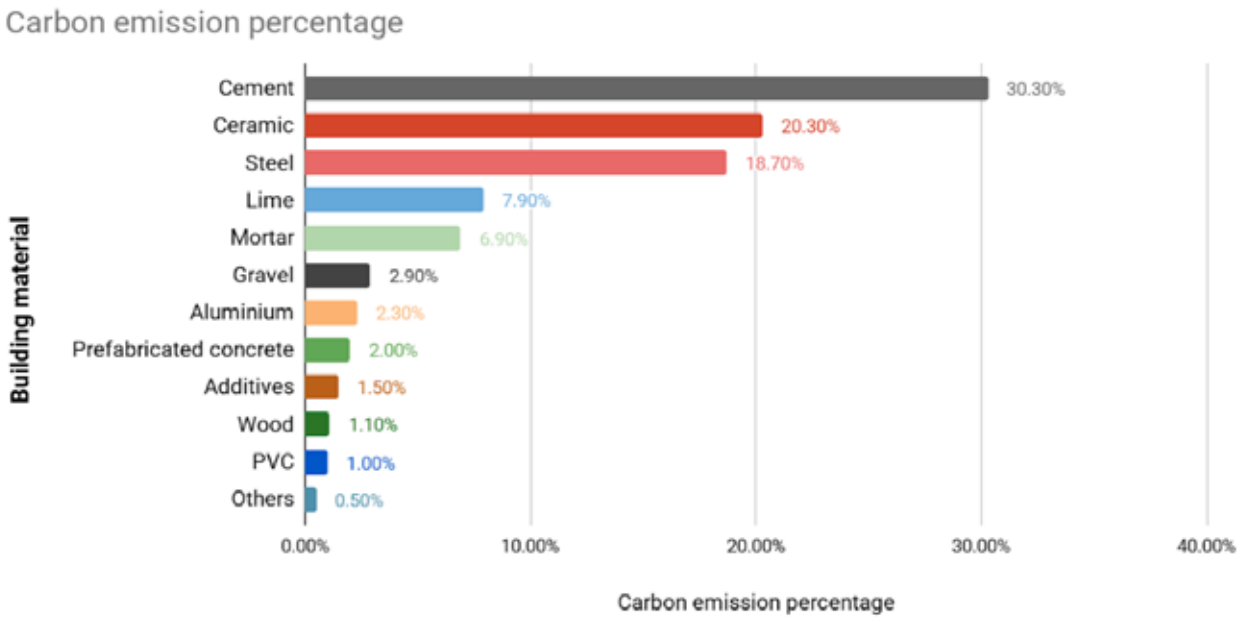



*Figure 3-10: The Carbon Emission Percentage of Various Building Materials.*

**Source: Kilgore G., (2024).**

[12] UNEP (2023). Building Materials and the Climate: Constructing a New Future.

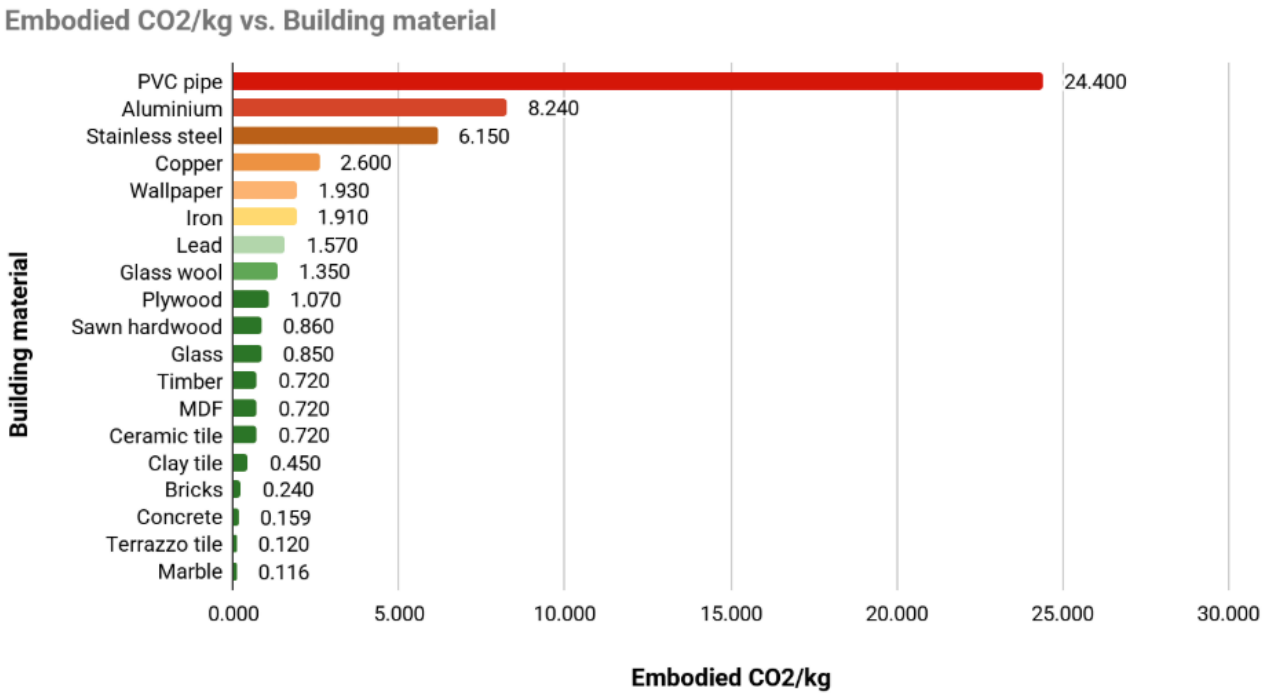



*Figure 3-11: The List of Embodied Carbon Footprint of Building Materials.*

**Source: Kilgore G., (2024).**

When extracting, refining, processing or transporting these materials, $CO^2$ emissions are also produced. Above is a chart summarising embodied carbon per material [13]:

## 3.5 Energy Use and Technology Adoption Patterns

### 3.5.1 GHG emissions contribution from buildings (residential, commercial, industrial).

Per capita, the total $CO^2$ emissions by Kenya in 2023 was 0.329 Mt $CO^2$, which was an increase of 26% over the past 20 years. It ranks as no.23 in Africa with the highest being South Africa at 7.557 Mt $CO^2$ [14]. Out of the total energy emissions, 6.2% comes from residential buildings while 4.5% comes from commercial and public buildings. 18.4% comes from the industrial buildings and related processes.

[13] Kilgore, G. (2024, October 3). Carbon Footprint of Building Materials (Green Building Calculator).

[14] International Energy Agency. (n.d.). Emissions, Kenya. IEA.

### 3.5.2 Energy efficiency trends and challenges.

Approximately 92% of Kenya's energy generation is renewable, hydro at 47.9% and geothermal at 43.7%[15]. Buildings account for almost 75% of the total final energy consumption. By 2030, Kenya hopes to provide the entire population with electricity as stated in Kenya Vision 2030, by focusing on developing new and renewable energy sources, energy efficiency and raising access to electricity.

In Kenya, The total building stock in Kenya in 2025 is estimated to be 47 million square meters, pointing to an increase in both energy demand the potential for energy efficiency[16]. Furthermore, with the National building code updated in 2022, building owners have been given the option to adopt green building strategies. This is further encouraged by tax exemptions and credits for renewable energy installations offered by the Green Fiscal Incentives Policy Framework introduced in 2022. 20% of the country's emissions is generated by 80% of the country's population who use wood and charcoal for cooking. This costs the economy Kshs. 5.7 trillion annually, highlighting the need for cleaner alternatives such as ethanol, electricity or solar energy.

However, with the strive for energy efficiency comes a few challenges[17]:

- Implementing sustainable strategies in buildings:
  - Despite the development of including sustainable strategies into the code, it is not yet mandatory for new and existing buildings. This, in turn, causes people to avoid incurring any initial costs for adopting these practices.
- Inability to finance energy efficiency in buildings
  - Financing energy efficiency in buildings remains a problem due to their small scale, low awareness of the benefits, and accompanying risks.
- Inefficient appliances
  - Lack of available energy efficient appliances in local markets limit consumers' homes or buildings from being more sustainable. In addition, the lack of awareness causes consumers to believe that higher efficient models mean higher costs.

## 3.6 Data Gaps and Uncertainties

Despite incremental progress, there remains a general hesitancy to fully adopt green building and sustainability principles across the sector. This is largely driven by a combination of limited financial incentives, low public and private sector awareness, resistance to change from traditional practices, and insufficient institutional support or enforcement from public bodies.

[15] KenGen (2024). KenGen Shines at APRA Investment Forum

[16] Copenhagen Centre on Energy Efficiency, Building Efficiency Accelerator, & Government of Kenya. (2018). Energy Efficiency in Buildings, Kenya. CCEE.

[17] OECD. (2023, 12 07). Energy Efficiency for Affordability. OECD.

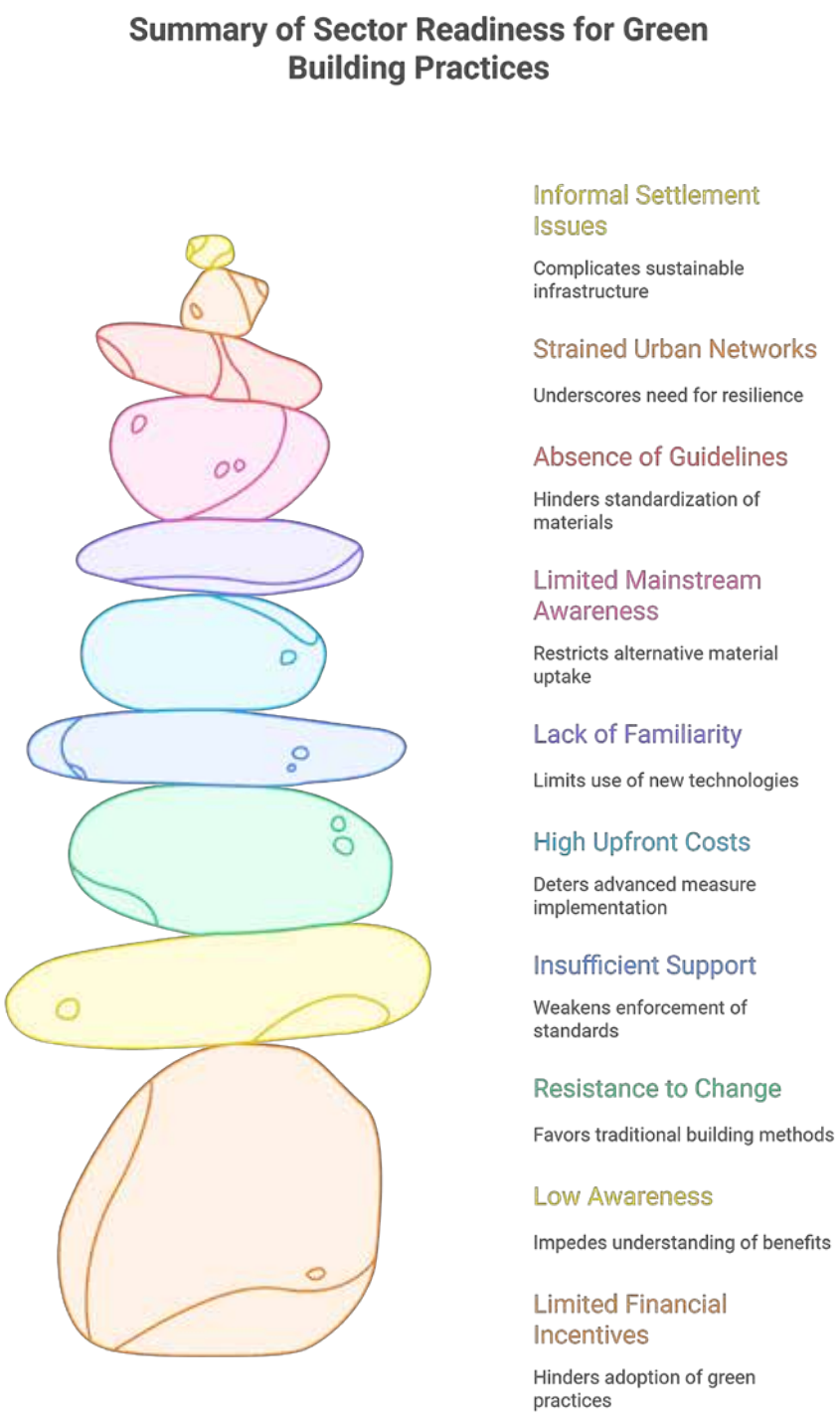



*Figure 3-12: Summary of sector readiness.*

**Source: GBPN - Graphic by Napkin AI (2025).**

Nevertheless, basic energy and water efficiency measures such as **solar panels, LED lighting, and energy-efficient appliances** are gradually being integrated into building designs. However, more advanced or high-impact measures such as **water recycling systems and large-scale rainwater harvesting** remain underutilized due to **high upfront costs and low familiarity or technical know-how.**

There is active research and piloting of **low-carbon and alternative green construction materials,** led by institutions such as Meru University and manufacturers like Bamburi Cement. However, the **lack of mainstream awareness, technical guidelines, and formal standardization of these materials** has limited their uptake, with most developers still preferring conventional materials due to familiarity, availability, and regulatory clarity. Kenya's **urban water and electricity networks are already under strain,** unable to sustainably support the rate of urban growth.

This underscores the **urgency for building-level resilience solutions,** including on-site water collection and storage, on-site renewable energy integration, and passive design strategies. The situation is even more pronounced in informal settlements, which **lack structured planning, reliable access to utilities, and face complex land tenure issues, making** the integration of sustainable infrastructure even more difficult.

### 3.6.1 Gaps

Some of the gaps seen within our existing policies and energy sector include:

1. They **don't contain sector-specific emission reduction targets** for buildings.
2. Implementation is slow and dependent on donor support.
3. Weak accountability for counties or private actors in integrating climate measures.
4. The **Climate Change Fund** is underutilized and poorly linked to green building projects.
5. Energy audits are required for large users, but enforcement is weak and does not cover smaller or residential buildings.
6. **No mandate** for energy performance in new buildings or retrofits.
7. Energy Performance Certificates (EPCs) are complex and poorly understood by property owners and financiers.
8. **Net metering regulations exist but uptake is low** due to lack of incentives and awareness.
9. **Data availability is limited** – benchmarking of building energy use is rarely done.
10. Awareness activities remain underfunded and sporadic.
11. **Very high-level strategy** with no enforcement mechanism.
12. Lacks clear institutional mandates for execution (who does what, by when).
13. Green buildings mentioned in passing, but **no detailed roadmap or investment plan.** Sustainability requirements are not mandatory, and enforcement is weak.
14. County-level approval authorities often lack technical capacity to enforce or interpret green provisions.
15. No connection to green certification systems (e.g., EDGE, LEED).
16. **Limited awareness** among developers, contractors, local authorities and users leads to slow uptake of green practices.

**17. Green building certifications (e.g., EDGE, LEED)** are not required or considered in approval decisions.
18. High levels of **corruption and informal approvals** further undermine integrity of the process.
**19. No standard requirements for green building practices** (e.g., passive design, solar, water reuse).
**20. Limited technical expertise and knowledge transfer** among professionals as well as technicians and students.


*Figure 3-13: Challenges in green building implementation*

**Source: GBPN - Graphic by Napkin AI (2025).**

# 4 Policy and Regulatory Landscape

## 4.1 Existing Policies, Codes, and Standards

The legal and regulatory framework governing Kenya's construction landscape consists of policies, Acts of Parliament, regulations, and ordinances that govern the industry, ensuring order, health and safety of workers on construction sites. These frameworks are interlinked and complementary, collectively promoting coherence, accountability, and sustainable development within the built environment.

Kenya's construction landscape is regulated through several key frameworks:

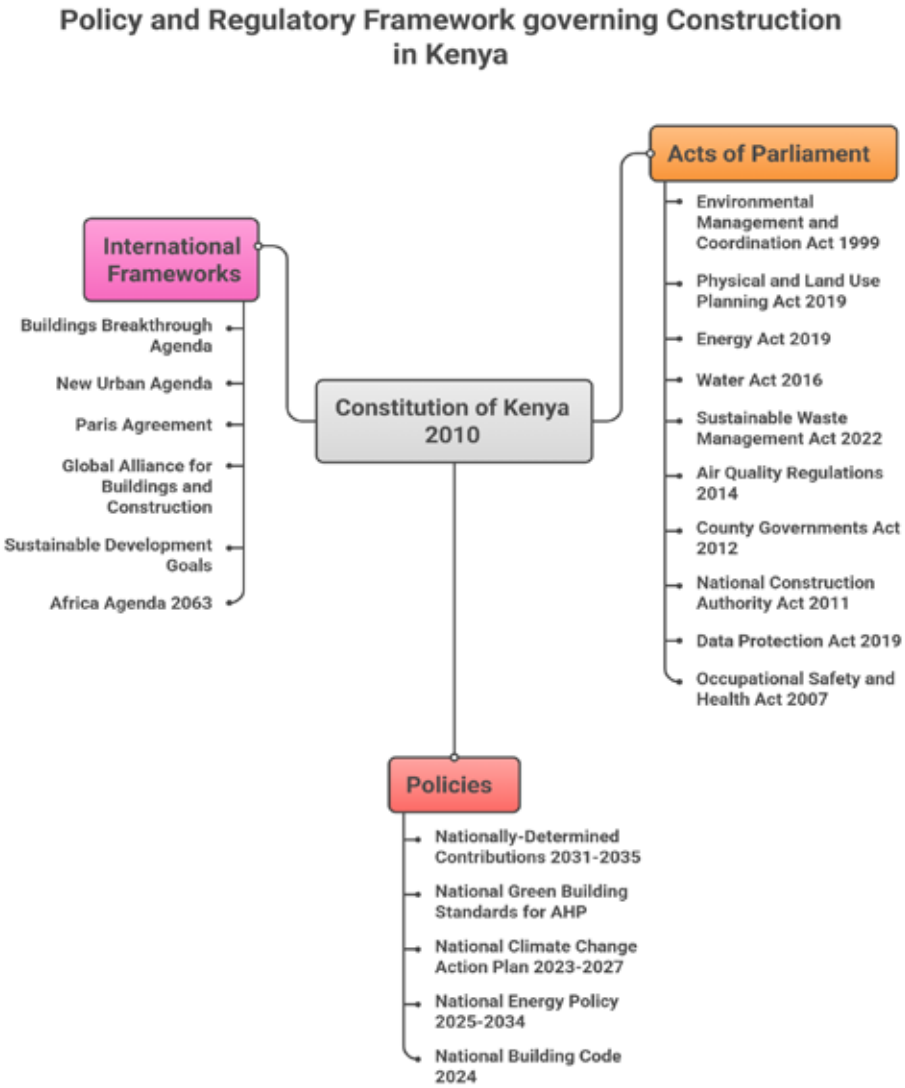



*Figure 4-1: Snapshot of Policy and regulatory lanscape governing Kenya's Construction Industry.*

**Source: Author (2025).**

## 4.2 Governance and Institutional Framework

The construction industry is regulated through a coordinated framework of institutions at both national and county levels, each mandated to implement, enforce, and operationalize the laws and regulations governing the sector. These include:

### 1. Ministry of Lands, Public Works, Housing and Urban Development (MLPWHUD)

The Ministry provides overall policy direction for the built environment by facilitating access to adequate and decent housing, and preparing plans for urban areas that govern their sustainable development. It oversees formulation and implementation of construction, housing, and urban development policies through the State Departments for Public Works, Lands and Physical Planning, and Housing and Urban Development. The Ministry also hosts key implementing agencies such as the National Construction Authority (NCA) and the National Building Inspectorate (NBI).

**i. State Department for Public Works**

The State Department for Public Works is responsible for planning, designing, constructing, supervising, and maintaining public buildings and infrastructure. The department reinforces its role by ensuring compliance with national standards through the National Construction Authority and National Building Inspectorate, and coordinates research in the industry through the Kenya Building Research Centre (KBRC).

**ii. National Construction Authority (NCA)**

The National Construction Authority Act of 2011 mandates NCA to regulate and coordinate the development in the construction industry. NCA registers contractors, enforces quality standards, accredits and certifies construction workers and site supervisors, and monitors compliance across construction sites in Kenya. NCA has established regional offices across the country to enhance service delivery, facilitate compliance monitoring, provide technical support, and ensure effective oversight of construction activities at the local level.

**iii. National Building Inspectorate (NBI)**

The National Building Inspectorate (NBI) enforces building regulations and standards by conducting site inspections, audits, and quality assurance, assessing the structural integrity of buildings, and recommending legal action where necessary. It also oversees the implementation of on-site health and safety measures and coordinates the integration of climate resilience, mitigation, and adaptation in line with the Climate Change Act, 2016. Additionally, NBI supervises the demolition of unsafe buildings in compliance with the National Building Code, 2024.

### 2. County Governments

County governments play a central role in urban planning and the management of the construction industry within their jurisdictions. Their mandate is derived from the devolved functions of county planning and development as outlined in the Fourth Schedule of the Constitution of Kenya (2010) and further operationalized by the County Governments Act, 2012, and the Physical and Land Use Planning Act (PLUPA), 2019.

Counties are tasked with administering planning approvals & building permits, and enforcing development control. They also implement Local Physical Development Plans (LPDPs) in alignment with PLUPA, County spatial plans and the National Spatial Plan. Additionally, they conduct infrastructure development, facilitate public participation and community engagement, and ensure construction projects are compliant with environmental protection, waste management, and occupational health and safety standards.

## 3. Other Regulating Bodies

**i. National Environmental Management Authority (NEMA)**

The National Environment Management Authority (NEMA) serves as a regulatory and oversight function in ensuring that construction activities in Kenya are environmentally sustainable and comply with national environmental laws and standards. Its mandate is derived from the Environmental Management and Coordination Act (EMCA), 1999.

In fulfilling this mandate, NEMA oversees the conduct of Environmental Impact Assessments (EIAs) and Environmental Audits prior to project approval and licensing, enforces environmental compliance and monitoring, facilitates public participation, regulates pollution control, and ensures environmental restoration and rehabilitation.

**ii. Water Resources Authority (WRA)**

The Water Resources Authority (WRA) ascertains that construction projects in Kenya are developed in a manner that protects and sustainably manages the country's water resources. Its mandate is derived from the Water Act, 2016, which establishes WRA as the national agency responsible for the regulation, use, and conservation of water resources.

**iii. Regulators, Professional Bodies and Business Membership Organizations (BMOs)**

These bodies play a vital role in maintaining standards, ethics, and professionalism within the construction industry. Institutions such as the Board of Registration of Architects and Quantity Surveyors (BORAQS), Engineers Board of Kenya (EBK) and the Physical Planners Registration Board (PPRB) regulate professional practice through the registration and licensing of practitioners, enforcement of codes of conduct, and promotion of continuous professional development.

In addition, business membership organizations such as the Architectural Association of Kenya (AAK), the Institution of Engineers of Kenya (IEK), the Kenya Institute of Planners (KIP), and the Institute of Quantity Surveyors of Kenya (IQSK) represent the collective interests of construction professionals, promote best practices, provide platforms for networking and knowledge exchange, and advocate for policy reforms that strengthen the built environment.

They also enhance professional growth through training, conferences, and certification programs, while fostering collaboration amongst stakeholders to promote quality, innovation, and sustainability in the industry.

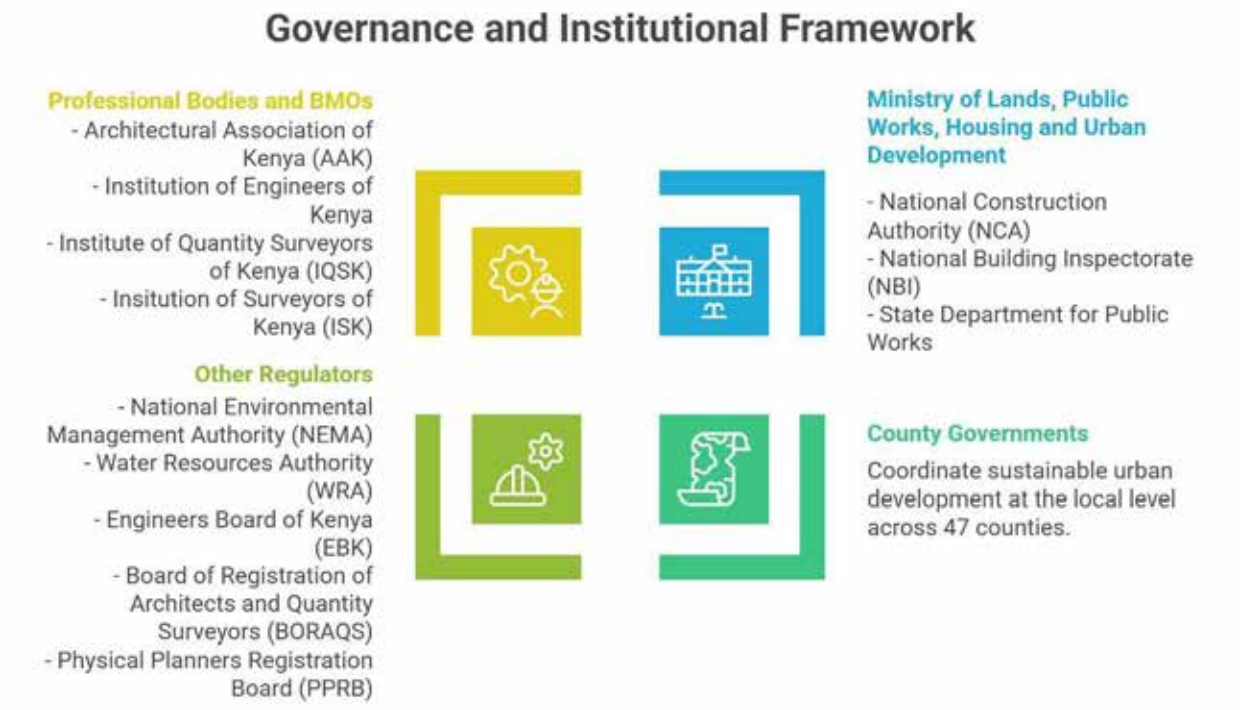



*Figure 4-2: Construction industry's Governance and Institutional Framework.*

**Source: Author (2025).**

## 4.3 Barriers to Enforcement and Compliance

### 4.3.1 The Colonial & Post-Colonial Situation

Kenya has undergone several phases with regards to the legislative landscape since before independence. In 1926, the first by–laws for building development controls were introduced and were applied by the Nairobi Town Council at the time, before being replaced by the Nairobi Council Building by-laws in 1948 that covered the town and zoning requirements. It was not until 1968 when Kenya got its first National Building Code which was mostly a replica of the British Building Regulations[18].

The building code was used in the country as enforced by the Local Government Act (1968) as the official code for building regulations. In 2012, the County Government Act repealed the Local Government Act, as part of the devolution process as stated in the 2010 Constitution. The repeal created a legal vacuum where the 1968 Building Code was only used as an informal reference by the industry.

It is only recently in 2024 that the new National Building Code was launched for use by the industry.

[18] Managing Risks for a Safer Built Environment in Kenya

### 4.3.2 Lack of a National Building Legislation

Globally, national buildings legislations are set in order to define the building responsibilities of both the national and local governments, mandate the enforcement of the building code and the certification and training of building regulators and professionals. Kenya to date has not promulgated a national building legislation, which hinders the enforcement of sanctions by government authorities on building violations including poor building practices.

### 4.3.3 Ambiguous and/or Overlapping Regulations

There are many policies and legislations in the built environment that tend to overlap and provide inconsistencies due to lack of clarity and may hinder effective enforcement. For example, the 2024 National Building Code includes provisions that encourage the adoption of green building principles, and resource efficient practices. However, these provisions are largely framed as guidance rather than mandatory compliance requirements, resulting in varied levels of uptake across the sector. Similarly, the National Construction Authority Act (2011) and its supporting regulations are ambiguous in the enforcement and inspection responsibility by the Authority. This ambiguity at the national level creates an overlap clash at the county government level, leaving room for poor enforcement that results in poor building practices in the sector.

## 4.4 Incentives, Fiscal Tools, and Finance Mechanisms

The Kenyan market at the moment offers minimal options for financial mechanisms, with very few alternative lending products. Bank lending and mortgages are the main sources of financing within the built environment. Several barriers to green financing options have been identified including: the higher upfront costs of equipment and material, asymmetric information, performance data and validation and poor local market conditions[19].

To overcome these barriers, the industry should look into equalising the costs of green building and the current forms of financing for the sector. It is important to create a producer and consumer understanding of the demand for green properties using an evidence base.

However, there has recently been shifts towards green financing options, with certain models and programs being set in place, since financing has been identified as one of the barriers to larger adoption of green building practices. The following are notable programs:

**Kenya Green Finance Taxonomy (KGFT) -** it provides a unified framework for identifying, evaluating, and reporting on green investments.

**Kenya Green Bond Programme** - a national initiative coordinated by KBA, NSE and CBI supported by FSD Africa and FMO to develop Kenya's Green Bond Market.

**FSD Kenya** - facilitates financial inclusion particularly in the green space.

[19] Sustainable Buildings Finance: A Practical Guide to Project Financing in East Africa

**Global Energy Efficiency & Renewable Energy Fund (GEEREF)** - committed $21 million to scale renewable energy projects within Africa

**Local banks** such as KCB which offered KES 21 billion in 2023 in green loans- 16% of its loan portfolio and Equity Bank which funds renewable energy, energy efficiency, green infrastructure, and e-mobility initiatives through the Equity Group Foundation[20]

## 4.5 Subnational Integration and County-Level Readiness

Kenya's pathway to achieving its NDCs must integrate **data-driven decision-making and institutional collaboration**, as the buildings and construction sector presents both a major challenge and a tremendous opportunity for decarbonization. It is important for counties to take leadership roles in contextualizing national targets within local development priorities, especially in areas such as energy efficiency, sustainable urban planning, and resilient infrastructure [21].

The Council of Governors have a mandate to coordinate and strengthen county capacities in policy implementation and resource utilization. Kenya's county governments are **at the frontline of delivering sustainable development outcomes**, making them **critical partners** in Kenya's climate agenda.

By aligning county development plans with national frameworks e.g. The Green Economy Strategy and the National Decarbonization Roadmap, it creates an easier route for implementation at a sub-national level. However, for counties to implement climate-responsive infrastructure and energy systems, they require:

- Technical support
- Financial mechanisms
- Policy coherence and de-fragmentation

The biggest challenge counties are facing is **they are developing faster than they are planning [22],** and this is supported by the rapid urbanization rate. Emerging urban areas such as Kitengela and Ongata Rongai where unstable housing patterns, inadequate sewage systems and poor spatial planning have created environmental and social challenges. With only **19 counties having gazetted County Spatial Plans** and **202 out of 2,636 urban centers adequately planned [23],** it highlights a large disconnect in the works and a need for consistency, hierarchy review and properly structured development control.

Furthermore, this issue is particularly crucial as county governments are responsible for approving building plans, enforcing standards and guiding local use land decisions. Therefore the participation of these institutions to deliver and implement the roadmap is vital for the benefit of the country as a whole.

[20] Status of the Built Environment Report 2024

[21] Decarbonization Sector Workshop with Council of Governors and World Resources Institute (2025)

[22] Decarbonization Sector Workshop with Council of Governors and World Resources Institute (2025)

[23] Status of the Built Environment Report 2025

### 4.5.1 County-Level Readiness

Counties have begun integrating sustainability into their development with counties such as Kisumu, Lamu and Homa Bay taking the forefront. Kisumu's Lakefront Development plan contains aspects such as mixed-use developments and zoning that promote community integration with environmental conservation. It also promotes pedestrian and cycling activity integrated with vehicular access promoting sustainable transport systems.

Homabay's Climate Adaptation Plan is fully locally led, embedding community knowledge into official development frameworks in spatial planning and climate adaptation. This extends into practices such as affordable water access, flood mitigation, housing upgrades and cleaner cooking solutions.

Lamu's Land-Marine plan under the Go Blue Project is aimed at strengthening the blue economy for sustainable, inclusive economic growth. This includes mainstreaming ecosystem-based land-sea planning, supporting tourism and cultural heritages which, in turn, creates green jobs and promotes long-term sustainable practices.

# 5 Strategic Pillars and Action Areas

## 5.1 Overview

For this roadmap to be measurable, effective and produce results, there is need to focus on the areas that support Kenya's decarbonization goals and climate vision. These focus areas are aligned with the GlobalABC framework as well as GBPN's own framework to ensure high and targeted impact.

These 6 core focus areas are the foundation of the roadmap strategy and are fashioned after the thematic areas: **Energy Efficiency, Spatial And Urban Development, Existing Buildings, New Buildings, Construction Supply Chain, Enabling Factors.** Each theme has specific action areas that are divided into policy recommendations, priority interventions and capacity building.


*Figure 5-1: Strategic Focus Areas*

**Source: GBPN - Graphic by Napkin AI (2025).**

## 5.2 Energy Efficiency in Buildings

### 5.2.1 Overview

Kenya's electricity is 90% renewable as it is mainly geothermal and hydroelectric in nature. However, as Kenya continues to urbanise the country's power needs also continue to rise, just as the population is expected to increase. This places continual additional strain on the existing power supply, creating a need for citizens, industries, office and commercial buildings to become more energy- efficient.

Energy efficiency has gained traction through implementation of energy efficient lighting and appliances due to ease of installation and immediate savings. However, the main hindrance to its adoption is high cost, especially in terms of infrastructure upgrades, HVAC systems, solar power systems and energy auditing. This issue arises particularly in buildings that neglected to observe passive design during conceptualization and design.

### 5.2.2 Gaps

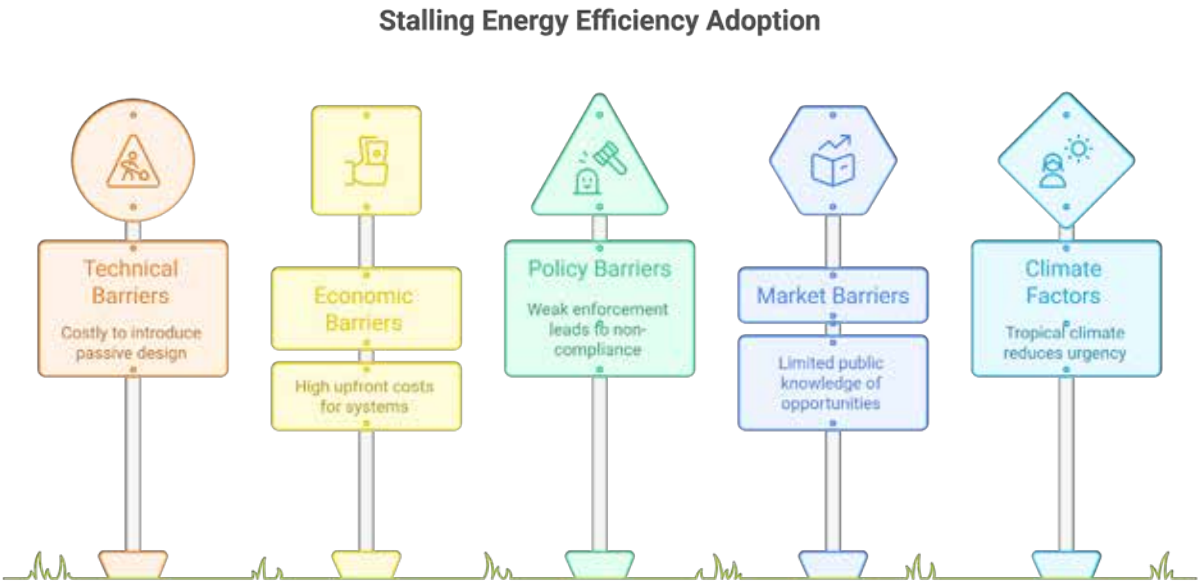



*Figure 5-2: Barriers to energy efficiency adoption*

**Source: GBPN - Graphic by Napkin AI (2025).**

Some of the main barriers experienced are:

- Weak enforcement and fragmented governance in policy and regulation.
- High costs of energy efficient appliances or retrofitting existing non-green buildings.
- Lack of incentives for energy efficient investments and limited access to green financing.

- Our tropical climate limits interest in some high efficiency solutions.
- Limited public knowledge about energy saving opportunities and disinterest in certification.

### 5.2.3 Actions & recommendations

The proposed actions create opportunities to enhance energy efficiency in consumption as well as production in the Kenyan building and Construction sector. The actions have been arranged in order of priority as voted during validation and prioritization sessions:

#### A. Policy Recommendations

a. Make regular energy audits mandatory, at varying levels, and at intervals with follow-up verification of recommendations.
b. Develop a national building energy performance database for benchmarking and comparison.
c. Mandate passive design strategies in new buildings to reduce dependence on energy-consuming techniques.
d. Promote low-interest green loans/grants for energy retrofits in existing buildings.
e. Implement transparent, publicly accessible net-metering tariffs.

#### B. Priority Interventions

a. Upgrade grid infrastructure in urban and high demand areas to support smart metering.
b. Mandate passive design in new buildings and promote energy retrofits in existing structures to reduce energy consumption.
c. Provide tax incentives and green financing to support adoption of energy efficient technologies.
d. Launch national campaigns on cost and energy benefits of passive design strategies and energy efficient measures.
e. Promote energy efficient HVAC systems before audits make them mandatory.

*Figure 5-3: Finance and citizen collaboration*

**Source: DrawKit**

#### C. Capacity Building

a. Build capacity in county governments and national regulators to monitor compliance, enforce building codes and offer technical support.
b. Integrate energy efficiency and climate responsive design modules into university architecture and engineering curricula.

c. Offer homeowner workshops and digital tools to explain energy efficiency benefits and easy actions they can take.
d. Train energy auditors and utility staff on advanced audit techniques, smart grids and demand-side management.
e. Promote community energy champions to share success stories & peer learning.

## 5.3 Spatial and Urban Development

### 5.3.1 Overview

Less than 50% of the population have access to public transport within a 10-minute walk due to poor public transport coverage. This means that people have to use a last-mile connection such as a motorbike or tuktuks.

This addition of extra transportation causes an increase in carbon emissions with regard to a person's whole commute, resulting in many Kenyans opting to buy their own personal vehicles to save themselves the trouble.

To help mitigate emissions on this end, the World Research Institute is leading a 5-year initiative to accelerate the transition to electric mobility in Kenya, the 'Electrifying Kenya's Two and Three Wheelers' Initiative[24]. This is especially significant to this sector as two and three wheelers are mostly used for last-mile connections in areas with poor public transportation coverage. Furthermore, lack of properly defined sidewalks used for both walking and cycling, deters people from these options and pushes them to take up motorised transportation.


*Figure 5-4: Electric motorbike charging*
**Source: Mahmut Yilmaz (Pexels, 2025)**

The existing water and electricity supply networks can't accommodate any form of urban expansion posing a potential hindrance to building operations, street services such as lighting, and proper drainage.

Many residents within informal settlements lack legal ownership of land, which informs the kinds of structures they put up; temporary shelters. Despite efforts in affordable housing, green infrastructure, and climate resilience, local governments rarely involve communities meaningfully. In informal settlements,the effectiveness of early warning systems depends on community awareness, timely communication, and integration with local response mechanisms.

[24] UNDP, UNCDF and WRI Launch Climate Projects to Boost Kenya's Food Security and Clean Transport.

### 5.3.2 Gaps

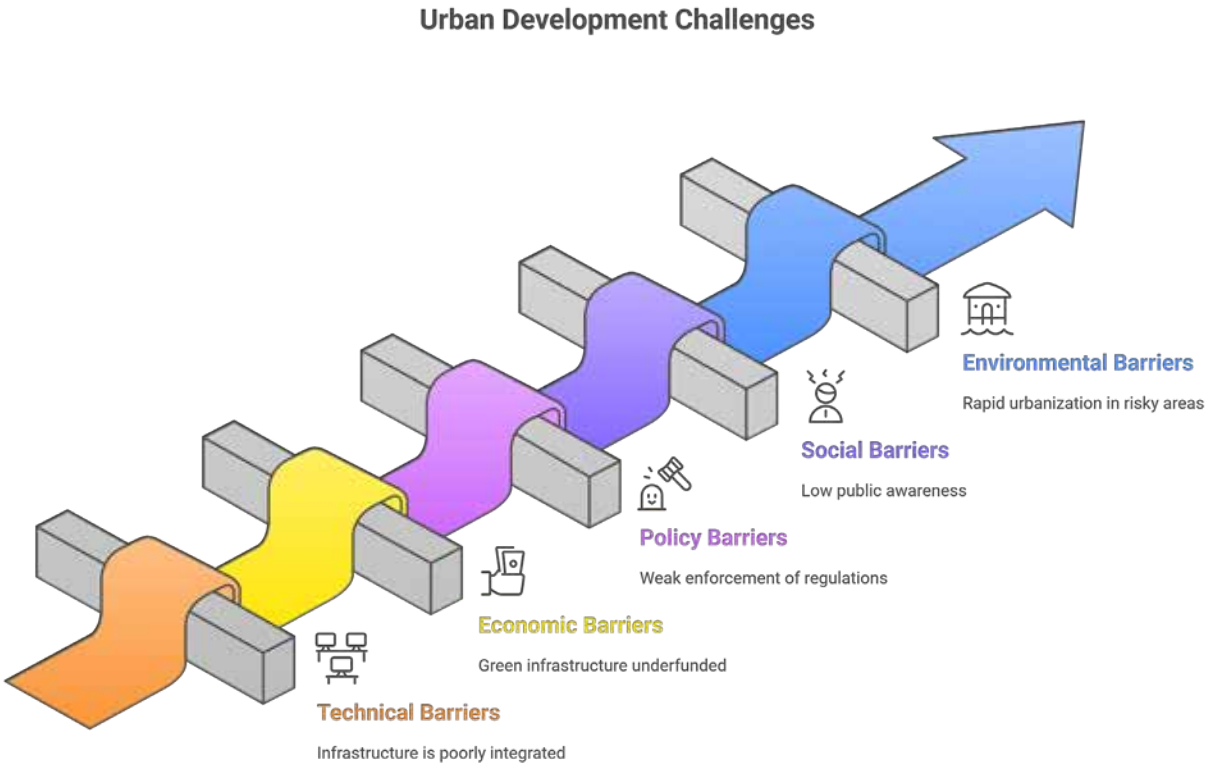



*Figure 5-5: Gaps hindering urban development*

**Source: GBPN - Graphic by Napkin AI (2025).**

- Limited non-motorised infrastructure such as walkways and cycling lanes encourage private car and motorcycle use.
- Inadequate stormwater infrastructure in urban areas, reducing building and infrastructure resilience as well as increasing health risks.
- Public perception often favors low-density development, which increases sprawl and infrastructure costs.
- Green or climate-resilient designs for roads, utilities, and housing are seen as expensive by local authorities.
- Informal settlements are rarely included in city-wide resilience or infrastructure budgets.
- Digital tools such as GIS and hazard mapping are still at pilot stages and not yet mainstreamed leading to low coverage by smart urban technologies.
- Expansion into floodplains or poorly drained zones heightens climate vulnerability.
- Urban heat and flooding strain electricity and water systems that are already underperforming.

### 5.3.3 Actions & recommendations

The proposed actions create opportunities to enhance emission reduction through spatial and urban planning in Kenya. The actions have been arranged in order of priority as reached by consensus during validation and prioritization sessions:

*Figure 5-6: Dedicated cyclist and pedestrian lane*

**Source: Maria Clara Diab (Pexels, 2023)**

#### A. Policy Recommendations

a. Integrate non-motorized transport (NMT) infrastructure (cycling lanes, pedestrian walkways) into urban mobility planning.
b. Enact regulations mandating transport-oriented development (TOD) to improve accessibility to public transport.
c. Revise building and zoning codes to require climate-resilient infrastructure in flood-prone areas.
d. Institutionalize community feedback mechanisms in urban policy processes
e. Develop and enforce disaster risk-sensitive land use policies.

#### B. Priority Interventions

a. Build/retrofit last-mile connectivity to ensure public transport access within 10 minutes.
b. Construct dedicated pedestrian and cyclist infrastructure.
c. Establish community-managed service delivery models.
d. Expand stormwater drainage and energy networks aligned with growth.
e. Conduct awareness campaigns on affordable housing/climate adaptation.
f. Retrofit high-risk informal settlements with flood-resilient infrastructure.

#### C. Capacity Building

a. Build capacity in sustainable utility design.
b. Train developers/contractors on green building and inclusive design.
c. Strengthen inter-departmental coordination.
d. Educate residents on land rights, and service entitlements.
e. Train leaders and youth in disaster preparedness.

## 5.4 Existing Building Stock and Retrofitting

### 5.4.1 Overview

Buildings mainly rely on grid electricity while using diesel generators for primary backups. Many buildings have implemented basic energy efficiency measures despite full-scale retrofits being limited. These interventions aim to improve operational performance but also reflect growing concerns around rising energy costs.

The use of low-flow fixtures and rainwater harvesting systems is relatively widespread, yet water recycling systems remain rare, largely due to cost, maintenance concerns, and limited awareness.

Despite the integration of high-efficiency HVAC systems and building management systems (BMS) in some commercial buildings, there is limited data available on operational carbon emissions.

Finally, many buildings have incorporated design features such as drainage diversion systems, elevated foundations, and sump pumps in basements to mitigate the impacts of extreme weather events. However, awareness and clarity around mandated resilience requirements remain low, with most adaptations occurring on a voluntary or reactive basis.

### 5.4.2 Gaps

- There is a significant knowledge gap and lack of awareness among building owners, property managers, professionals, and occupants regarding the environmental impact of existing buildings.
- Limited stakeholder engagement with the people who occupy, manage or finance the buildings.
- Resilience to change and heavy reliance on traditional construction methods.
- The high cost of retrofitting as well as inaccessibility to green financing discourages many building owners.
- High cost of green certification.
- There is little to no reliable data on the energy performance or carbon emissions of existing buildings.
- Weak regulatory and policy implementation framework.

*Figure 5-7: Finance analysis illustration*

**Source: Freepik**

### 5.4.3 Actions & recommendations

The proposed actions create opportunities to enhance reduction of carbon emissions by the existing Kenyan building stock. The actions have been arranged in order of priority as reached by consensus during validation and prioritization sessions:

#### A. Policy Recommendations

a. Enforce adoption of rainwater harvesting technologies.
b. Mandate installation of LED lighting to increase energy and cost savings.
c. Mandate energy audits for older buildings.
d. Require retrofitting of low-flow fixtures during renovations.
e. Provide incentives for stormwater management upgrades.
f. Integrate climate resilience standards into retrofitting codes.

#### B. Priority Interventions

a. Retrofit plumbing with low-flow fixtures.
b. Retrofit drainage and pumps.
c. Partial / Phased solar integration.
d. Greywater recycling systems.
e. Reinforce foundations & structural joints.
f. Upgrade lighting and appliances to energy-efficient models.

#### C. Capacity Building

a. Educate on low-flow fixtures.
b. Training on roof/slab design.
c. Train on smart energy systems.
d. Awareness on water reuse.
e. Educate on building resilience.
f. Create awareness about energy savings.

*Figure 5-8: Solar Panel Installation*

**Source: Los Muertos Crew (Pexels, 2021)**

## 5.5 New Buildings – Design, Construction, and Materials

### 5.5.1 Overview

The majority of new buildings rely on grid electricity and use solar power as a supplementary source. This indicates a shift towards integrating energy and water efficiency in building design. Traditional construction techniques remain dominant but recycled materials are gaining traction.

The reliance on conventional construction methods persists even as the demand for housing and other infrastructure intensifies, placing additional pressure on existing energy and water systems. The integration of sustainability measures at both the design and material levels is therefore critical to meeting future demand while minimizing environmental impact.

### 5.5.2 Gaps

- Financial products often come with stringent eligibility criteria, limited local availability, and a lack of institutional support or advisory services, which hampers the ability of organizations to invest in decarbonization initiatives.
- There is a limited knowledge of available technologies, funding opportunities, and regulatory expectations.
- Adoption of green building standards remains low due to perceived complexity, increased initial costs, and uncertainty about return on investment.
- Weak regulatory and policy implementation framework.

### 5.5.3 Actions & recommendations

#### A. Policy Recommendations

a. Promote incentives for solar and smart technologies (subsidies/rebates).
b. Enforce the use of water-saving fixtures and rainwater harvesting systems.
c. Legislate the use of certified sustainable materials.
d. Integrate energy efficiency into building regulations.
e. Mandate incentives for water recycling systems.
f. Update building codes with mandatory green material standards.

#### B. Priority Interventions

a. Peg new building approvals to considerations for low-flow fixtures and rainwater harvesting.
b. Incentivize use of sustainable materials (tax breaks, subsidies).
c. Enforce energy-efficient design standards.
d. Promote greywater recycling systems.
e. Promote renewable energy technologies.
f. Offer tax relief or fast-track approvals for green projects.

### C. Capacity Building

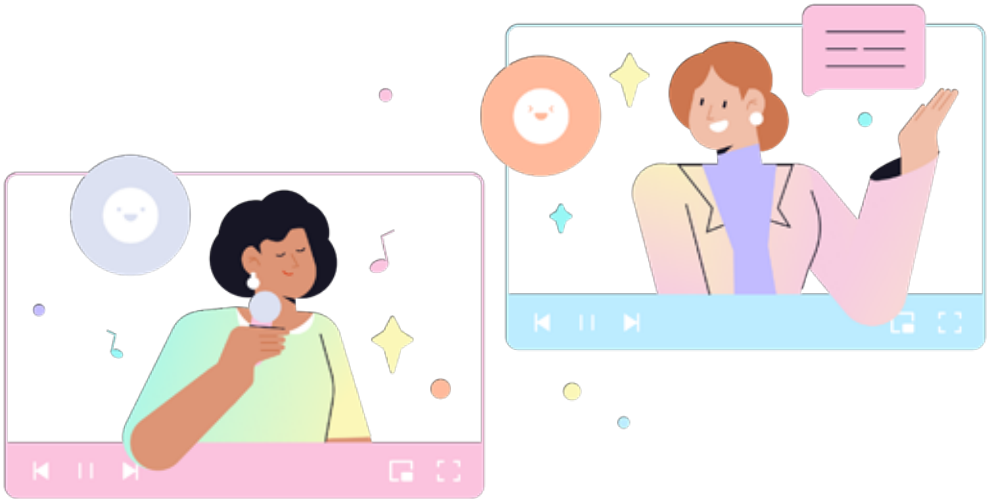


*Figure 5-9: Information sharing illustration*

**Source: DrawKit**

a. Run education programs on water recycling.
b. Run awareness campaigns on energy-efficient technologies (HVAC, smart metering, etc.).
c. Create awareness on sourcing, benefits and lifecycle of green materials.
d. Develop local material certification and evaluation frameworks.
e. Provide user and installer training on low-flow fixtures and rainwater harvesting.
f. Develop technical guides for passive design.

## 5.6 Construction Supply Chain and Embodied Emissions

### 5.6.1 Overview

Grid electricity and diesel generators are heavily used in the production processes of the construction supply chain, while renewable energy use is minimal. The lack of low-carbon emissions reporting and awareness suggests limited progress toward sustainability and vulnerability to rising energy costs or supply disruptions.

High production costs, a lack of advanced technology, and insufficient government incentives are the primary obstacles hindering the local production of sustainable building materials.

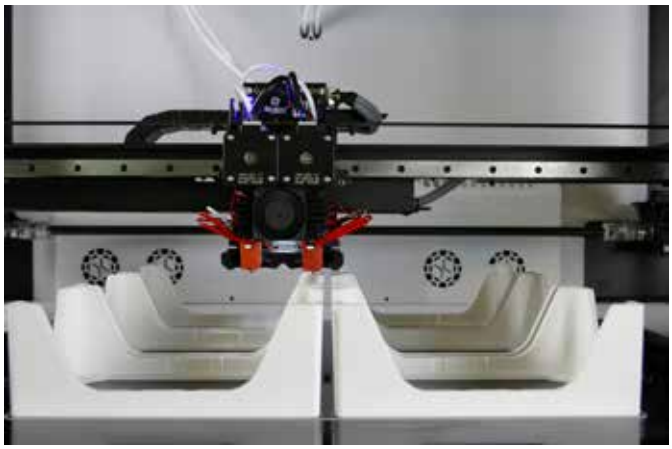


*Figure 5-10: 3D printing of building blocks*

**Source: Unsplash**

While most suppliers lack formal sustainability certifications, the materials themselves have typically undergone testing or quality certification from recognized regulatory bodies like KEBS.

The cost of sustainable materials e.g. bamboo, timber, bio-based products and low-carbon cement alternatives, is higher than conventional materials, which highlights a cost premium. This is due to: limited local supply, high production costs, low demand and economies of scale. There is also a low client demand for sustainable materials due to cost sensitivity, despite the knowledge of the long-term benefits, like energy savings and incentives.

### 5.6.2 Gaps

- Weak enforcement and fragmented governance in policy and regulation.
- Lack of mandatory standards for emissions and life cycle assessments.
- High cost of low carbon materials and limited access to green financing.
- Low adoption of advanced manufacturing techniques.
- Inadequate recycling and circular infrastructure.
- Low client demand, low awareness and knowledge gaps.

### 5.6.3 Actions & recommendations

#### A. Policy Recommendations

a. Introduce carbon impact labels for materials (e.g. cement, steel, glass).
b. Require public buildings to use certified green materials.
c. Establish standard methods for calculating and reporting embodied carbon in building materials.
d. Require developers to submit a Life Cycle Assessment (LCA) report for large-scale construction .
e. Encourage use of Life Cycle Inventory (LCI) databases tailored to Kenyan materials.
f. Set renewable energy targets for manufacturing of materials.
g. Provide feed-in tariffs or tax incentives for solar integration in manufacturing plants.

#### B. Priority Interventions

a. Centralize data on embodied energy, emissions, and source location for materials.
b. Encourage material circularity, especially for concrete, steel, and glass.
c. Promote use of compressed stabilized earth blocks (CSEBs), bamboo, and pozzolana-blended cement.

*Figure 5-11: Environmental awareness illustration*

**Source: DrawKit**

d. Encourage retrofitting of manufacturing facilities to improve energy efficiency and reduce emissions.
e. Promote kiln upgrades for cement and lime production to reduce fuel intensity.
f. Create incentives for contractors to send waste to certified Material Recovery Facilities (MRFs).

### C. Capacity Building

a. Partner with polytechnics and TVETs to teach clean production methods, kiln efficiency, and solar integration.
b. Encourage universities to include green building and carbon literacy in architecture and construction programs.
c. Offer certified training on EDGE, LEED, and LCA tools.
d. Organize high-level dialogues on the economic and climate risks of unsustainable material production.
e. Present evidence of Kenya's vulnerabilities to fuel cost shocks and emissions to policy makers.
f. Expand training for EDGE Auditors, LEED APs, Green Star and Safari Green Building Index (SGBI) professionals in Kenya.

## 5.7. Enabling Factors – Data Systems, Capacity Building, Digitization, and Finance

### 5.7.1 Overview

Kenya has developed several policies and frameworks that encourage the decarbonization of the built environment. However, their effectiveness remains moderate due to weak enforcement, slow policy adoption, and a lack of alignment between national directives and county-level implementation. Green finance offerings have grown in recent years, with some banks and development institutions providing sustainability-linked loans and project-based climate finance. Still, there is a split perception regarding the actual availability and accessibility of these products.

Market demand for green-certified buildings is growing, especially within the commercial and institutional sectors, where long-term operational cost savings are a strong motivator. Yet, the willingness to adopt green practices is often hindered by cost-related concerns and a lack of accessible, locally relevant information on the tangible environmental and financial benefits of decarbonization. A significant barrier to scaling decarbonization efforts is the shortage of skilled professionals. This highlights the need for structured capacity building programs and stronger academia-industry linkages.

### 5.7.2 Gaps

- Fragmented policy and weak enforcement due to capacity constraints at county & national levels.
- Limited access to tailored green financing as well as lack of investor familiarity with risks and returns of sustainable buildings.
- Critical skill gaps in professionals to execute large scale decarbonization.
- High certification costs and complex processes.
- Inconsistent capacity and coordination among public agencies.
- Low market demand and high hesitancy to adopt green buildings.

### 5.7.3 Actions & recommendations

The proposed actions create opportunities to enhance the reduction of carbon emissions by enabling factors. The actions have been arranged in order of priority as reached by consensus during validation and prioritization sessions:

#### A. Policy Recommendations

a. Establish a national compliance framework to monitor existing policies.
b. Strengthen inter-agency coordination (national–county).
c. Incentivise PPPs for green infrastructure / housing.
d. Enforce mandatory energy performance audits and public disclosure (all buildings).
e. Align National Building Code with decarbonisation via mandatory implementation of green design.
f. Introduce fiscal incentives (tax rebates, VAT exemptions) for green-certified buildings.

*Figure 5-12: Timber and Masonry Construction*

**Source: Pixabay (Pexels, 2017)**

## B. Priority Interventions

a. Roll out green demonstration projects in public institutions.
b. Launch a Green Building Incentive Scheme for retrofits & low-carbon new constructions.
c. Develop a national platform to track certifications & energy performance.
d. Conduct awareness campaigns on cost savings & health benefits.
e. Integrate green building standards into public procurement.
f. Create a centralized Green Finance Help Desk.

## C. Capacity Building

a. Train architects, engineers, and contractors on energy modelling, passive design, and green standards (e.g., EDGE, LEED).
b. Develop climate-resilient, low-carbon curricula in universities/TVETs.
c. Grassroots training on energy-efficient practices and sustainable living.
d. Equip financial institutions to assess green projects & offer specialized products.
e. Establish certification & licensing for green building professionals.
f. Provide continuous professional development for county planners, inspectors, policymakers.

*Figure 5-13: Illustration on information sharing*

**Source: Freepik**

# 6 Decarbonization Pathways and Scenarios

## 6.1 Baseline vs. Decarbonization Scenarios (2030 / 2050)

### 6.1.1 Emission Scenarios

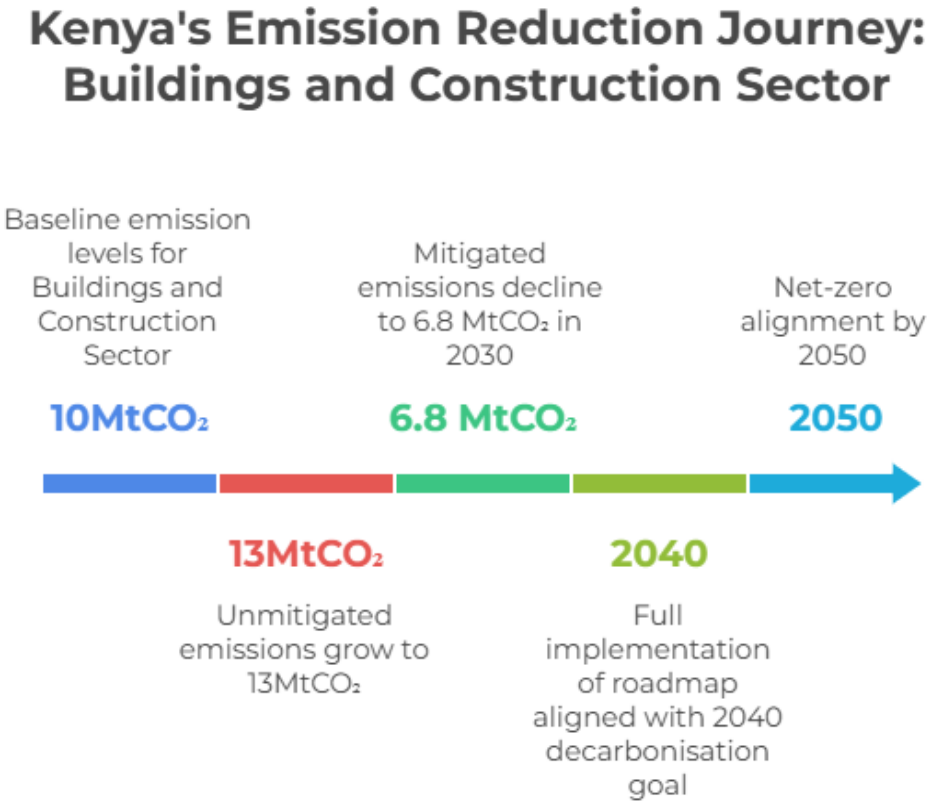



*Figure 6-1: Emission scenario illustration*

**Source: GBPN - Graphic by Napkin AI (2025).**

There are 3 types of emission scenarios in this chapter:

- The baseline scenario
- Business as usual scenario
- Mitigated scenario

### 1. The Baseline Scenario (Current conditions)

This scenario draws from the Tier 1 methodology (national proxies, building stock data, grid-intensity) and is refined by Tier 2 techniques (survey responses, stakeholder data, Carbon Metric proxies) to capture a realistic snapshot of current emissions.

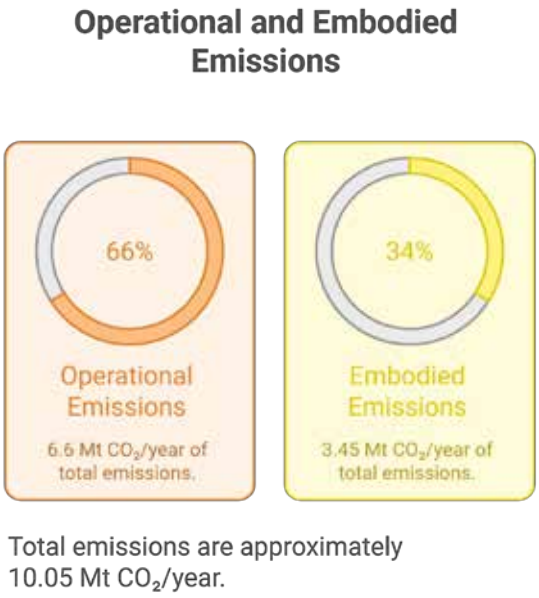



*Figure 6-2: Baseline scenario illustration*

**Source: GBPN - Graphic by Napkin AI (2025).**

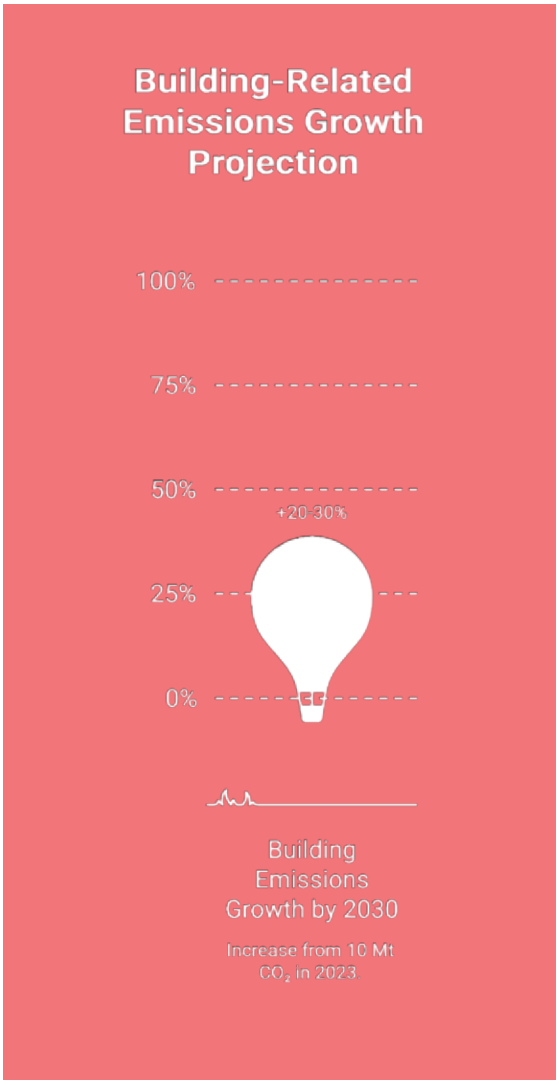



*Figure 6-3: Business as usual scenario illustration*

**Source: GBPN - Graphic by Napkin AI (2025).**

### 2. The Business as usual Scenario (Unmitigated conditions)

Assuming no additional interventions, building-related emissions are projected to grow ~2–3% annually (urbanization + stock turnover), from: 10.0 Mt $CO_2$ in 2023 → ≈ **12–13 Mt $CO_2$ by 2030**

This aligns with Kenya's overall BAU trajectory and reflects the Buildings Breakthrough warning:

**Africa's building emissions may double by 2050.**

### 3. The Mitigated Scenario (NDC - aligned conditions)

Under Kenya's updated NDC, which aims for a **32% national reduction vs BAU by 2030,** the buildings sector, responsible for ~10% of national emissions, would need to:

Cut building emissions from ~**13 Mt to ≈ 8.8 Mt $CO_2$ by 2030.**

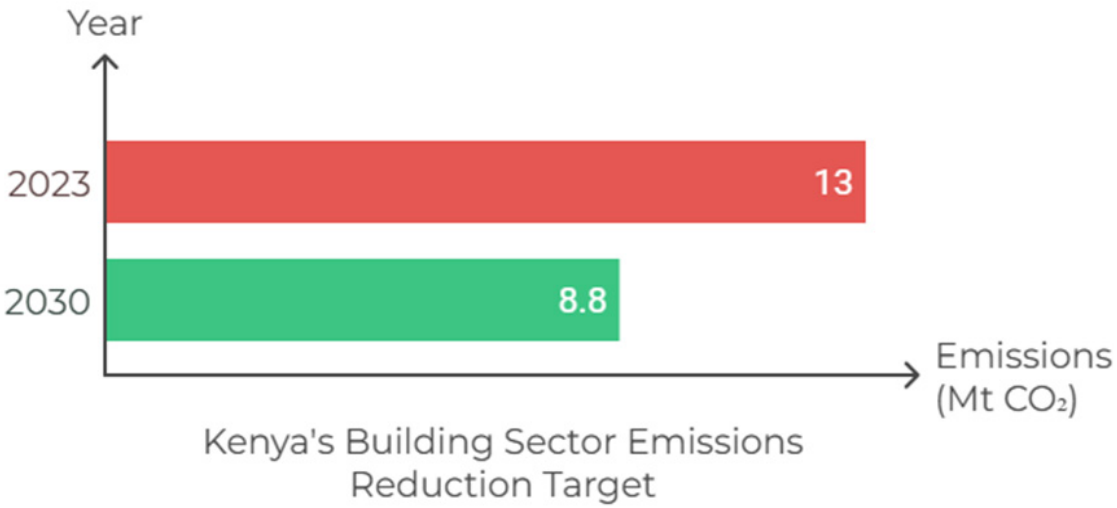



*Figure 6-4: Mitigated scenario illustration*

**Source: GBPN - Graphic by Napkin AI (2025).**

This represents a ≈30% mitigation within this sector, achievable through scalable measures: energy-efficient retrofits, solar cookstoves, green building codes, and low-carbon materials—all supported by Tier 3 case-level data and the Carbon Metric Tool outputs to quantify intervention impacts.

## 6.2 Modelling Results and Emission Reduction Potential

Mitigated emissions trajectory until 2030.

| Year | Operational ($MtCO_2$) | Embodied ($MtCO_2$) | Total Emissions ($MtCO_2$) |
|---|---|---|---|
| **2023** | 6.6 | 3.4 | 10.0 |
| **2024** | 6.3 | 3.3 | 9.6 |
| **2025** | 6.0 | 3.2 | 9.2 |
| **2026** | 5.6 | 3.1 | 8.7 |
| **2027** | 5.2 | 2.9 | 8.1 |
| **2028** | 4.8 | 2.8 | 7.6 |
| **2029** | 4.5 | 2.7 | 7.2 |
| **2030** | 4.2 | 2.6 | 6.8 |

*Table 6-1: Emission Trajectory from 2023-2030*

**Source: GBPN (2025).**

Some assumptions made for the Emission Reduction are:

**1. Reduced Operational Emissions**

a. Target: Reduce emissions by 35–40% by 2030 by:
   i. Improved building envelope design in new construction
   ii. Increased retrofits for public/institutional buildings
   iii. Implementation of Minimum Energy Performance Standards (MEPS) for appliances
   iv. Promotion of clean cooking and electrification in residential areas
   v. Improvement of urban planning to reduce inefficiencies

Projected Reduced Emissions:

**~6.6 $MtCO_2$ (2023) → ~4.2 $MtCO_2$ (2030)**

**2. Reduced Embodied Emissions**

a. Target: Reduce embodied carbon by 20–25% in new buildings by 2030 by:
   i. Promotion of low-carbon materials
   ii. Encouraged reuse and recycling of materials
   iii. Implementation of material efficiency measures
   iv. Encouraged product certification schemes and carbon labelling

Projected Reduced Embodied Emissions:

**~3.4 $MtCO_2$ (2023) → ~2.6 $MtCO_2$ (2030)**

### 6.2.1 Mitigated emissions scenario to 2030 and 2050

#### Mitigated Emissions Trajectory (2023-2030)

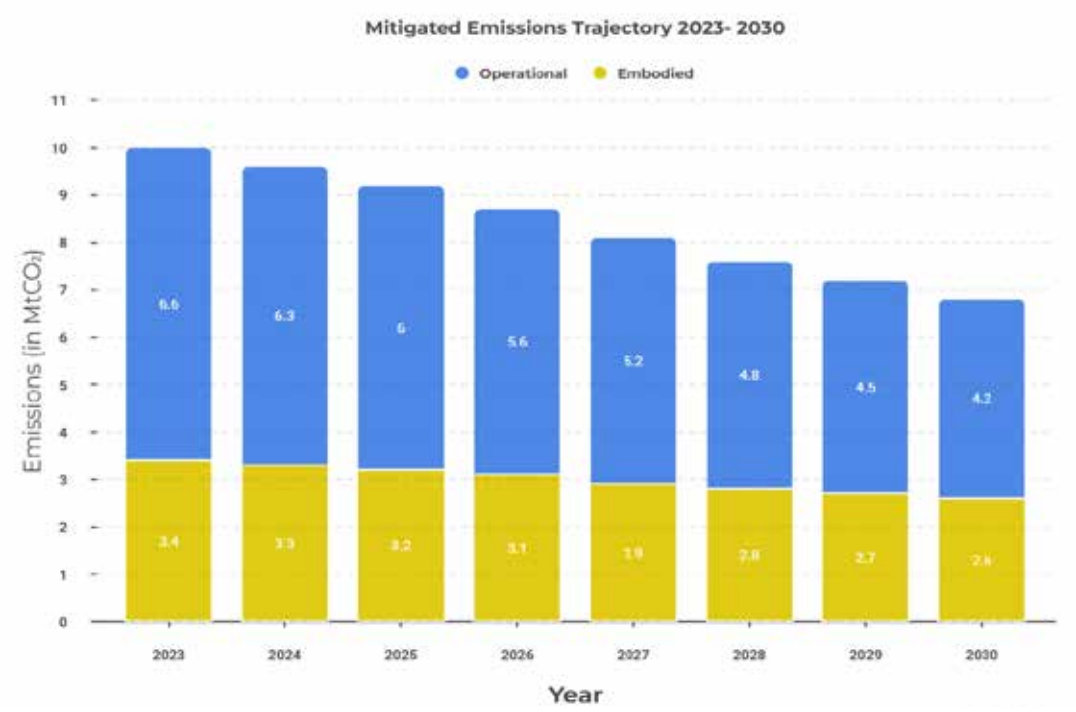



*Figure 6-5: Mitigated Emission Trajectory from 2023-2030*

**Source: GBPN (2025).**

**Note:** ***2030 Target: ~6.8 $MtCO_2$ → a 44% reduction from the unmitigated scenario (~12.1 $MtCO_2$)***

#### Assumptions for Emission Reduction to 2030

**1. Reduced Operational Emissions**

**Target:** Reduce energy-related emissions by **35–40% by 2030.**

**How:**

1. Improve building envelope design in new construction (through Kenya's revised building code)
2. Scale up retrofits for public/institutional buildings
3. Implement Minimum Energy Performance Standards (MEPS) for appliances
4. Promote clean cooking and electrification in residential areas
5. Improve urban planning to reduce transport and infrastructure inefficiencies

Therefore, Projected Reduced Operational Emissions:

**~6.6 $MtCO_2$ (2023) → ~4.2 $MtCO_2$ (2030)**

**2. Reduced Embodied Emissions**

**Target**: Reduce embodied carbon by **20–25% in new buildings by 2030.**

**How:**
1. Promote low-carbon materials (e.g., interlocking blocks, timber, earth)
2. Encourage reuse and recycling of materials
3. Implement material efficiency measures (e.g., modular designs)
4. Encourage product certification schemes and carbon labelling

Therefore, Projected Reduced Embodied Emissions:

**~3.4 $MtCO_2$ (2023) → ~2.6 $MtCO_2$ (2030)**

### Mitigated Emissions Trajectory (2023-2050)

To project the mitigated scenario to 2050, the curve is extended using the same methodological logic applied in the roadmap's modelling section:

**Assumptions for Emission Reduction to 2050:**
1. The mitigated pathway assumes full implementation of the roadmap, consistent with Kenya's 2040 decarbonisation goal and subsequent net-zero alignment by 2050.
2. Between 2030 and 2040, reductions are driven by full enforcement of the Building Code (Green Amendment-that incorporates the green building standards currently under development), low-carbon material substitution, large-scale retrofitting, and expansion of renewable energy access.
3. Between 2040 and 2050, reductions plateau slightly as residual emissions persist from legacy stock and material production but are partially offset through circular economy integration and carbon offset programs.
4. Operational emissions decline by roughly 5% annually between 2030–2040, tapering to 2% annually from 2040–2050.
5. Embodied emissions decline by 4% annually between 2030–2040, tapering to 1.5% annually thereafter due to material lifecycle constraints.

## Projected Mitigated Scenario (2023–2050)

| Year | Operational ($MtCO_2$) | Embodied ($MtCO_2$) | Total Emissions ($MtCO_2$) |
|---|---|---|---|
| **2023** | 6.6 | 3.4 | **10.0** |
| **2024** | 6.3 | 3.3 | **9.6** |
| **2025** | 6.0 | 3.2 | **9.2** |
| **2026** | 5.6 | 3.1 | **8.7** |
| **2027** | 5.2 | 2.9 | **8.1** |
| **2028** | 4.8 | 2.8 | **7.6** |
| **2029** | 4.5 | 2.7 | **7.2** |
| **2030** | 4.2 | 2.6 | **6.8** |
| **2031** | 4.0 | 2.5 | **6.5** |
| **2032** | 3.8 | 2.4 | **6.2** |
| **2033** | 3.6 | 2.3 | **5.9** |
| **2034** | 3.4 | 2.2 | **5.6** |
| **2035** | 3.2 | 2.1 | **5.3** |
| **2036** | 3.0 | 2.0 | **5.0** |
| **2037** | 2.9 | 1.9 | **4.8** |
| **2038** | 2.7 | 1.8 | **4.5** |
| **2039** | 2.6 | 1.7 | **4.3** |
| **2040** | 2.5 | 1.6 | **4.1** |
| **2041** | 2.45 | 1.58 | **4.03** |
| **2042** | 2.40 | 1.55 | **3.95** |
| **2043** | 2.35 | 1.53 | **3.88** |
| **2044** | 2.30 | 1.50 | **3.80** |
| **2045** | 2.25 | 1.48 | **3.73** |
| **2046** | 2.20 | 1.46 | **3.66** |
| **2047** | 2.15 | 1.43 | **3.58** |
| **2048** | 2.10 | 1.41 | **3.51** |
| **2049** | 2.05 | 1.39 | **3.44** |
| **2050** | 2.00 | 1.37 | **3.37** |

*Table 6-2: Projected Mitigation Scenario from 2030-2050*

**Source: GBPN (2025).**

In summary therefore, if the recommendations of the roadmap are put in place the mitigation potential to 2030 and 2050 respectively is **3.2 and 6.63 $MtCO_2$.**

## 6.3 Key Leverage Points and Priority Interventions

The modelling results presented in Sections 6.1 and 6.2 reveal that Kenya's highest mitigation potential lies in a set of structural leverage points across the buildings and construction value chain. These leverage points represent areas where targeted interventions, supported by policy reform, financial incentives, institutional strengthening, and industry participation, can achieve disproportionate emissions reductions at relatively low cost. This subsection identifies the priority levers that will unlock Kenya's pathway toward a 2030 and 2050 low-carbon trajectory and outlines corresponding interventions for coordinated national and subnational action.

### 6.3.1. Leverage Point 1: Decarbonizing Building Materials and Local Supply Chains

#### Rationale

Embodied emissions currently represent ~34–38% of total building sector emissions in Kenya, driven largely by cement, steel, aggregates, and transport. Modelling shows that up to 40% of cumulative emission reductions by 2050 can be achieved by transforming material production systems, improving efficiency, and enabling low-carbon alternatives.

**Priority Interventions:**

a. Adoption of low-clinker and blended cements (LC3, pozzolana-rich mixes).
b Energy efficiency upgrades in cement and steel plants, including waste-heat recovery and continuous kiln retrofits.
c. Standards for recycled and secondary materials (recycled steel, crushed concrete, sustainable timber).
d. Localized material sourcing strategies to reduce transport emissions.
e. Mandatory Environmental Product Declarations (EPDs) for high-impact materials by 2030.
f. Green procurement guidelines for public infrastructure, supporting early market creation.

Global assessments, including the GlobalABC Materials Roadmap and UNEP's Material Efficiency Guidelines, show a similar pattern across fast-growing economies, where clinker reduction, recycled materials, and efficient production lines consistently generate early, high-impact mitigation.

### 6.3.2. Leverage Point 2: Energy Efficiency in New and Existing Buildings

#### Rationale

Operational emissions account for the largest share of sectoral emissions. Modelling shows that improving building envelope performance, appliances, and energy systems can deliver 45–55% of operational reductions by 2050, especially as cooling demand rises.

Drawing insights from the EU Building Renovation Wave; GlobalABC Buildings Energy Pathways; and South Africa's SANS 10400-XA compliance frameworks, Kenya's priority interventions are:

a. Enforcement of the new Kenya Green Building Code and harmonized energy performance standards.
b. Minimum Energy Performance Standards (MEPS) for appliances, lighting, motors, and cooling equipment.
c. Cost-effective retrofits for existing public buildings (schools, hospitals, county offices), including insulation, efficient appliances, and solar integration.
d. Building-level renewable energy adoption, leveraging net-metering and county energy plans.
e. Digitized permitting systems that embed energy performance checks.

### 6.3.3. Leverage Point 3: High-Density, Transit-Oriented Urban Development

#### Rationale

Urban form influences both operational and embodied emissions through land consumption, infrastructure expansion, and mobility patterns. Kenya's modelling and International experience, from C40 cities to SEforAll municipal planning pilots, shows that compact, transit-oriented development (TOD) reduces emissions by lowering infrastructure demand and enabling efficient construction of multi-storey residential buildings, which offer the highest abatement potential.

**Priority Interventions**

a. County-level spatial plans promoting higher densities in serviced areas.
b. Incentive zoning for low-carbon affordable housing near transit corridors.
c. Integrated land-use and transport planning, including BRT expansions in Nairobi, Mombasa, and Kisumu.
d. Design guidelines for passive cooling and ventilation in high-rise residential buildings.
e. Infrastructure alignment frameworks ensuring utilities match low-carbon growth strategies.

### 6.3.4. Leverage Point 4: Strengthening Codes, Enforcement, and Regulatory Systems

#### Rationale

Modelling indicates that even high-impact technological or design interventions will not yield significant emissions reductions without robust institutional frameworks and compliance systems. Enforcement gaps remain one of the greatest barriers identified by national and county stakeholders.

**Priority Interventions**

a. Digitized building permit systems enabling compliance checks and MRV integration.
b. Capacity building for county works officers, inspectors, and fundis on low-carbon construction.
c. Updated building regulations aligned with the Kenya Green Building Standards.
d. County-level green building by-laws, harmonized nationally.
e. Certification and accreditation pathways for low-carbon building professionals.

### 6.3.5. Leverage Point 5: Affordable and Climate-Resilient Housing Transformation

#### Rationale

Kenya's baseline shows the largest emissions growth trajectory in high-rise residential housing, given current urbanisation trends and the national affordable housing programme. This sector provides the single most powerful decarbonization opportunity when material optimisation, passive design, and efficiency measures are combined.

**Priority Interventions**

a. Low-carbon design guidelines for high-rise housing, including material optimisation.
b. Standardised low-carbon prototypes for affordable housing.
c. Public developer procurement requirements for Environmental Product Declarations (EPDs), efficient envelopes, and design for disassembly.
d. Partnerships with private developers for demonstration projects in Nairobi, Kiambu, Mavoko, and Eldoret.
e. County incentives (fast-tracked approvals, density bonuses) for low-carbon multi-storey housing.

### 6.3.6. Leverage Point 6: Strengthening Subnational (County) Capacity and Action

#### Rationale

Counties control planning approvals, enforcement, utilities, housing delivery, and materials markets. Modelling indicates that 30–40% of the interventions needed for the 2030 target fall under county mandates.

**Priority Interventions**

a. County-level climate action plans (CAPs) aligned with the national pathway.
b. Integrated development plan (CIDP) updates embedding low-carbon construction.
c. County Energy Centres and MRV hubs, leveraging local data.
d. Targeted capacity building for inspectors, planners, and procurement teams.
e. Demonstration projects that reflect county priorities (housing, schools, markets)

### 6.3.7. Leverage Point 7: Financing and Market Mobilisation

#### Rationale

Decarbonization will require blending public finance, climate finance, and private investment. Without financial structures, the technically feasible becomes practically unattainable.

**Priority Interventions**

a. Green procurement frameworks for national and county governments.
b. Climate finance facilities for material producers, retrofits, and affordable housing projects.
c. Risk-sharing mechanisms (e.g., guarantees) for low-carbon innovation.
d. Incentive-based tariff structures for energy-efficient buildings.
e. A national green taxonomy for buildings, aligned with the CBK and Treasury.

## 6.4 Regional and Subnational Differentiation

Kenya's decarbonization pathway must account for the substantial spatial, climatic, economic, and infrastructural differences across the country. Although national-level modelling provides a unified emissions trajectory, the actual implementation of the interventions identified in Section 6.3 will occur primarily at the county level, where planning, permitting, enforcement, and service provision functions are exercised. This subsection highlights the regional variations that influence mitigation potential and proposes sub-nationally differentiated priorities, ensuring that every county contributes to the national targets in ways that reflect its conditions and capabilities.

Similar to global experiences in India, South Africa, and Rwanda where state- or district-specific building policies have accelerated adoption of national climate targets, Kenya's success depends on recognising that the highest-impact actions differ from county to county. The result is a place-based decarbonisation approach that complements the national scenario while supporting counties to develop targeted implementation pathways.

### 6.4.1. Climatic Zones and Building Performance Needs

Kenya spans multiple climatic zones; highland temperate regions, warm–humid coastal areas, hot–arid and semi-arid counties, and lake-basin climates, each of which produces different operational energy demands. Cooling loads dominate in coastal and arid counties, while heating and thermal comfort needs appear in highland zones.

**Implications for Decarbonisation Pathways**

a. Warm–humid and Coastal Counties (e.g., Mombasa, Kilifi, Lamu):
   High cooling demand underscores the need for natural ventilation design, reflective materials, high-performance glazing, and MEPS enforcement for cooling units.
b. Arid and Semi-Arid Lands (ASAL) Counties (e.g., Turkana, Isiolo, Garissa):
   Passive cooling, shading, and envelope performance are critical; materials transport emissions also become significant due to long distances and limited local manufacturing.
c. Highland Counties (e.g., Nairobi, Nyeri, Kiambu, Nakuru):
   Mixed-mode cooling and heating efficiency measures provide the highest operational gains.
d. Lake Basin Counties (e.g., Kisumu, Homa Bay):
   Moisture management, mixed ventilation strategies, and efficient cooling are central to energy use patterns.

These climatic distinctions require counties to prioritise building standards, materials, and enforcement strategies tailored to their local conditions.

### 6.4.2. Urbanisation, Growth Patterns, and Infrastructure Readiness

Kenya's counties vary significantly in population density, urban expansion rates, and infrastructure maturity. These differences shape both embodied and operational emissions, as well as the feasibility and sequencing of interventions.

**a) High-Growth Metropolitan Counties (Nairobi, Kiambu, Machakos, Kajiado):**

These counties concentrate most of the new construction, particularly high-rise residential developments. They therefore offer the highest embodied and operational mitigation potential and are ideal for early adoption of:

1. Low-carbon housing prototypes
2. Mandatory EPDs for materials
3. Transit-oriented development (TOD)
4. Digitised building approvals and inspections

**b) Secondary Urban Centres (Nakuru, Eldoret, Kisumu, Mombasa):**

1. These counties can accelerate:
2. Retrofitting of public buildings
3. Implementation of MEPS and energy audits
4. Medium-density growth supported by efficient mobility systems

**c) Rural and ASAL Counties:**

These regions may focus more on:

1. Low-carbon materials suitable for rural contexts (compressed earth blocks, sustainable timber)
2. Reducing materials transport emissions
3. Basic enforcement capacity-building
4. Climate-resilient, low-energy building typologies

### 6.4.3. Local Materials Availability and Supply Chain Constraints

Material production and supply chains vary significantly across counties:

a. Cement hubs in Kajiado, Machakos, and Bamburi (Mombasa) enable early shifts toward blended cements and lower-clinker products.
b. Timber-producing counties (Elgeyo-Marakwet, Nyeri, Kericho) can accelerate sustainable timber value chains.
c. Counties with limited local production face higher embodied emissions from transport and may require incentives to support mini-hubs for recycled aggregates and alternative materials.

This spatial differentiation is directly tied to the embodied carbon leverage point, emphasizing the need for county-specific material procurement and circularity strategies.

### 6.4.4. Enforcement Capacity and Institutional Readiness

The modelling shows that regulation and enforcement capacity is a major determinant of emissions outcomes. County readiness varies due to differences in staffing, technical expertise, digital systems, and institutional coordination.

**a) Counties with Higher Readiness (Nairobi, Mombasa, Nakuru, Kajiado, Kiambu):**

These counties can immediately implement:

1. Digitised permitting
2. Green building compliance checks
3. EPD-linked procurement
4. Advanced MRV reporting

**b) Counties with Moderate to Low Readiness (Others):**

These counties benefit from:

1. Targeted training for planning and works officers
2. Step-wise introduction of building performance checks
3. Simplified compliance pathways
4. Demonstration projects to build confidence

This reflects lessons from India's state-wide ECBC roll-out and South Africa's municipal by-law reforms, where differentiated implementation improved uptake and compliance.

### 6.4.5. Priority Interventions by County Typology

Based on modelling results and stakeholder consultations, the roadmap identifies subnational differentiation across four typological clusters:

**a. Metropolitan Growth Counties:**

*Nairobi, Kiambu, Machakos, Kajiado*
**Priority:** Low-carbon high-rise housing, TOD, digital enforcement, MEPS compliance, EPD-driven procurement.

**b. Mature Urban Centres:**

*Mombasa, Kisumu, Nakuru, Eldoret*
**Priority:** Public building retrofits, district energy systems, circular economy hubs, efficient cooling strategies.

**c. Rural Agricultural Counties:**

*Nyeri, Kericho, Uasin Gishu, Meru*
**Priority:** Sustainable biomass/timber, agro-based construction materials, efficient rural housing typologies.

**d. ASAL and Low-Density Counties:**

*Turkana, Marsabit, Garissa, Isiolo, Wajir*
**Priority:** Climate-resilient building design, passive cooling, low-carbon local materials, transport emission reduction, basic enforcement strengthening.

### 6.4.6. Counties as Anchors of Demonstration/Market-testing Projects

Several counties emerged as strong candidates for early pilot and demonstration/market- testing initiatives (see Section 7):

- Nairobi, Kiambu, and Machakos for low-carbon high-rise residential housing;
- Mombasa and Kisumu for efficient cooling and urban retrofits;
- Nakuru and Eldoret for public building retrofits;
- Turkana, Isiolo, and Garissa for climate-resilient, low-energy building prototypes.

County selection aligns with both emissions potential and institutional willingness, ensuring a balanced national impact.

# 7 Implementation Framework

## 7.1 Institutional Roles and Responsibilities

A successful transition toward a decarbonized and climate-resilient building sector depends on strong, clearly defined institutional roles and mechanisms for coordination across national, subnational, and sectoral levels. The implementation of this Roadmap is therefore anchored in a multi-level governance framework that promotes coherence, inclusivity, and accountability.

### 7.1.1 Lead and Coordinating Institution

The Ministry of Lands, Public Works, Housing and Urban Development (MLPWHUD) will serve as the lead coordinating institution for the implementation of the roadmap. Within the Ministry, the State Department for Public Works (SDPW) will host the Roadmap Secretariat, which will provide day-to-day coordination, technical oversight, and reporting functions. The Secretariat will:

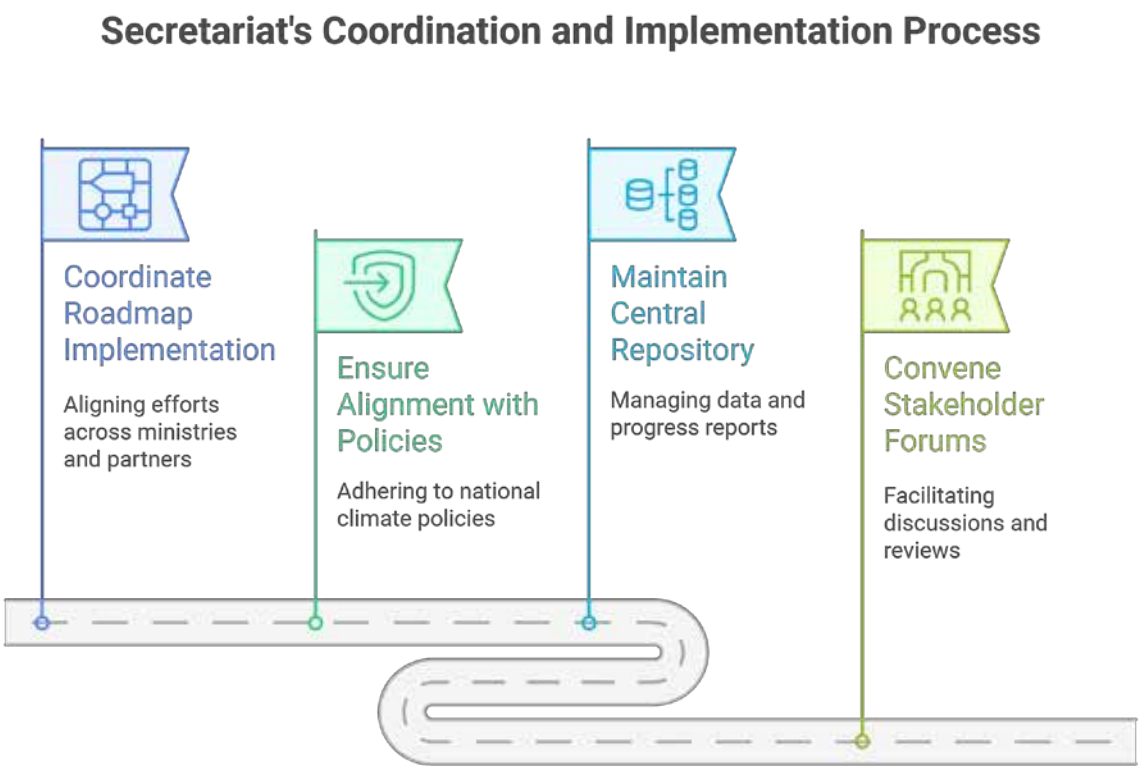



*Figure 7-1: Functions of the secretariat.*

**Source: GBPN - Graphic by Napkin AI (2025).**

- Coordinate roadmap implementation across relevant ministries, counties, and development partners.
- Ensure alignment with Kenya's Nationally Determined Contributions (NDCs), Climate Change Act (2016), and the National Climate Change Action Plan (NCCAP 2023–2027).
- Maintain a central repository for data and progress reporting.
- Convene periodic stakeholder forums and technical review sessions.

### 7.1.2 Inter-Ministerial Coordination

Recognising the cross-sectoral nature of decarbonization, the roadmap implementation will rely on a **National Inter-Ministerial Technical Committee (NITC)** comprising key ministries and agencies whose mandates intersect with the built environment.

The Committee will be chaired by the Principal Secretary for Public Works, with membership from:

a. **Ministry of Energy and Petroleum (MoEP)** – advancing energy efficiency, electrification, and integration of renewables into the built environment.
b. **Ministry of Environment, Climate Change and Forestry (MECCF)** – overseeing GHG inventories, MRV systems, and alignment with Kenya's NDC targets.
c. **National Treasury and Economic Planning** – mainstreaming decarbonization actions into national budgets and developing fiscal incentives for green construction.
d. **Ministry of Industrialization and Trade** – promoting low-carbon building materials, circular economy practices, and green manufacturing.
e. **Ministry of Education, Science and Technology** – integrating green building and climate literacy into professional training and research.
f. **National Construction Authority (NCA) and Board of Registration of Architects and Quantity Surveyors (BORAQS)** – enforcing professional standards and compliance with sustainable building codes.

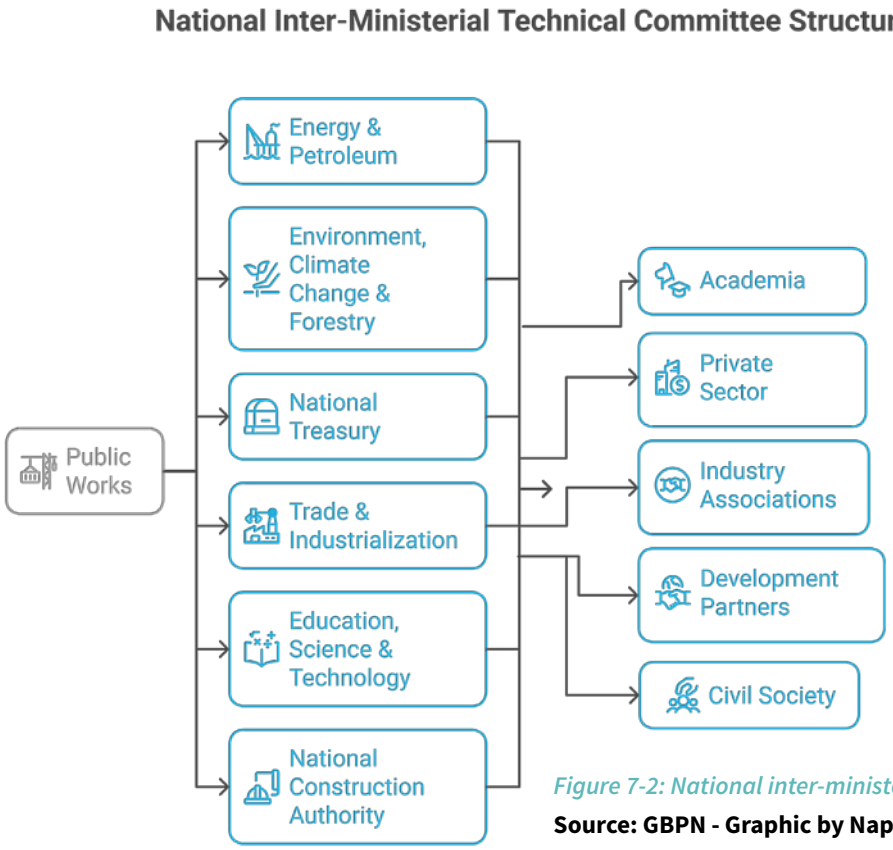



*Figure 7-2: National inter-ministerial technical committee structure*

**Source: GBPN - Graphic by Napkin AI (2025).**

The NITC will ensure horizontal policy alignment, reduce duplication of efforts, and drive inter-agency accountability.

### 7.1.3. Subnational Governments

The county governments play a central role in translating national commitments into local implementation. Through the Council of Governors (CoG), counties will:

1. Integrate roadmap actions into County Integrated Development Plans (CIDPs) and County Spatial Plans (CSPs).
2. Adopt and enforce locally adapted green building guidelines, codes, and permitting systems.
3. Establish county-level monitoring and reporting mechanisms in line with the national MRV framework.
4. Foster partnerships with local academia, industry, and communities to promote contextual solutions.

County participation ensures that diverse climatic zones and urban-rural contexts are adequately reflected in the roadmap's actions, promoting equity, relevance, and scalability.

### 7.1.4. Private Sector and Industry Associations

The private sector remains a primary driver of transformation within the construction ecosystem. The roadmap positions developers, contractors, manufacturers, and financiers as key partners in the delivery of decarbonisation actions. Their roles include:

1. Adopting green standards and energy-efficient construction technologies.
2. Mainstreaming circular economy practices in design, procurement, and waste management.
3. Mobilising investment through green finance instruments, including bonds and sustainability-linked loans.
4. Supporting self-regulation through professional associations such as the Architectural Association of Kenya (AAK), Institution of Engineers of Kenya (IEK), and Kenya Property Developers Association (KPDA).

These industry-led alliances will accelerate voluntary adoption of sustainable construction practices ahead of regulation.

*Figure 7-3: Researching image*

**Source: Chokniti Khongchum (Pexels, 2019)**

### 7.1.5. Academia, Research, and Technical Institutions

Academic and research institutions are vital for data generation, innovation, and capacity building. Universities, polytechnics, and technical institutes will:

1. Support research on low-carbon materials, building physics, and life-cycle assessment.

2. Provide technical input to the Roadmap Secretariat on baselining and emissions modelling.
3. Embed decarbonization and resilience principles into professional curricula.
4. Serve as long-term partners in monitoring and evaluation (M&E).

This embedding of Academia within the technical advisory structure will ensure scientific robustness and policy continuity.

### 7.1.6. Development Partners and Civil Society

Development partners, philanthropic organisations, and NGOs such as UNEP, IFC, UN-Habitat, and local climate networks will continue to play an enabling role through:

1. Technical assistance and policy support.
2. Capacity building for both professionals and counties.
3. Piloting innovative financing and demonstration projects.
4. Providing independent review, advocacy, and public awareness.

This Civil society engagement strengthens transparency, enhances citizen participation, and ensures that roadmap outcomes promote inclusivity and social justice.

### 7.1.7. Coordination and Accountability Mechanisms

To ensure synergy and coherence, the roadmap will establish a three-tier coordination structure:

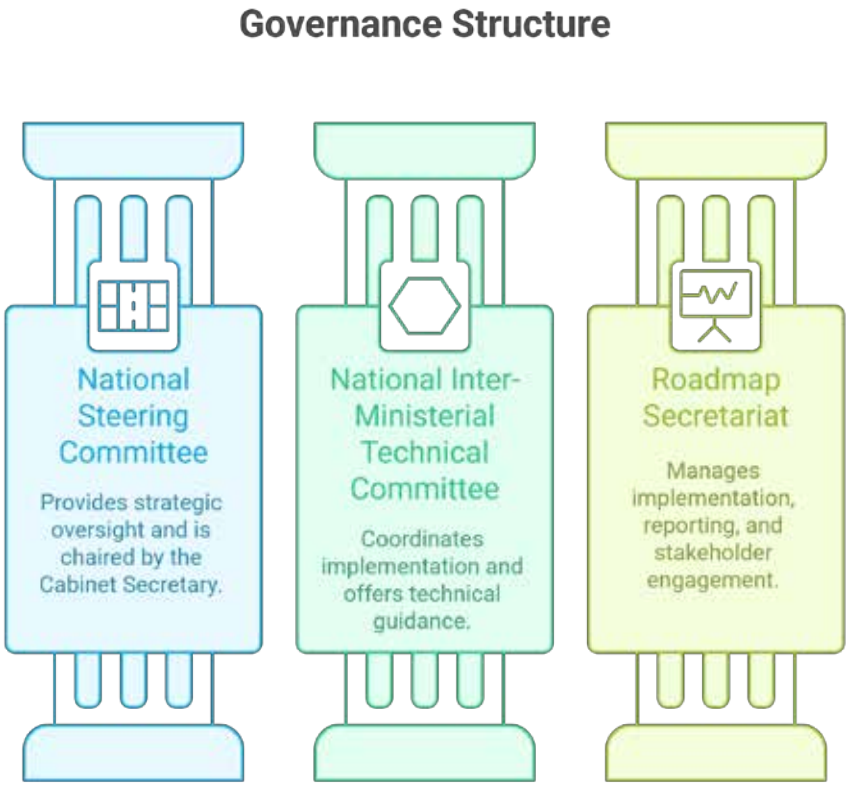



*Figure 7-4: Roadmap governance structure*

**Source: GBPN - Graphic by Napkin AI (2025).**

1. National Steering Committee (NSC) – providing strategic oversight and chaired by the Cabinet Secretary, MLPWHUD.
2. National Inter-Ministerial Technical Committee (NITC) – coordinating implementation and technical guidance.
3. Roadmap Secretariat – managing implementation, reporting, and stakeholder engagement.

An integrated Monitoring, Reporting, and Verification (MRV) mechanism will track progress, feeding into Kenya's National Climate Change MRV+ System under MECCF. Progress will be reviewed biennially, with findings informing updates to the NCCAP and subsequent NDC submissions.

### 7.1.8. Guiding Principles

Implementation will be anchored on the following principles:

1. **Clarity** – clearly defined institutional mandates and reporting lines.
2. **Integration** – alignment of national, subnational, and sectoral priorities.
3. **Inclusivity** – engagement of all value chain actors, including women, youth, and informal sector artisans.
4. **Accountability** – transparent, measurable roles tied to performance indicators.
5. **Continuity** – institutional learning embedded in regular review cycles.

## 7.2 Coordination Across National and County Levels

### 7.2.1 Rationale and Objective:

Coordination between national and county governments is critical because:

1. Implementation of building and construction decarbonization actions is inherently multi-level, involving national policy direction and local enforcement.
2. Counties (sub-nationals) are the frontline implementers of building permits, land-use control, and compliance with building codes.
3. Without vertical coordination, national goals (such as NDC targets or net-zero pathways) cannot translate into practical actions at the local level.

Kenya's devolved system of governance provides a strong institutional foundation for multilevel coordination and this roadmap builds on:

1. The **Climate Change (Amendment) Act, 2023,** which mandates county climate change units and reporting.
2. The **Intergovernmental Relations Act, 2012,** which provides for sectoral intergovernmental forums.
3. The **Council of Governors (CoG),** which can champion peer learning, joint financing, and policy harmonisation among counties.

The coordination structure proposed shall leverage:

1. The **Intergovernmental Climate Change Committee (IGCCC)** for policy oversight.
2. A **National Buildings Decarbonisation Secretariat** for technical leadership.

3. **County Decarbonisation Focal Points** within housing and environment departments to drive implementation and report upwards.

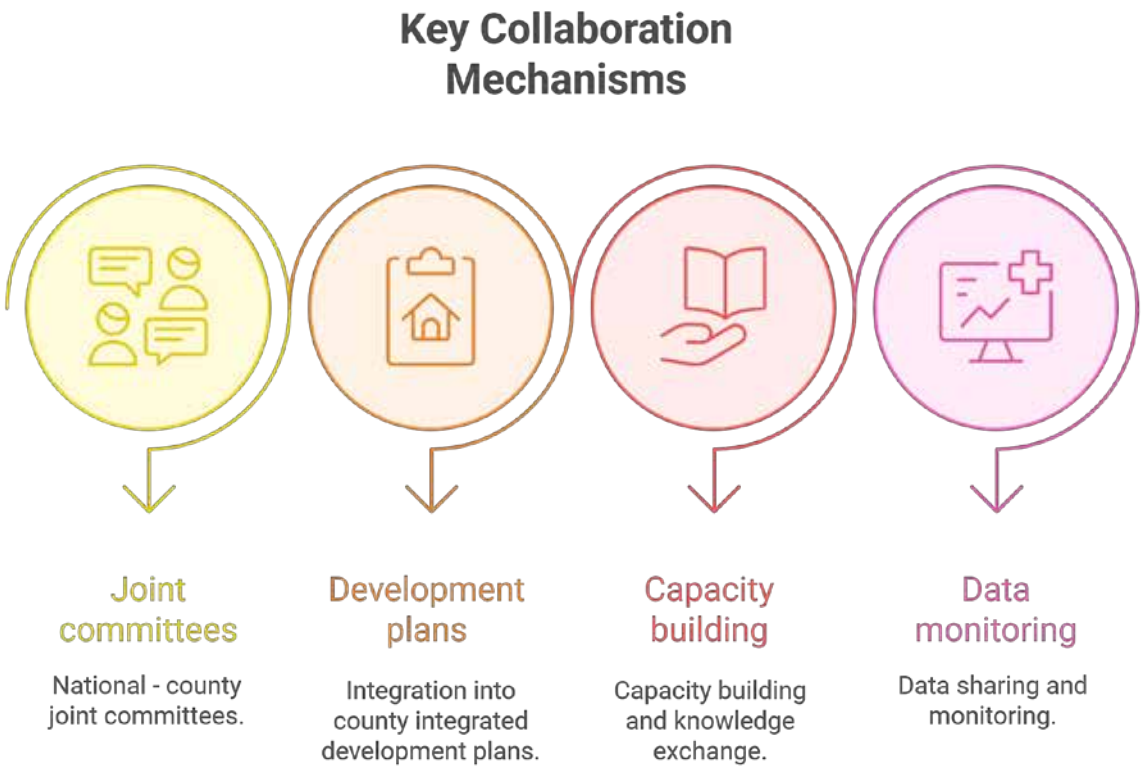



*Figure 7-5: Key Collaboration Mechanisms*

**Source: GBPN - Graphic by Napkin AI (2025).**

### 7.2.2 Key Coordination Mechanisms

#### a. National - County Joint Committees

Establish a National-County Decarbonisation Coordination Committee (NCDCC) bringing together representatives from the Ministry of Lands, Public Works, Housing and Urban Development (MoLPWHUD), Ministry of Energy, NEMA, the Council of Governors (CoG), and select county departments. The committee would facilitate:

1. Joint planning and monitoring.
2. Harmonisation of county building codes and green standards with national frameworks.
3. Development of county-level decarbonisation action plans (CDAPs).

### b. Integration into County Integrated Development Plans (CIDPs)

Counties should embed roadmap actions within CIDPs, spatial plans, and annual development plans, ensuring budgetary alignment and local accountability.

Nationally, The National Treasury and the State Department for Economic Planning can integrate these goals into Medium-Term Plans (MTPs) under Vision 2030, ensuring funding linkages.

### c. Capacity Building and Knowledge Exchange

National agencies provide technical support and capacity building through the Kenya School of Government, EPRA, and professional boards (NCA, BORAQS, ERB, etc.). County pilot programs can act as learning hubs for replication across other jurisdictions.

### d. Data Sharing and Monitoring

Create a shared monitoring platform for emission data, building performance metrics, and project tracking, managed by the national secretariat but with county-level data input. Counties should submit annual progress reports on energy efficiency, green building compliance, and climate adaptation initiatives.

The expected outcomes of National to County coordination include:

1. Streamlined implementation and monitoring across all 47 counties.
2. Harmonised green building codes and permitting procedures.
3. Localised investment and innovation in green construction.
4. Strengthened accountability and data-driven decision-making.
5. Increased visibility of Kenya's progress in achieving NDC and SDG targets.

## 7.3 Industry and Private Sector Partnerships

### 7.3.1 Rationale and Objective

The private sector, including real estate developers, contractors, manufacturers, financial institutions, and professional associations, plays a pivotal role in driving the transition to a low-carbon buildings sector.

Given that the majority of construction activity, building materials production, and real estate investment in Kenya is led by private actors, establishing strong partnerships is critical to achieving the targets of the Buildings Decarbonisation Roadmap.

This sub-section outlines how industry and private sector participation will be structured, incentivised, and monitored to ensure effective collaboration in reducing operational and embodied carbon across the building lifecycle.

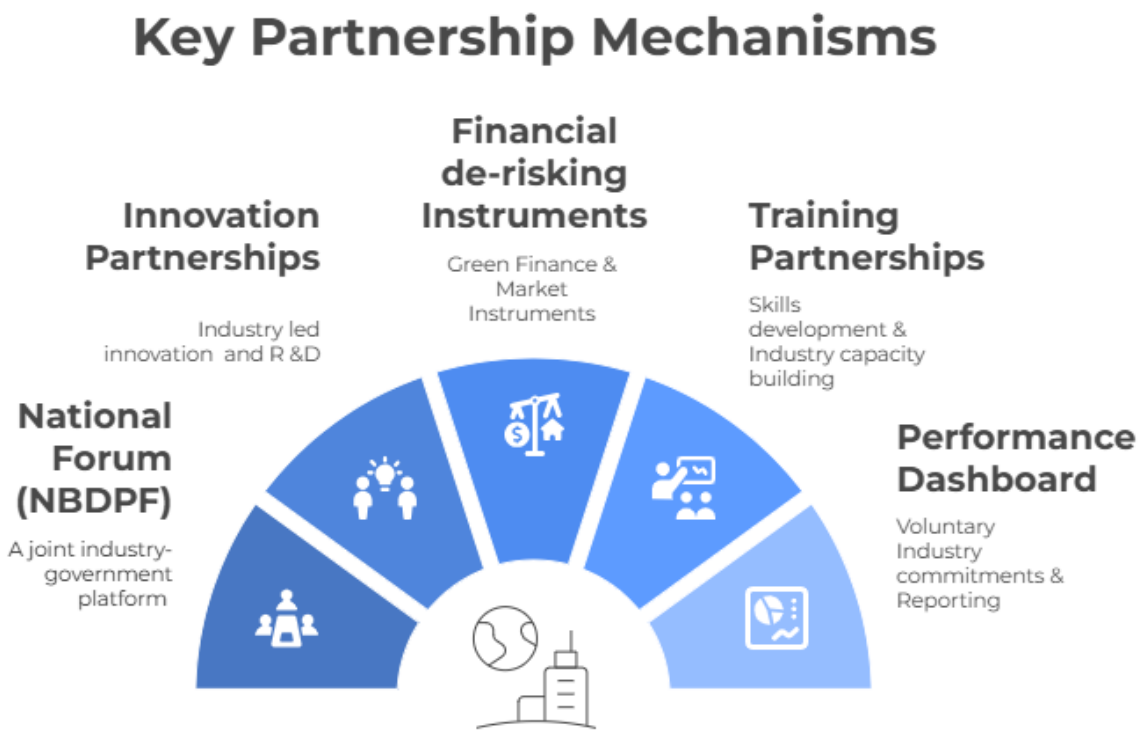



*Figure 7-6: Key Partnership Mechanisms*

**Source: GBPN - Graphic by Napkin AI (2025).**

### 7.3.2 Key Partnership Mechanisms

#### a. Public–Private Collaboration Platforms

A **National Buildings Decarbonization Partnership Forum (NBDPF)** will be convened under the Ministry of Lands, Public Works, Housing and Urban Development (MoLPWHUD) to bring together:

A. Industry associations (e.g. KPDA, KAM, KGBS, EBK, AAK, NCA)
B. Financial institutions and green financiers
C. Large developers and construction companies
D. Academic and research institutions

The Forum will coordinate on:

1. Joint target setting for carbon reduction
2. Voluntary agreements for energy efficiency and materials circularity
3. Development of sectoral action plans (e.g. cement, steel, other building materials)

**Comparable Example:** The UK's Construction Leadership Council (CLC) under the Transforming Construction Programme acts as a joint industry-government platform that defines decarbonisation pathways and reports annually on emissions reduction progress.

### b. Industry-Led Innovation and R&D

The private sector will be encouraged to **invest in green construction technologies and low-carbon materials,** such as:

A. Cement substitutes (e.g. pozzolanic cement, geopolymer)
B. Recycled steel and aggregates
C. Modular and prefabricated construction systems

Collaboration with research institutions like the Kenya Industrial Research and Development Institute (KIRDI) and universities will be formalised through innovation partnerships.

**Comparable Example:** In India, the Building Materials and Technology Promotion Council (BMTPC)[25] links academia and private firms to test, certify, and mainstream low-carbon materials through technology missions and demonstration projects.

### c. Green Finance and Market Instruments

**Private investors and developers will be supported through financial de-risking instruments** such as:

1. Green building certification-linked tax incentives
2. Preferential access to green loans and guarantees via commercial banks, SACCOs, and development finance institutions (e.g. KCB Green Mortgage Programme, Shelter Afrique, IFC EDGE)
3. Introduction of Green Procurement Guidelines in public projects to stimulate market demand.

**Comparable Example:** South Africa's Green Finance Taxonomy (2021)[26], developed by the National Treasury in collaboration with the private financial sector, provides clarity on eligible green investments, helping channel private capital into low-carbon infrastructure.

### d. Skills Development and Industry Capacity Building

Through **partnerships with TVET institutions, professional bodies, and industry training boards**, the roadmap will support the development of:

1. Green construction curricula
2. Certification for sustainable building professionals
3. Apprenticeship programs in energy efficiency and retrofit works

**Comparable Example:** Colombia's *"Build Green"* Program engages construction companies and training institutions to certify workers in sustainable building practices, improving employability while accelerating market uptake.

[25] Government of India (2021). *Building Materials and Technology Promotion Council (BMTPC) Annual Report*.
[26] Government of South Africa (2021). Green Finance Taxonomy. National Treasury.

### e. Voluntary Industry Commitments and Reporting

1. Companies and professional associations will be encouraged to:
2. Publish annual sustainability and carbon disclosure reports
3. Join voluntary carbon reduction initiatives such as the Science-Based Targets initiative (SBTi)

Align operations with ISO 14001 (Environmental Management) and ISO 50001 (Energy Management) standards

To support transparency, the Buildings Decarbonisation Secretariat will maintain a National Industry Performance Dashboard that aggregates progress indicators from voluntary reporting.

## 7.3.3 Global Alignment with Best Practice

Global frameworks such as the Global ABC Roadmap for Buildings and Construction (2022–2050), the UNEP Sustainable Buildings and Construction Programme, and the World Green Building Council's Net Zero Carbon Buildings Commitment highlight the centrality of private sector action in driving systemic transformation.

Key lessons include:
1. Clear government signals (through regulation and incentives) catalyse private investment.
2. Multi-stakeholder platforms ensure shared accountability and knowledge exchange.
3. Demonstration projects and green procurement policies help build early market confidence.
4. Voluntary reporting mechanisms complement mandatory standards for progressive compliance.

## 7.3.4 The Kenyan Context

Kenya already has the backbone for an active green building ecosystem, anchored by:
1. ***Kenya Green Building Society (KGBS),*** which could promote certification and advocacy.
2. ***Kenya Private Developers Association (KPDA),*** which could drive large-scale housing delivery.
3. ***Kenya Association of Manufacturers (KAM),*** which could advance energy efficiency in production.

This roadmap builds on existing partnerships and formalises a national coordination mechanism for private sector participation. Anticipated key outcomes include:

a. Mobilisation of private investment for green construction and retrofitting.
b. Mainstreaming of low-carbon materials in industry supply chains.
c. Creation of green jobs through skills alignment and training.
d. Increased contribution of the private sector to Kenya's NDC targets.
e. Strengthened industry-government collaboration on building decarbonisation.
f. Growth of a competitive, innovation-driven green construction market.
g. Enhanced private capital mobilisation for sustainable infrastructure.
h. Transparent and data-driven monitoring of private sector performance.
i. Scaled-up adoption of green standards across the construction value chain.

## 7.4 Knowledge Hub and Digital Integration

### 7.4.1 Rationale and Objective

The establishment of knowledge hubs is now recognised as a core enabler in most national decarbonisation strategies: The *Global ABC Regional Roadmaps* (Africa, Asia, Latin America) all identify digital data ecosystems and knowledge exchange as critical enablers of systemic transformation[27]. Similarly, it has been emphasised that progress depends on data transparency, cross-sector integration, and the mainstreaming of digital tools like BIM and LCA platforms[28]. Additionally, the importance of shared digital infrastructure in achieving efficient policy coordination across national and subnational levels has been underscored by the World Bank [29].

Kenya's digital transformation agenda provides a strong foundation for the creation of a knowledge hub and for digital integration as below:

1. **The National ICT Policy (2020)** prioritises digitisation for efficiency and transparency.
2. The **Kenya National Spatial Data Infrastructure (KNSDI)** under the Ministry of Lands enables geospatial data sharing.
3. The **Kenya Climate MRV+ Framework** establishes a national system for tracking climate actions and emissions.


*Figure 7-7: National Digital Frameworks*

Source: GBPN - Graphic by Napkin AI (2025).

[27] UNEP (2023). Global ABC Building Sector Decarbonisation Roadmaps: Methodological Guidelines.

[28] UNEP (2022). Global Status Report for Buildings and Construction.

[29] The World Bank's Digital Government Framework (2023)

Building on these systems, the Knowledge Hub will serve as a cross-sector integration layer linking climate data, building performance indicators, and material supply chain metrics into one national ecosystem.

The knowledge hub is expected to provide:

1. A stronger evidence base for policy and investment decisions.
2. Efficient coordination between national and county governments.
3. Enhanced data transparency and stakeholder accountability.
4. Continuous learning and innovation across the building sector.
5. International visibility of Kenya's leadership in data-driven climate action.

### 7.4.2 Key Components of the knowledge hub

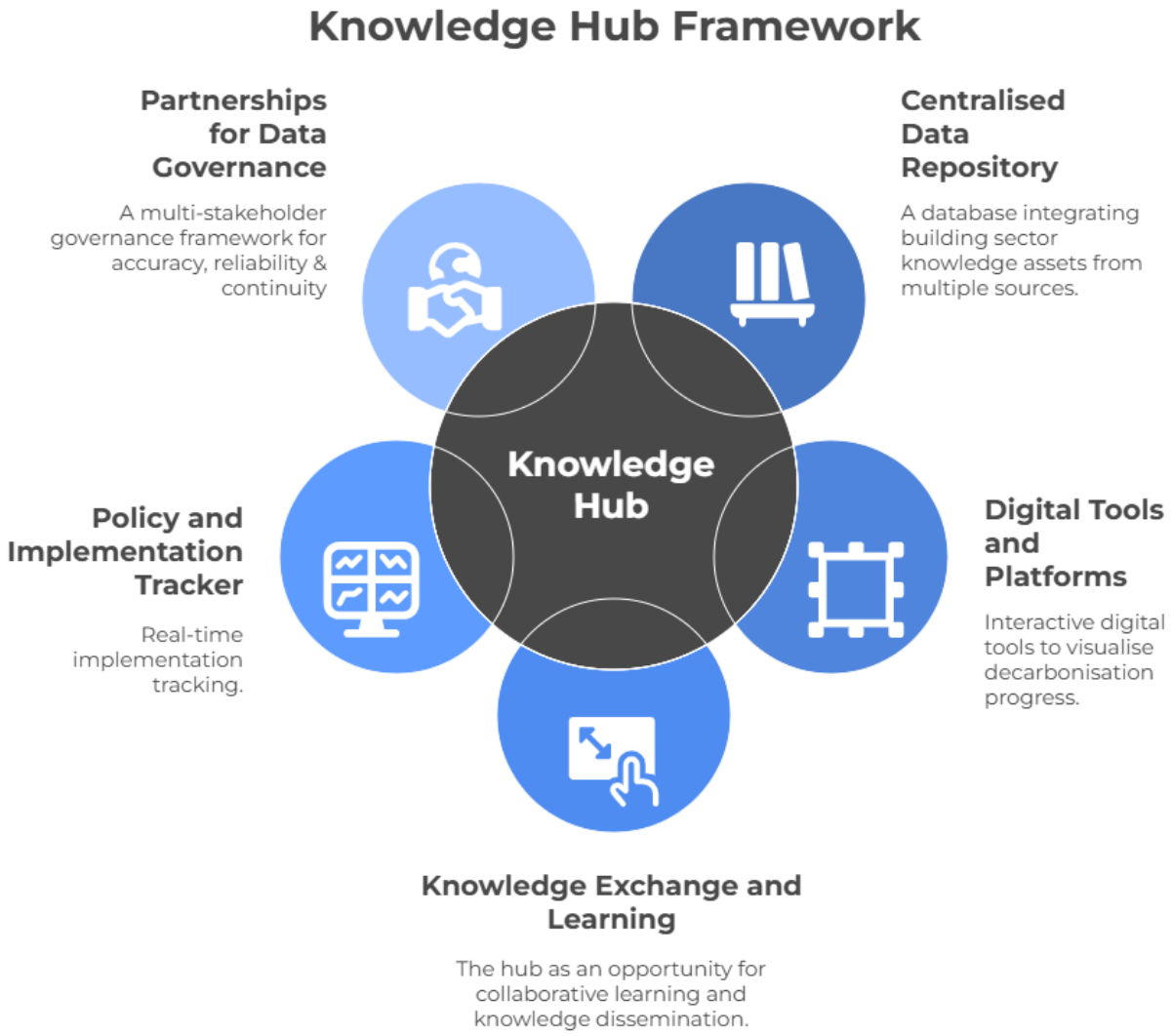



*Figure 7-8: Knowledge Hub Frameworks*

**Source: GBPN - Graphic by Napkin AI (2025).**

### a. Centralised Data Repository

The Knowledge Hub will house a national repository of data on:
1. Building energy performance and emissions (both operational and embodied)
2. Material supply chains and life-cycle assessments
3. Building typologies and construction practices
4. Policy instruments, standards, and incentives
5. Climate vulnerability and adaptation mapping

Data integration will align with any existing systems such as: National Building Information Modelling (BIM) initiatives, Kenya National Bureau of Statistics (KNBS) datasets, NEMA's Environmental Information System (EIS) and County urban planning GIS databases.

### b. Digital Tools and Platforms

The Hub will develop and host interactive digital tools to facilitate:
1. Scenario modelling of emissions reduction pathways
2. Building performance benchmarking
3. Access to decarbonisation technologies and material databases
4. Tracking progress against NDC and Buildings Breakthrough targets

It will also feature a GIS-enabled dashboard to visualise decarbonisation progress geographically, linking national and subnational actions.

### c. Knowledge Exchange and Learning

Beyond data, the Hub will function as a learning and innovation platform. Activities will include:
1. Webinars, workshops, and online training for government and industry stakeholders
2. Knowledge-sharing events and peer-to-peer exchanges with regional and international partners
3. Publication of technical briefs, policy summaries, and demonstration project case studies

The Hub will leverage partnerships with universities (e.g., University of Nairobi, JKUAT), professional associations (AAK, IEK, KGBS), and training institutions (TVETs) to institutionalise continuous learning.

### d. Policy and Implementation Tracker

The digital integration component will support:
1. Real-time monitoring of policy implementation across ministries and counties
2. Integration of roadmap milestones with national climate monitoring systems *(including the Climate Change Directorate's MRV framework)*
3. A public transparency portal to show progress on key decarbonisation indicators

This approach aligns with the principles of digitisation which are transparency, accountability, and efficiency, enabling Kenya to shift from policy formulation to real-time implementation tracking.

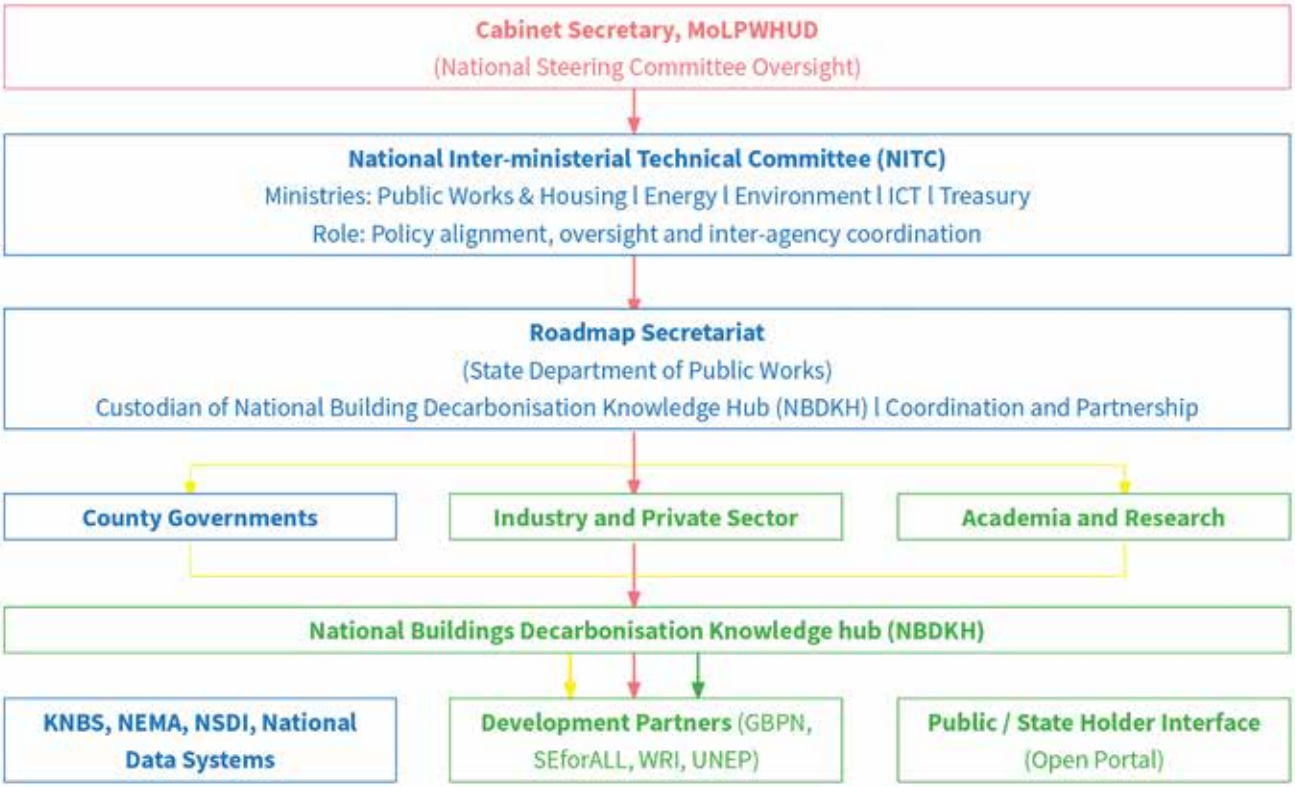
### e. Partnerships for Data Governance and Interoperability

To ensure accuracy, reliability, and continuity, the Hub will operate under a multi-stakeholder governance framework involving:

1. Ministry of Lands, Public Works, Housing and Urban Development (MoLPWHUD) – lead custodian
2. Kenya National Bureau of Statistics (KNBS) – data validation and standardisation
3. National Environment Management Authority (NEMA) – environmental and emissions data integration
4. Council of Governors (CoG) – coordination with county-level data systems
5. Private sector and academia – data provision and analytics collaboration

The Hub's digital systems will adopt open data standards and interoperability protocols compatible with global reporting platforms such as Global ABC's Building Climate Tracker and UNEP's Building Materials Emissions Database.

#### Institutional Linkages and Data Flows




Key:

| Policy oversight → | Technical Coordination → | Data Flow → |
|---|---|---|
| Government Agencies | Private Sector | CS, Oversight |
| | | |

*Figure 7-9: Institutional Linkages and Data Flows for the National Buildings Decarbonisation Knowledge Hub (NBDKH)*

**Source: GBPN (2025).**

## 7.5 Financing and Investment Roadmap

### 7.5.1 Overview and Approach

Financing the decarbonization of Kenya's building and construction sector demands an integrated approach that aligns public, private, and blended finance instruments. Globally, other building decarbonization roadmaps have emphasized financing mechanisms that combine regulatory incentives, green investment frameworks, and fiscal tools that mobilize domestic and international capital[30]. Kenya's approach aligns with this model, leveraging both national and county fiscal structures, development finance institutions (DFIs), and private sector innovation to ensure financial sustainability. The expected outcomes of this approach include:

1. Increased volume of climate-aligned investments in the building sector.
2. Greater participation of counties and local developers in accessing green finance.
3. Enhanced investor confidence through transparent reporting and monitoring systems.
4. Measurable reduction in embodied and operational carbon emissions through financed projects.

The financing and investment roadmap therefore aims to:

1. **Catalyze Green Investment:** Mobilize public and private sector financing for green building development and retrofits through tax incentives, low-interest green loans, and guarantees.
2. **Enable Access to Finance:** Strengthen credit lines and financial products for developers, homeowners, and SMEs to invest in energy-efficient and low-carbon technologies.
3. **Mainstream Green Finance:** Embed climate finance mechanisms within the financial sector, aligning with the Central Bank of Kenya's Sustainable Finance Initiative and the Green Finance Taxonomy under development.
4. **Leverage International Mechanisms:** Position Kenya to access climate finance through global mechanisms such as the Green Climate Fund (GCF), Global Environment Facility (GEF), and NDC Partnership support programs.
5. **Promote Circular Economy Investments:** Incentivize financing for materials innovation, recycling, and local green manufacturing within the construction supply chain.

[30] UNEP. (2022). *2022 Global Status Report for Buildings and Construction*

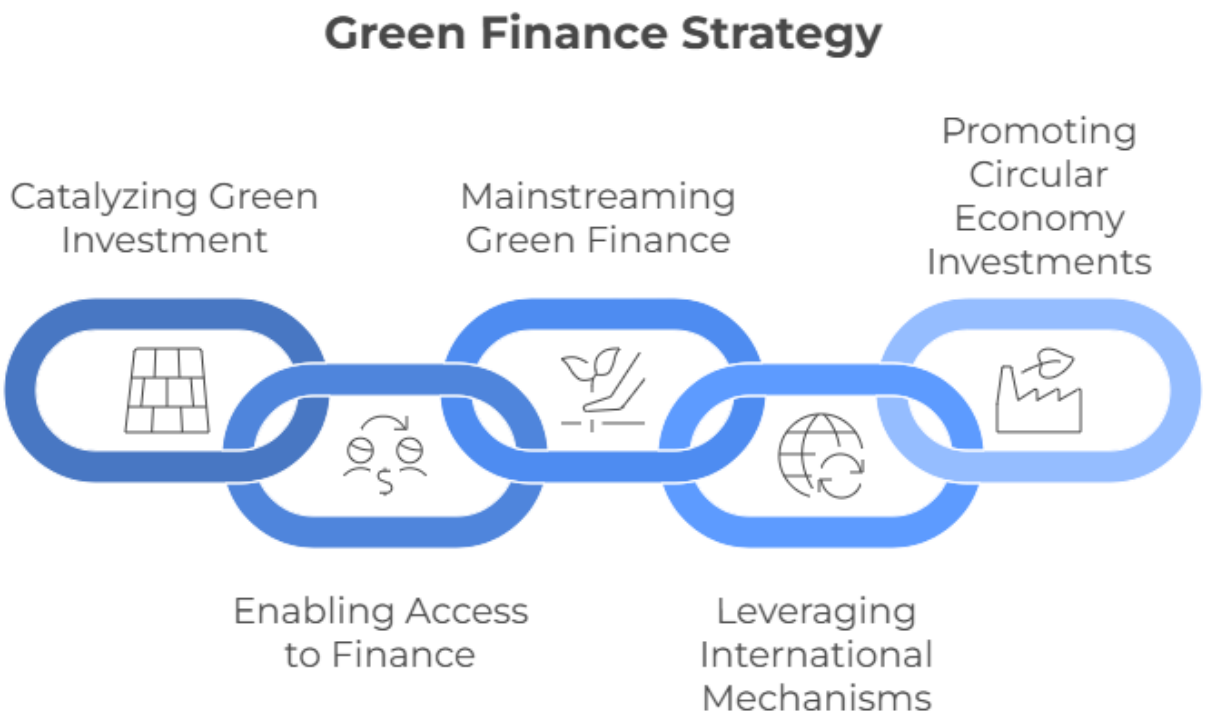



*Figure 7-10: Green Finance Strategy*

**Source: GBPN - Graphic by Napkin AI (2025).**

### 7.5.2 The integrated Approach

**1. Public Sector Alignment:**

Integrate green building investment priorities into the *Medium-Term Expenditure Framework (MTEF)* and *County Integrated Development Plans (CIDPs)*.

Encourage line ministries (Transport, Housing, Energy, Environment) to include decarbonization projects in their annual development plans and budgets.

**2. Private Sector Mobilization:**

Foster partnerships with real estate developers, banks, and pension funds to create targeted green investment portfolios.

Promote the uptake of ESG (Environmental, Social, Governance) and green bond standards within the built environment sector, modelled after Kenya's Green Bond Programme[31].

[31] Impact of Green Bonds in Africa

**3. Blended and Innovative Finance:**

Explore blended finance structures that combine concessional finance, grants, and commercial lending to reduce investment risk.

Develop Pay-for-Performance (P4P) or Energy Savings Performance Contracting (ESPC) schemes to link investment returns with verified energy savings.

**4. County and Community-Level Financing:**

Establish county-level revolving funds to support small-scale retrofits and climate-resilient housing projects.

Collaborate with SACCOs and microfinance institutions to expand access to affordable financing for low-income and informal sector actors.

**5. Capacity and Data Infrastructure:**

Build financial literacy and capacity for local banks, developers, and policymakers on green financing mechanisms.

Use the Knowledge Hub (refer to Section 7.4) as a platform for tracking investments, sharing success stories, and providing data for investors and policymakers.

| Approach Area | Description | Intended Impact |
|---|---|---|
| Strategic Alignment | Aligns financing priorities with national climate goals, NDCs, and sectoral strategies to ensure coherence across ministries and counties. | Strengthened policy coordination and efficient resource allocation. |
| Blended Finance Models | Leverages concessional, commercial, and philanthropic capital through blended instruments to de-risk private investments. | Increased private sector participation and scalable project financing. |
| Incentives and Fiscal Tools | Introduces tax rebates, green building credits, and fast-track approvals for compliant projects. | Encourages investment in low-carbon construction and retrofits. |
| Green Finance Integration | Works with financial institutions to embed green taxonomies, risk assessment, and ESG frameworks. | Mainstreamed green finance and enhanced investor confidence. |
| Subnational and Community Financing | Establishes localized financing mechanisms via county revolving funds, cooperatives, and microfinance channels. | Broadened access to finance for SMEs and informal sector builders. |
| Capacity Building and Data Systems | Develops financial literacy, pipeline development skills, and digital monitoring tools via the Knowledge Hub. | Improved transparency, accountability, and data-driven decision-making. |

*Table 7-1: Summary of Approach to Finance and investments for National Buildings and Construction Sector Decarbonisation*

**Source: GBPN (2025).**

## 7.6 Pilot Projects, Market-testing and Early Implementation Opportunities

### 7.6.1 Rationale and objectives

Pilot and market-testing projects form a critical bridge between strategic ambition and measurable implementation. They enable Kenya to demonstrate the technical feasibility, financial viability, and social value of low-carbon and climate-resilient construction methods.

In line with **Kenya's Buildings Breakthrough commitment and NDC implementation priorities,** the pilots serve as living laboratories for applying the roadmap's recommendations in real projects to test regulatory, technical, and financing approaches before nationwide scale-up.

The pilots and market-testing projects also provide an evidence base for refining building codes, informing fiscal incentives, and training professionals on low-carbon design and construction practices.

These projects aim to:

- **Operationalise the roadmap recommendations** by testing interventions at project level.
- **Generate measurable data** on embodied and operational carbon reductions using tools such as the *GBPN Carbon Metric Tool* and *SEforALL's Open Building Insights (OBI)*.
- **Demonstrate viable business models** for green construction within Kenya's public and private development landscape.
- **Foster industry learning** and build capacity through collaborative implementation involving government, academia, and private sector actors.
- **Create replicable case studies** to accelerate the adoption of low-carbon practices across counties and building types.

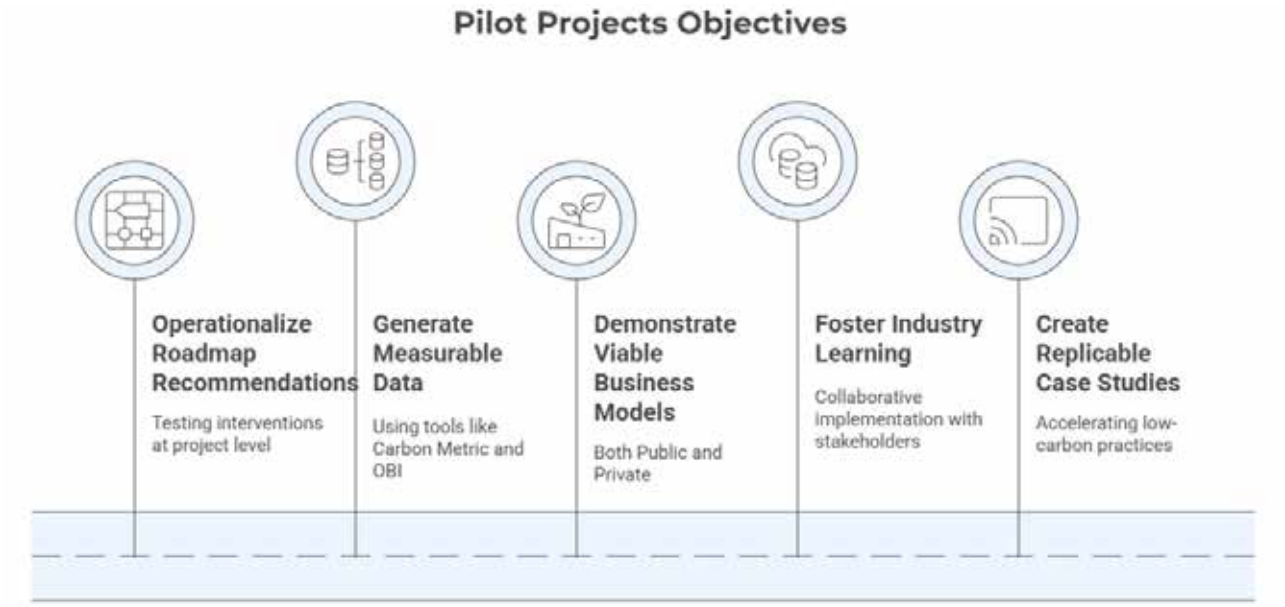



*Figure 7-11: Pilot Project Objectives*

**Source: GBPN - Graphic by Napkin AI (2025).**

### 7.6.2 Criteria for Selection of Pilot and Market-testing Projects

The selection process will follow a multi-criteria prioritisation framework derived from GBPN's baseline assessment, the stakeholder prioritisation exercise and international good practice. Projects will be selected based on:

| Criterion | Description | Rationale |
|---|---|---|
| **Emission Reduction Potential** | Demonstrable operational and embodied carbon savings in construction and operation. | Supports Kenya's NDC and Buildings Breakthrough targets. |
| **Regional Representation** | Reflects key climatic zones (coastal, highland, arid/semi-arid, urban). | Ensures contextual adaptation and inclusivity. |
| **Policy Alignment** | Linked to flagship national initiatives such as the Affordable Housing Programme and FLLoCA. | Enhances policy integration and scalability. |
| **Implementation Feasibility** | Availability of partners, data, and resources. | Ensures timely and successful execution. |
| **Replication Potential** | Potential for scale-up through public and private development models. | Builds a foundation for nationwide adoption. |
| **Social Impact** | Benefits to vulnerable groups, employment generation, and gender inclusion. | Aligns with Kenya's Just Transition and Vision 2030 goals. |

*Table 7-2: Criteria for pilot/market-testing project selection*

**Source: GBPN (2025).**

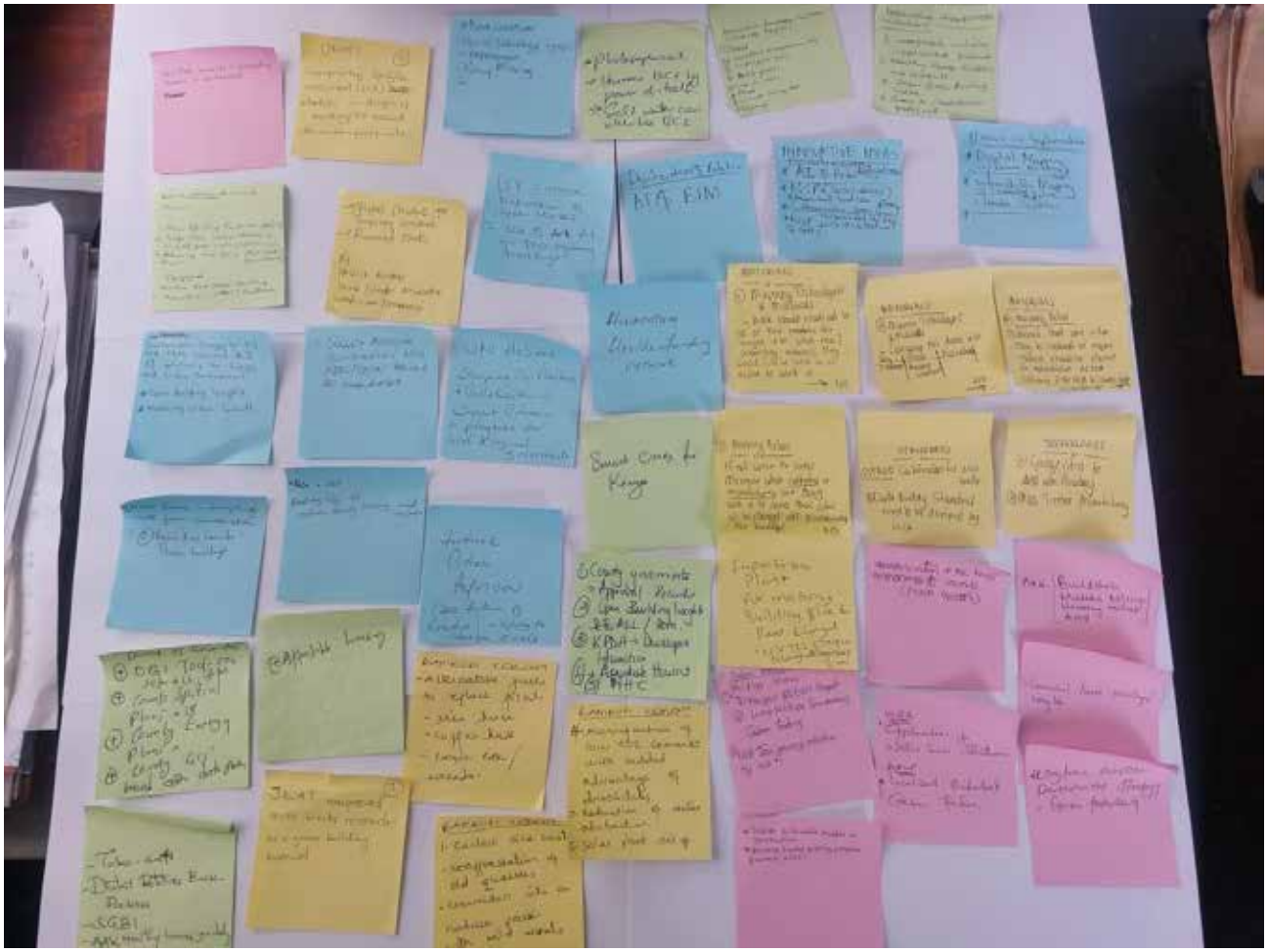


*Figure 7-12: Criteria Selection On-going decarbonisation initiatives captured from participants in a stakeholder workshop.*

**Source: GBPN (2025).**

### 7.6.3 Priority Themes and Typologies

Based on the emissions baseline, material flow analysis, and prioritisation results, from the GBPN Baseline assessment exercise, the residential building sector has emerged as the top priority for emission reduction interventions.

Additional typologies and themes include:

| Typology / Theme | Opportunity Area | Lead / Partners |
|---|---|---|
| **High-rise Affordable Housing** | Retrofit and new builds incorporating low-carbon cement, passive design, modular systems, and circular construction practices. | State Department for Housing & Urban Development, developers, GBPN, KGBS, IFC EDGE. |
| **Public Schools** | Demonstration of climate-resilient classrooms using compressed earth blocks, passive ventilation, and green landscaping. | Ministry of Education, AAK, Academia, Save the Children. |
| **Primary Health Facilities** | Incorporation of solar PV, natural ventilation, and rainwater harvesting in small and medium health facilities. | Ministry of Health, County Governments, UNOPS. |
| **County Government Offices** | Green retrofits and digital energy management systems for public buildings. | Council of Governors, MoLPWHUD, KAM. |
| **Informal Settlement Upgrades** | Affordable, low-carbon materials, improved layouts, and decentralized services (water and energy). | UN-Habitat, SDI, community groups. |

*Table 7-3: Priority Themes*

**Source: GBPN**

### 7.6.4 Geographic and Subnational Representation

Pilot/ Market-testing projects will be distributed to capture Kenya's regional and climatic diversity, focusing on counties with strong institutional capacity and active housing or infrastructure programmes, such as Nairobi, Mombasa, Nakuru, Kisumu, and Machakos, with additional pilots in Homa Bay and Turkana representing the lake and arid regions respectively.

The process will leverage coordination with the Council of Governors (CoG) and integrate with ongoing county climate action plans and local development frameworks. This ensures that subnational governments co-own and replicate lessons within their jurisdictions.

### 7.6.5 Implementation Approach

Implementation will proceed through a five-step iterative process:

1. **Identification and Scoping**: Using the GBPN Carbon Metric Tool and SEforALL's OBI platform to identify high-impact opportunities.
2. **Stakeholder Co-Design:** Participatory workshops with working groups representing government, academia, and industry to define technical and social priorities.
3. **Technical Design and Feasibility Studies:** Development of design prototypes, LCA assessments, and financial appraisals.

4. **Execution and Monitoring:** Construction/retrofitting accompanied by real-time monitoring via the National Knowledge Hub.
5. **Evaluation and Learning:** Performance evaluation, case documentation, and dissemination through training and policy feedback loops.

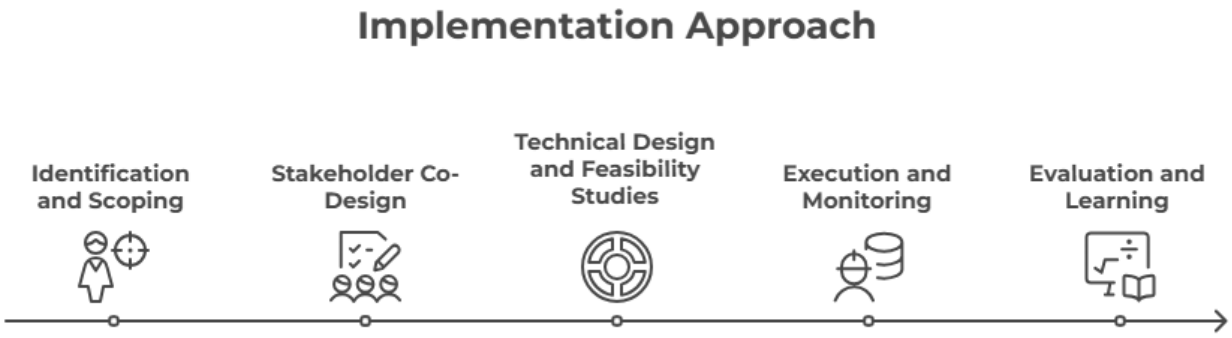



*Figure 7-13: Implementation Approach*

**Source: GBPN - Graphic by Napkin AI (2025).**

### 7.6.6 Financing and Partnerships

Pilot/Market-testing projects will draw on **blended financing models**, combining:

1. Public financing through national and county budgets (e.g., FLLoCA, AHP funds).
2. International climate finance (e.g., GCF, GEF, and bilateral support).
3. Private developer contributions and PPP models.
4. Corporate sustainability and CSR investments (e.g., Bamburi Cement's low-carbon initiatives).

Strategic technical partnerships will include GBPN, SEforALL, IFC, UNEP, WRI, AAK, KGBS, among others, **ensuring both technical depth and cross-sector ownership.**

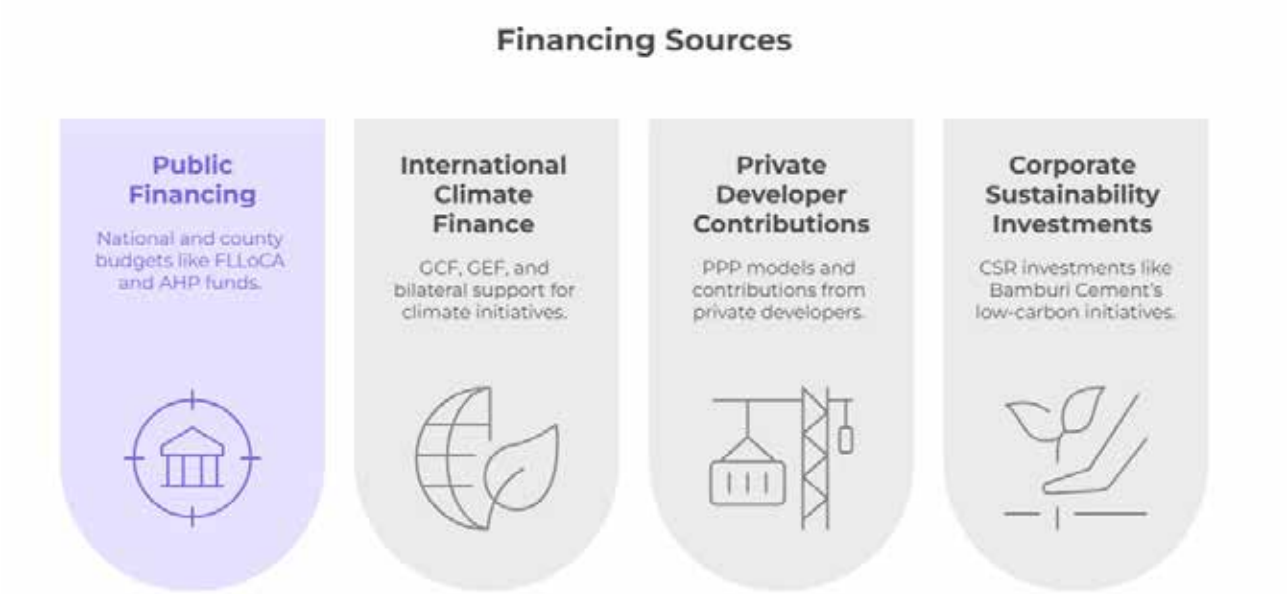



*Figure 7-14: Financing Sources*

**Source: GBPN - Graphic by Napkin AI (2025).**

### 7.6.7 Monitoring, Learning, and Scaling

Each project will establish **baseline and post-intervention metrics** aligned with the roadmap's M&E framework, including:

a. Emissions avoided ($tCO_2e$)
b. Energy and water efficiency gains
c. Percentage of local and recycled materials used
d. Cost-benefit and lifecycle performance
e. Training sessions and jobs created

Lessons will feed back into:

Updates of the *Kenya Building Code* and *National Green Building Standards*

1. Refinement of incentive frameworks and procurement guidelines
2. Expansion into new counties and typologies in Phase II (2026–2030)

### 7.6.8 Expected outcomes

| Timeframe | Outcome |
|---|---|
| Short-term (2025–2026) | 5–8 pilots/market-testing projects demonstrating measurable carbon savings and capacity building of over 500 professionals. |
| Medium-term (2027–2029) | Policy integration of lessons into national standards and scaling across counties through the Knowledge Hub. |
| Long-term (2030 and beyond) | Institutionalized green construction practices across Kenya's housing and public works sectors contributing significantly to national emission reduction targets. |

*Table 7-4: Expected Outcomes*

**Source: GBPN (2025).**

# 8 MONITORING, REPORTING, AND VERIFICATION (MRV) FRAMEWORK

## 8.1 Indicators and Metrics

### 8.1.1 Introduction and Rationale

To track progress and ensure accountability, Kenya's Buildings and Construction Decarbonisation Roadmap will employ a robust Monitoring, Reporting, and Verification (MRV) system. The MRV system will capture both quantitative and qualitative indicators across the roadmap's strategic pillars of operational emissions, embodied emissions, enabling factors, and sectoral engagement, while aligning with the country's NDC monitoring architecture and Climate Change Directorate's MRV+ Framework (2023).

This MRV system aims to:

- Provide a transparent and consistent method for measuring progress towards emission reduction targets.
- Support evidence-based decision-making for policy, investment, and regulation.
- Enable periodic reporting to national and international platforms, including *Global ABC*, *UNEP's Global Buildings Status Report*, and *Kenya's NDC tracking systems*.
- Foster data-driven collaboration between national ministries, counties, academia, and the private sector.

### 8.1.2 Structure of Indicators

| Tier | Focus | Data Source / Frequency | Purpose |
|---|---|---|---|
| Tier 1: Outcome Indicators | National and sector-level emission reductions, energy intensity, and materials decarbonisation. | National statistics, KNBS, NEMA, EPRA, County MRV units (annual). | To monitor progress toward NDC and net-zero goals. |
| Tier 2: Output Indicators | Implementation of policy, regulatory, and financial instruments; number of green buildings certified; adoption of codes. | MoLPWHUD, AAK, KGBS, counties (semi-annual). | To assess effectiveness of enabling frameworks. |
| Tier 3: Process Indicators | Institutional, capacity-building, and stakeholder engagement metrics; data system functionality. | GBPN Knowledge Hub, professional bodies, development partners (continuous). | To track institutional readiness and learning outcomes. |

*Table 8-1: Structure Indicators*

**Source: GBPN (2025).**

The indicators are structured around three tiers, consistent with GBPN's data methodology and international MRV practice:This tiered system ensures both top-down policy coherence and bottom-up data generation from counties and sector actors.

### 8.1.3 Key Indicator Domains and Metrics

Indicators are grouped under five key domains reflecting the roadmap's structure and Kenya's specific priorities:

### A. Emission Reduction Indicators

| Metric | Definition / Unit | Source / Tool |
|---|---|---|
| **Total GHG emissions from buildings ($tCO_2e$/year)** | Combined operational + embodied emissions from residential, commercial, and public buildings. | GBPN Carbon Metric Tool; KNBS data. |
| **Energy use intensity (kWh/$m^2$/year)** | Average energy consumption per building type. | EPRA, SEforALL OBI data. |
| **Share of renewable energy in buildings (%)** | Portion of total building energy consumption from renewables. | MoE, County energy departments. |

*Table 8-2: Emission Reduction Indicators*

**Source: GBPN (2025).**

### B. Material and Supply Chain Indicators

| Metric | Definition / Unit | Source / Tool |
|---|---|---|
| **Emission intensity of cement ($tCO_2e$/t cement)** | Production-based emissions from major cement producers. | KAM, NEMA, Bamburi, Savannah Cement. |
| **Percentage of recycled/ reused construction materials (%)** | Share of materials with secondary life-cycle use. | NCA, private developers, KAM. |
| **Number of certified low-carbon products** | Number of materials certified under national or international schemes. | KEBS, KGBS, GBPN Knowledge Hub. |

*Table 8-3: Material & Supply Chain Indicators*

**Source: GBPN (2025).**

### C. Building and Urban Development Indicators

| Metric | Definition / Unit | Source / Tool |
|---|---|---|
| **Number of buildings meeting green certification** | EDGE, LEED, Green Star, or KGBS certifications per year. | KGBS, AAK. |
| **Proportion of buildings compliant with energy code** | % of new developments applying energy efficiency requirements. | County Governments, EPRA. |
| **Floor area of retrofitted buildings ($m^2$/year)** | Area upgraded with energy-efficient and low-carbon features. | MoLPWHUD, County reports. |

*Table 8-4: Building & Urban Development Indicators*

**Source: GBPN (2025).**

### D. Enabling Environment and Institutional Indicators

| Metric | Definition / Unit | Source / Tool |
|---|---|---|
| **Number of policy or regulatory instruments implemented** | Green codes, guidelines, or incentive mechanisms enacted. | MoLPWHUD, Treasury, NEMA. |
| **Public and private investment in green buildings (USD/year)** | Total value of climate-aligned building projects. | NSE, IFC, KCB, Shelter Afrique. |
| **Number of counties with local decarbonisation plans** | County climate plans integrating building sector actions. | Council of Governors, County MRV systems. |

*Table 8-5: Enabling Environment & Institutional Indicators*

**Source: GBPN (2025).**

### E. Capacity Building and Knowledge Indicators

| Metric | Definition / Unit | Source / Tool |
|---|---|---|
| **Professionals trained in green construction** | Architects, engineers, planners, fundis certified under green programs. | AAK, EBK, TVETA, GBPN. |
| **Data points uploaded to the Knowledge Hub (annual)** | Total number of validated datasets shared by stakeholders. | GBPN Knowledge Hub dashboard. |
| **Engagement in stakeholder platforms** | Number of joint working group sessions, webinars, or reports. | Roadmap Secretariat. |

*Table 8-6: Capacity building & Knowledge Indicators*

**Source: GBPN (2025).**

### 8.1.4 Data Flow and Reporting Structure

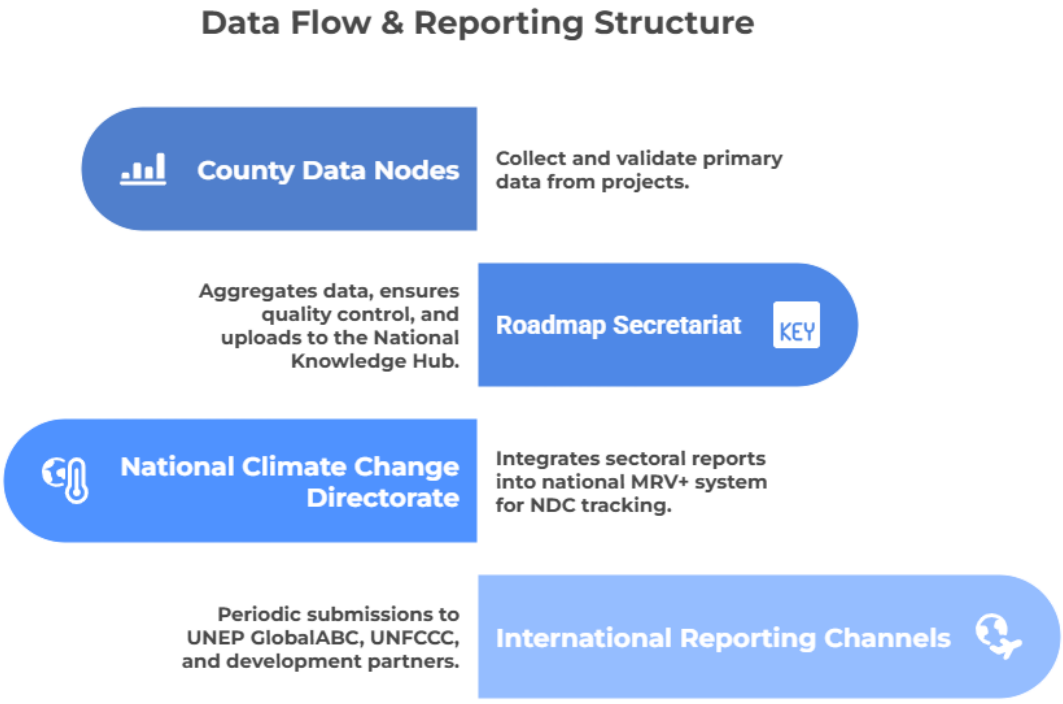



*Figure 8-1: Data Flow & Reporting Structure*

**Source: GBPN - Graphic by Napkin AI (2025).**

Data will flow through a multi-level MRV ecosystem:

1. **County Data Nodes** – collect and validate primary data from projects, building approvals, and local monitoring (aligned with County Climate Change Units).
2. **Roadmap Secretariat** (State Department for Public Works) – aggregates data, ensures quality control, and uploads to the National Knowledge Hub.
3. **National Climate Change Directorate (NCCD)** – integrates sectoral reports into the national MRV+ system for NDC tracking.
4. **International Reporting Channels** – periodic submissions to *UNEP Global ABC*, *UNFCCC*, and development partners for benchmarking and support.

This structure ensures bottom-up data ownership while maintaining national consistency and global alignment.

### 8.1.5 Integration with Digital Systems

The MRV framework will be fully integrated with the National Buildings Decarbonisation Knowledge Hub, allowing real-time visualization of:

1. Emission trends and sector performance
2. Geographic distribution of low-carbon projects
3. Progress against targets through dashboards and heat maps

The Hub will host Application Programming Interfaces (APIs) linking data from KNBS, NEMA, EPRA, and county digital permitting systems to ensure automated and verifiable data flows.

### 8.1.6 Verification and Quality Assurance

Verification will be based on three levels of assurance, consistent with UNEP and ISO 14064 guidance:

1. Self-reporting verification by participating institutions.
2. Independent audit by the Roadmap Secretariat and technical partners (GBPN, SEforALL).
3. Third-party review every three years by accredited verification bodies or academia to ensure transparency and credibility.

The verification process will include random audits of data entries, cross-checking of emission baselines, and consistency reviews with NDC MRV systems.

### 8.1.7 Expected Outcomes

1. Establishment of a nationally recognised MRV framework for buildings.
2. Integration of roadmap indicators into Kenya's national climate reporting mechanisms.
3. Improved data-driven policymaking and investment targeting.
4. Annual *Kenya Buildings Decarbonisation Progress Report* published via the Knowledge Hub.

## 8.2 Data Systems and Reporting Mechanisms

### 8.2.1 Introduction and Rationale

Effective data systems and reporting mechanisms are the backbone of the Monitoring, Reporting, and Verification (MRV) framework. In Kenya, where data on the building and construction sector has historically been fragmented across multiple institutions, establishing a unified digital data ecosystem is essential to track progress, support transparency, and inform decision-making at national and county levels.

This subsection outlines the architecture, governance, and flow of data within the MRV system, anchored on the National Buildings Decarbonisation Knowledge Hub (NBDKH), and its integration with national and international reporting platforms.

The expected outcomes of implementing the outlined data systems and reporting mechanisms include:

1. Operational MRV data ecosystem linking county, national, and international systems.
2. Enhanced data transparency and credibility for national and donor reporting.
3. Improved decision-making for policy, investment, and innovation.
4. Strengthened capacity of counties and institutions to collect and manage climate data.
5. Recognition of Kenya's building sector globally for leadership in digital, evidence-driven climate action.

### 8.2.2 Objectives of the Data and Reporting Framework

The data systems and reporting mechanisms are designed to:

1. **Aggregate and standardize data** from diverse public, private, and academic sources into a single interoperable framework.
2. **Enable near real-time reporting** of indicators and progress on roadmap implementation.
3. **Facilitate verification** through digital traceability and cross-referencing with national systems.
4. **Enhance transparency and accountability** to citizens, investors, and global partners.
5. **Support continuous learning** by making data accessible to policymakers, practitioners, and researchers.

### 8.2.3 System Architecture and Data Flows

The MRV data ecosystem is designed as a multi-tiered system to ensure both top-down policy coherence and bottom-up data accuracy:

| Tier | System Level | Key Functions | Data Custodian / Actor |
|---|---|---|---|
| **Tier 1: Local Data Nodes** | Project and County Level | Collection of raw data on building performance, materials, energy use, and emissions. | County Governments, Developers, Industry Associations (KAM, AAK, KGBS, SEforALL, WRI). |
| **Tier 2: National Knowledge Hub** | Central Aggregation | Data validation, integration, and analytics for sector-wide indicators. | State Department for Public Works (Roadmap Secretariat), GBPN. |
| **Tier 3: National Climate MRV+ System** | National Coordination | Cross-sector aggregation for NDC reporting and climate planning. | Climate Change Directorate (CCD), NEMA. |
| **Tier 4: Global Reporting Platforms** | International Transparency | Uploading sectoral data to Global ABC, UNEP, UNFCCC, and SEforALL platforms. | MoLPWHUD in coordination with MoE, MoEF, and GBPN. |

*Table 8-7: System Architecture & Data Flows*

**Source: GBPN (2025).**

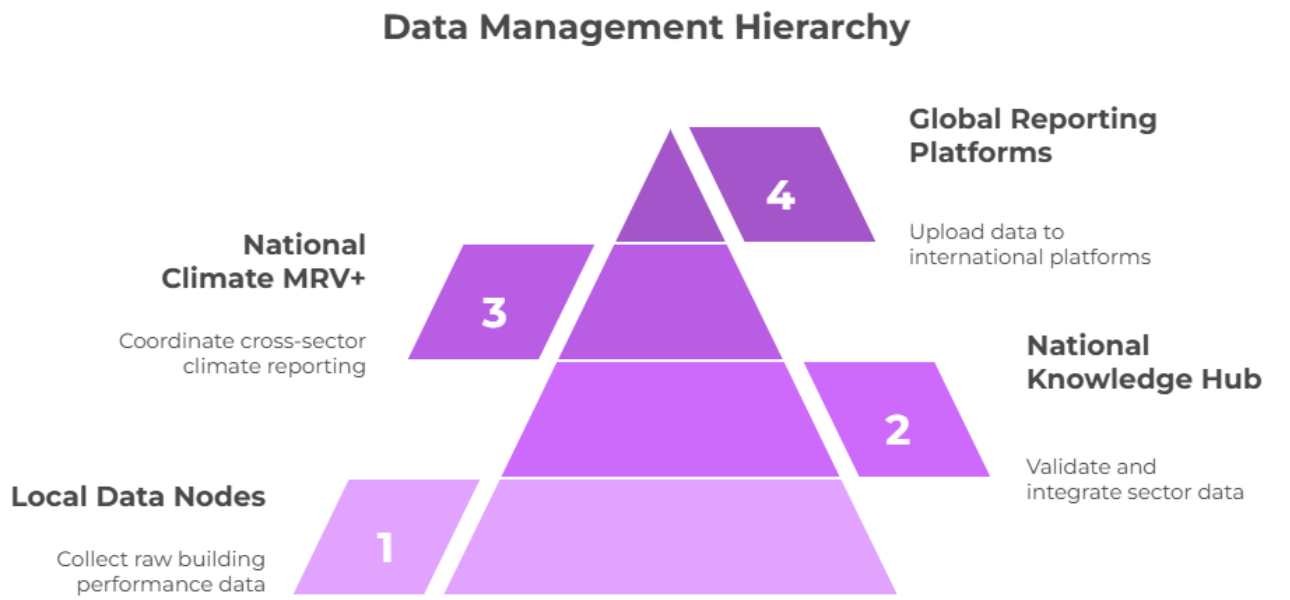



*Figure 8-2: Data Management Hierarchy*

**Source: GBPN - Graphic by Napkin AI (2025).**

### 8.2.4 Core Data Systems

The MRV system will integrate and build on existing national digital platforms, including:

| System / Platform | Host Institution | Relevance to Roadmap MRV |
|---|---|---|
| **National Buildings Decarbonisation Knowledge Hub (NBDKH)** | SDPW & GBPN | Core repository for data, dashboards, and analytics. |
| **National Spatial Data Infrastructure (NSDI)** | Ministry of Lands, Public Works & Urban Development | Provides geospatial layers for mapping construction activity and emissions. |
| **MRV+ Platform** | Climate Change Directorate | Houses sectoral emissions data for NDC reporting. |
| **ePermitting and County GIS Systems** | County Governments | Source of real-time data on building permits, approvals, and compliance. |
| **EPRA Energy Efficiency Database** | Ministry of Energy | Tracks energy performance, renewable integration, and appliance standards. |
| **NEMA Environmental Information System (EIS)** | Ministry of Environment | Monitors environmental compliance and construction-related emissions. |
| **Green building certification Databases such as SGBI & IFC EDGE** | Private Sector /AAK/ IFC | Source of certified project-level data on energy, water, and material efficiency. |

*Table 8-8: Core Data Systems*

**Source: GBPN (2025).**

Each system contributes to a national data pipeline feeding into the Knowledge Hub through secure APIs and standardised data exchange formats (JSON/CSV).

### 8.2.5 Data Standards and Interoperability

To ensure consistency, all MRV data systems will apply the following standards and protocols:

1. **Interoperability Standards:** Open data architecture aligned with *Global ABC* and *UNFCCC* data schemas.
2. **Data Quality Assurance:** Tiered validation using completeness, accuracy, and frequency checks.
3. **Version Control and Metadata:** Each dataset will include metadata (source, date, custodian, confidence level).
4. **Data Security:** Compliance with Kenya's *Data Protection Act (2019)* and international best practices (ISO 27001).
5. **Lifecycle Tracking:** Datasets tagged according to project phases ie. design, construction, operation, retrofit, or decommissioning.

These standards will be embedded within the Knowledge Hub's digital backbone, ensuring automated ingestion, cleaning, and visualization of data for users across government and industry.

### 8.2.6 Reporting Mechanisms

The MRV system will generate structured reports at different levels of granularity and frequency:

| Report Type | Frequency | Purpose / Content | Target Audience |
|---|---|---|---|
| **Project-Level Reports** | Quarterly | Energy use, material performance, emissions intensity, compliance data. | Developers, Counties, AAK, NEMA. |
| **County Implementation Reports** | Semi-Annual | Aggregated indicators, challenges, and progress at subnational level. | County Assemblies, CoG, Roadmap Secretariat. |
| **Sectoral MRV Dashboard** | Continuous (real-time) | Online visualization of progress indicators and spatial maps. | Public, Industry, Academia. |
| **National Decarbonisation Progress Report** | Annual | Consolidated analysis across all roadmap domains; submitted to NCCD. | Cabinet, National Treasury, UNFCCC. |
| **Global Reporting Submissions** | Biennial | Contributions to UNEP Global Status Report and Global ABC Building Climate Tracker. | International Partners, Donors. |

*Table 8-9: Reporting Mechanisms*

**Source: GBPN (2025).**

All reporting outputs will be accessible through the Knowledge Hub Portal, ensuring open access while maintaining data security and quality control.

### 8.2.7 Feedback Loops and Continuous Improvement

To keep the MRV system responsive and adaptive:

a. **Annual Review Workshops** will be held to evaluate data gaps, reporting consistency, and system performance.
b. **Feedback Integration:** Users from counties, private sector, and academia will provide input through structured feedback forms hosted on the Hub.
c. **Version Updates:** Indicators, data standards, and system functionalities will be updated every two years in line with roadmap review cycles.
d. **Capacity Building:** Continuous training for county MRV officers, data analysts, and planners to maintain data integrity.

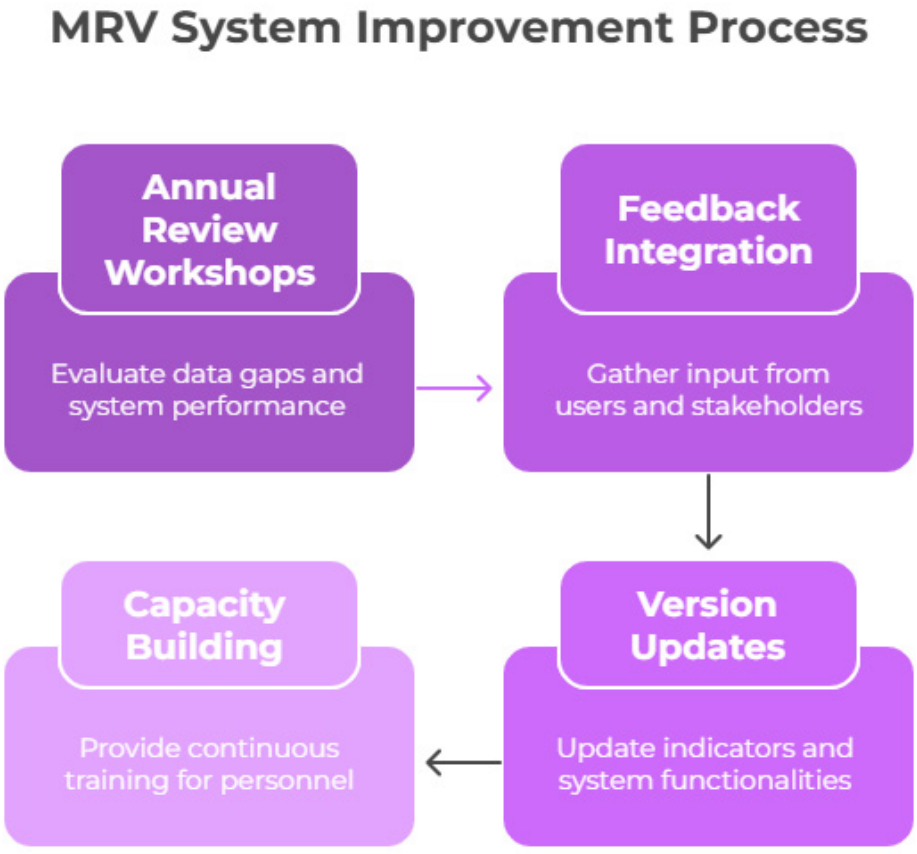



*Figure 8-3: MRV System Improvement Process*

**Source: GBPN - Graphic by Napkin AI (2025).**

This iterative feedback mechanism ensures that Kenya's MRV framework evolves with advances in technology, policy, and data availability.

### 8.2.8 Integration with International Systems

Kenya's MRV framework will interface directly with international systems to maintain global alignment:

a. **Global ABC Building Climate Tracker:** Reporting on policy adoption, emissions intensity, and market transformation indicators.
b. **UNEP Global Buildings Status Report (GBSR):** Contribution of verified national data to annual global publications.
c. **SEforALL Open Building Insights (OBI):** Data exchange on building energy intensity and typologies.
d. **UNFCCC Enhanced Transparency Framework (ETF):** Alignment with NDC progress reporting templates.

This global integration ensures Kenya's visibility as a regional leader in transparent, evidence-based decarbonisation.

## 8.3 Integration with National Climate Monitoring Systems

### 8.3.1 Introduction and Rationale

For Kenya's Buildings and Construction Decarbonisation Roadmap to be impactful and credible, it must be fully integrated within the country's national climate monitoring and reporting architecture. This ensures that sectoral data and progress from the building sector directly inform national greenhouse gas inventories, NDC implementation tracking, and reporting under the UNFCCC Enhanced Transparency Framework (ETF).

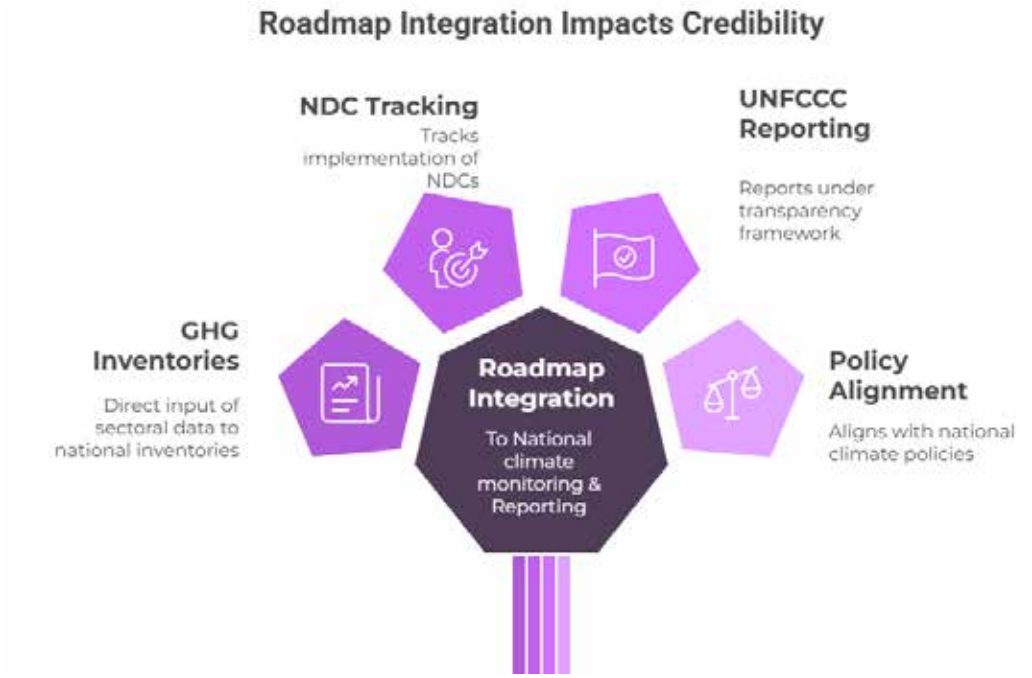



*Figure 8-4: Integration versus Capability*

**Source: GBPN - Graphic by Napkin AI (2025).**

Integration with national systems is also essential for alignment with Kenya's Climate Change Act (2016), the National Climate Change Action Plan (NCCAP III, 2023–2027), and the MRV+ Framework (2023) administered by the Climate Change Directorate (CCD) under the Ministry of Environment, Climate Change and Forestry (MECCF).

This subsection outlines how data, indicators, and reporting mechanisms developed under the roadmap interface with Kenya's existing climate monitoring systems and international reporting obligations.

### 8.3.2 Objectives

The integration aims to:

1. Align building sector MRV processes with the national MRV+ architecture to ensure consistency, comparability, and completeness.
2. Enable automatic data sharing between the Roadmap Secretariat and national systems for seamless emissions accounting.
3. Strengthen cross-sector coordination, ensuring the building sector's contributions are visible in national GHG reporting and NDC progress updates.
4. Facilitate international recognition and support, by providing verifiable, transparent data to global reporting mechanisms (UNFCCC, Global ABC, UNEP).

### 8.3.3 National Climate Monitoring Framework Overview

Kenya's national climate monitoring ecosystem operates under the MRV+ Framework, which provides guidance for data management and reporting across five thematic areas:

**GHG Inventory** – tracking sectoral emissions and removals;

1. **NDC Implementation Tracking** – progress towards national commitments;
2. **Adaptation Monitoring** – tracking resilience-building measures;
3. **Climate Finance Tracking** – identifying sources and application of funds;
4. **Capacity and Knowledge Management** – documenting skills, data systems, and institutional learning.

Within this framework, the building and construction sector is recognized as a key emitter and an opportunity area for low-carbon transition, sitting under the Energy, Transport, Industry, and Waste categories for mitigation and under Urban Resilience for adaptation.

### 8.3.4 Integration Pathways

The integration of the building sector MRV with national climate systems will occur through four key pathways:

| Integration Pathway | Mechanism / Description | Responsible Institution(s) |
|---|---|---|
| **Data Exchange Protocols** | Establish APIs between the National Buildings Decarbonisation Knowledge Hub and CCD's MRV+ system for direct data uploads. | SDPW (Roadmap Secretariat), GBPN, CCD, NEMA. |
| **Indicator Harmonisation** | Align roadmap indicators (Section 8.1) with national GHG inventory categories and NDC tracking indicators. | CCD, MoE, KNBS, GBPN. |
| **Institutional Coordination** | Joint MRV coordination committee with CCD, SDPW, and State Department for Housing to review data consistency and progress. | MECCF, SDPW, CoG. |
| **Reporting Synchronisation** | Align roadmap reporting cycles with NCCAP reviews, Biennial Transparency Reports (BTRs), and Global ABC submissions. | SDPW, GBPN, CCD. |

*Table 8-10: Reporting Mechanisms*

**Source: GBPN (2025).**

This integrated structure ensures that the building sector's data moves smoothly from project and county levels through the Knowledge Hub, and into the national MRV+ platform, where it contributes to the GHG inventory, NDC progress reports, and Biennial Transparency Reports (BTRs) submitted to the UNFCCC.

### 8.3.5 Data Flow and Responsibilities

The flow of information and responsibilities across the national climate monitoring system are as follows:

1. **Project-Level Data Collection:** Developers, counties, and professional bodies collect emissions and performance data using approved green certification tools, the GBPN Carbon Metric Tool and SEforALL's OBI platform.
2. **Aggregation at the Knowledge Hub:** The National Buildings Decarbonisation Knowledge Hub consolidates data, applies verification checks, and prepares sectoral summaries.
3. **Transmission to National MRV+ System:** Validated datasets are shared via secure data exchange protocols with the CCD's MRV+ system.
4. **Integration into National GHG Inventory:** CCD incorporates building-related data under IPCC sectors 1A4 (Energy Use in Buildings) and 2A (Industrial Processes).
5. **Reporting to Global Mechanisms:** Kenya's submissions to the UNFCCC ETF, Global ABC Building Climate Tracker, and UNEP Global Status Report include verified sectoral results.

This integrated data chain ensures accuracy, transparency, and traceability across local, national, and global scales.

### 8.3.6 Alignment with International Reporting Frameworks

The integration aligns Kenya's MRV system with international standards and transparency requirements, particularly:

| Framework / Tool | Integration Focus | Alignment Achieved |
|---|---|---|
| **UNFCCC Enhanced Transparency Framework (ETF)** | Biennial reporting of sectoral GHG data and mitigation progress. | Sector indicators embedded in national BTR templates. |
| **Global ABC Building Climate Tracker** | Annual tracking of policy adoption, emissions intensity, and energy efficiency. | Kenya's roadmap indicators are directly linked via GBPN and CCD collaboration. |
| **UNEP Global Buildings Status Report (GBSR)** | Contribution of verified data for Africa region analysis. | Data shared through Knowledge Hub partnerships. |
| **SEforALL Open Building Insights (OBI)** | Integration of building typology and energy intensity data. | Real-time exchange of building energy use and retrofit progress. |

*Table 8-11: Alignment with International reporting Frameworks*

**Source: GBPN (2025).**

By aligning with these frameworks, Kenya's building sector MRV system not only contributes to national transparency goals but also enhances international recognition of Kenya's leadership in climate-smart construction.

### 8.3.7 Governance and Institutional Coordination

To manage and sustain the integration process, the following coordination mechanisms are proposed:

1. **Joint MRV Steering Committee:** Co-chaired by CCD and SDPW, with membership from GBPN, NEMA, KNBS, EPRA, CoG, and AAK.
2. **Technical Working Group on Data Systems:** Responsible for interoperability, indicator harmonization, and QA/QC protocols.
3. **Annual MRV Integration Review Workshop:** Conducted to assess data consistency, identify gaps, and update reporting templates.
4. **Memoranda of Understanding (MoUs):** Formalized data-sharing agreements between GBPN, CCD, and key national data custodians.

These mechanisms institutionalize collaboration and ensure sustained integration between the building sector and Kenya's broader climate monitoring ecosystem.

### 8.3.8 Expected Outcomes

Seamless integration of building sector MRV into Kenya's MRV+ and NDC tracking systems.

1. Improved national GHG inventory accuracy and completeness.
2. Stronger institutional collaboration between SDPW, CCD, and counties.
3. Enhanced transparency and credibility in Kenya's international climate reporting.
4. Recognition of Kenya's building sector as a model for sectoral MRV integration in Africa.

## 8.4 Feedback Loops for Policy and Practice

### 8.4.1 Introduction and Rationale

For the decarbonisation roadmap to remain relevant and effective, the monitoring and data collection processes must not end at reporting. The insights generated must actively feed back into policymaking, regulation, training, and implementation.

Establishing feedback loops ensures that the MRV framework functions as a living system—one that continuously learns, adapts, and evolves based on real-world outcomes.

These loops connect data to decision-making: policy adjustments, code revisions, financing priorities, and professional practice are all informed by measured performance rather than assumptions.

In Kenya's case, this approach transforms the roadmap from a static policy instrument into a dynamic governance tool, aligned with the principles of adaptive management under the National Climate Change Action Plan (NCCAP III, 2023–2027) and the MRV+ Framework (2023).

### 8.4.2 Objectives

The feedback mechanisms are designed to:

1. Close the loop between data collection, policy action, and implementation refinement.
2. Translate evidence into policy reform, updated standards, and actionable guidance.
3. Enhance accountability and transparency by documenting how MRV outcomes influence decisions.
4. Strengthen learning ecosystems by involving academia, professional bodies, and counties in knowledge exchange.
5. Support continuous improvement in emissions reduction efforts, technologies, and capacity-building initiatives.

### 8.4.3 Structure of Feedback Loops

The roadmap adopts a three-tiered feedback model, connecting implementation outcomes with both policy reform and practice improvement:

| Tier | Focus | Mechanism / Action | Responsible Actors |
|---|---|---|---|
| **Tier 1: Practice-Level Feedback** | Translating lessons from pilot projects, counties, and industry. | Documentation of project performance, case studies, and sector reports feeding into the Knowledge Hub. | GBPN, Counties, Industry Associations (AAK, NCA, KGBS). |
| **Tier 2: Policy-Level Feedback** | Translating sector data into policy and regulatory reform. | Annual MRV Review Workshops and Policy Roundtables under SDPW and CCD. | State Department for Public Works, CCD, CoG, National Treasury. |
| **Tier 3: Strategic Feedback** | Long-term learning informing roadmap updates and NDC revisions. | Biennial Roadmap Review and integration with NDC and NCCAP updates. | SDPW, MECCF, GBPN, National Climate Change Council. |

*Table 8-12: Structure of Feedback Loops*

**Source: GBPN (2025).**

This tiered approach ensures that data generated from field practice informs policy direction, which in turn guides capacity-building, financing, and regulatory frameworks.

### 8.4.4 Feedback Flow and Communication Mechanisms

Feedback will flow through structured communication channels, embedded within the roadmap's institutional architecture:

1. **Data Collection and Validation:** MRV systems (as described in 8.1–8.3) aggregate quantitative and qualitative performance data.
2. **Analysis and Insight Generation:** GBPN and the Roadmap Secretariat conduct annual analysis, identifying emerging trends, policy gaps, and implementation barriers.
3. **Policy Feedback Forums:** Findings are presented during Annual MRV and Policy Learning Forums, convening government agencies, industry, academia, and civil society.
4. **Integration into Planning:** Recommendations are adopted into the National Building Code, County Development Plans, and Climate Finance Frameworks.
5. **Learning Dissemination:** Case studies, best practices, and policy briefs are published via the National Knowledge Hub, providing open access to practitioners and policymakers.

This process creates a continuous loop of data–decision–action–learning, reinforcing evidence-based governance.

### 8.4.5 Key Feedback Tools

Several mechanisms and digital tools will operationalise feedback within the roadmap:

| Tool / Mechanism | Purpose | Host Institution |
|---|---|---|
| **National Knowledge Hub Dashboards** | Visualise real-time progress, enabling stakeholders to track targets and identify lags. | GBPN, SDPW |
| **Annual MRV Review Reports** | Summarise performance, lessons, and recommended adjustments for policy and practice. | Roadmap Secretariat |
| **Sector Policy Briefs** | Thematic analyses translating MRV data into actionable insights (e.g., green materials, affordable housing). | GBPN, CCD |
| **Technical Working Groups (TWGs)** | Issue-specific review committees (e.g., codes, materials, energy efficiency) that process feedback and draft updates. | SDPW, AAK, EBK, KGBS |
| **Learning Exchange Forums** | Biennial multi-stakeholder platforms for cross-learning between counties, developers, and regulators. | CoG, NCA, GBPN |

*Table 8-13: Key Feedback Tools*

**Source: GBPN (2025).**

Together, these mechanisms institutionalize evidence-based reflection and continuous improvement within Kenya's building sector governance system.

### 8.4.6 Policy Uptake and Adaptive Governance

The feedback framework follows an adaptive governance model, where MRV findings directly influence policy instruments, such as:

1. **Building Code and Standards:** Updating minimum performance requirements and design guidelines.
2. **Fiscal Incentives:** Adjusting green tax rebates and financing tools based on uptake and impact data.
3. **Capacity Building:** Refining training curricula and accreditation based on emerging technical needs.
4. **Subnational Planning:** Integrating performance results into County Integrated Development Plans (CIDPs) and County Climate Action Plans (CCAPs).

Feedback loops will also help ensure Kenya's Biennial Transparency Reports (BTRs) reflect actual sector progress, supporting international credibility and access to climate finance.

### 8.4.7 Institutional Roles and Coordination

To ensure feedback processes are systematic, coordinated, and sustainable, institutional responsibilities are defined as follows:

| Institution / Actor | Feedback Role |
|---|---|
| State Department for Public Works (SDPW) | Lead coordination of feedback into national codes and standards. |
| Climate Change Directorate (CCD) | Integrate feedback into MRV+ Framework and NDC updates. |
| GBPN | Curate and analyse technical data, publish lessons and policy briefs. |
| Council of Governors (CoG) | Channel county-level data and experience into national planning. |
| AAK, EBK, IQSK, KGBS, NCA | Translate feedback into CPD, technical training, and design practice. |
| Academia and Research Institutions | Conduct applied research based on identified gaps. |

*Table 8-14: Key Feedback Tools*

**Source: GBPN (2025).**

### 8.4.8 Expected Outcomes

1. Dynamic, evidence-based policymaking driven by real-time sector insights.
2. Regular refinement of codes, standards, and incentive frameworks.
3. Strengthened collaboration and knowledge exchange between government, academia, and industry.
4. Accelerated adoption of low-carbon design and construction practices.
5. Institutionalisation of learning-by-doing in Kenya's decarbonisation process.

# 9 Capacity Building and Knowledge Dissemination

## 9.1 Professional Training and Accreditation

### 9.1.1 Introduction and Rationale

Decarbonising Kenya's building and construction sector requires more than policy reform, it depends on a skilled, informed, and empowered professional community capable of designing, constructing, and managing buildings that meet low-carbon, climate-resilient standards.

Professional training and accreditation are therefore central to the roadmap's implementation. They ensure that architects, engineers, planners, contractors, and artisans have the technical competencies, ethical grounding, and certification pathways needed to translate the roadmap's goals into real-world transformation.

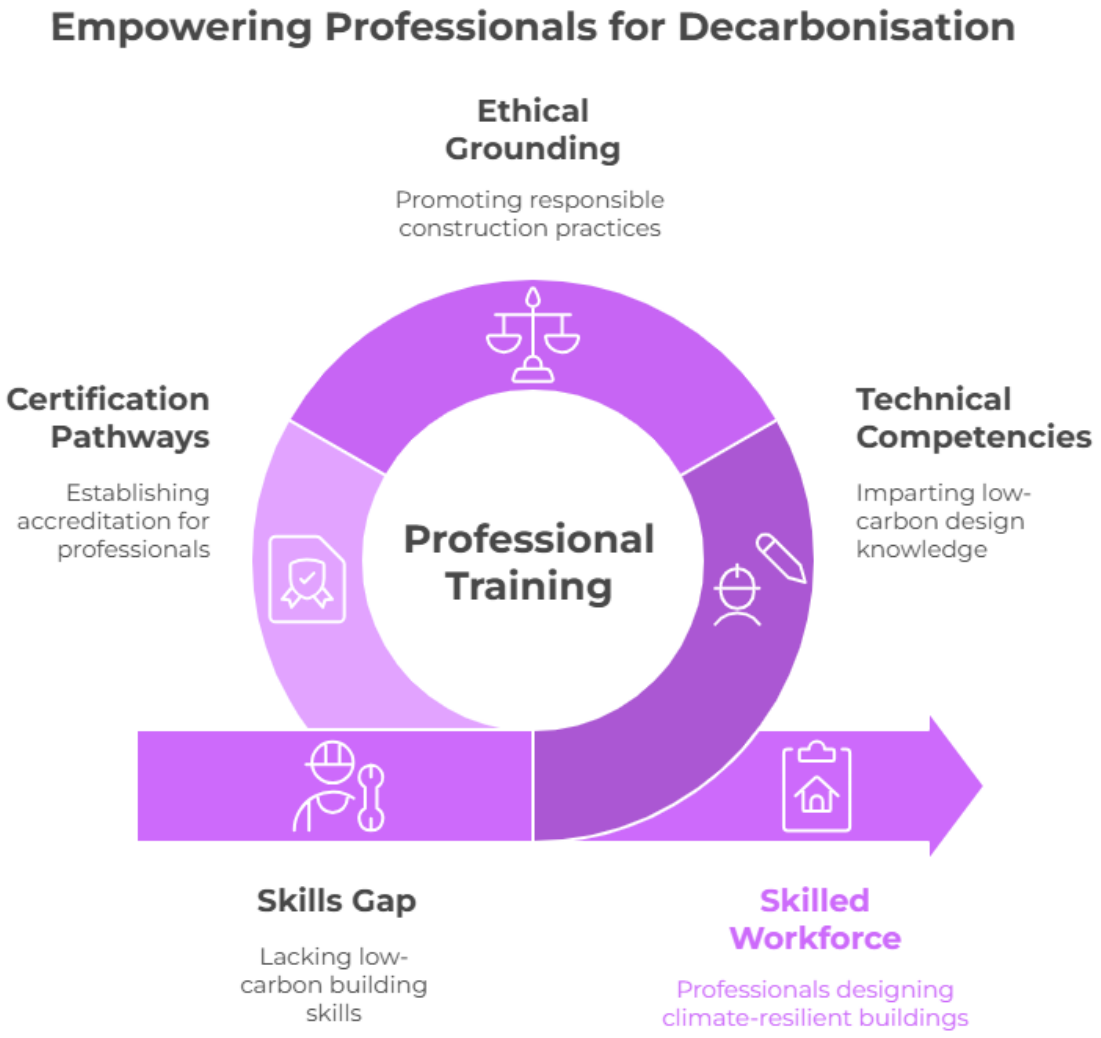



*Figure 9-1: Empowering Professionals*

**Source: GBPN - Graphic by Napkin AI (2025).**

This section outlines the strategy for capacity development across professional cadres, aligning with international best practice and Kenya's national frameworks for technical and vocational education, continuing professional development (CPD), and accreditation.

### 9.1.2 Objectives

The objectives of the professional training and accreditation framework therefore are to:

1. Build **technical capacity** for design and construction of low-carbon, energy-efficient, and climate-resilient buildings.
2. Integrate **sustainability competencies** into professional education and CPD programmes.
3. Establish **standardised accreditation and certification** for green building practitioners.
4. Strengthen **institutional linkages** between academia, professional bodies, and industry.
5. Promote **gender and youth inclusion** in the green construction workforce.

### 9.1.3 Target Professional Groups

Capacity-building interventions will be tailored for key actors across the building value chain:

| Category | Target Group | Implementing Partners |
|---|---|---|
| **Design & Planning** | Architects, engineers, planners, quantity surveyors | AAK, EBK, IQSK, ISK, universities |
| **Construction Management** | Contractors, site supervisors, developers | NCA, KAM, KGBS |
| **Skilled Trades & Artisans** | Fundis, masons, electricians, carpenters, plumbers | TVETA, NITA, County Training Centres |
| **Policy & Regulation** | County planners, building inspectors, policymakers | State Department for Public Works, CoG, NEMA |
| **Academia & Research** | Lecturers, researchers, and students in built environment disciplines | Universities, GBPN, UNESCO-UNEVOC |

*Table 9-1: Target Groups*

**Source: GBPN (2025).**

### 9.1.4 Training Framework and Methodology

The professional training framework will adopt a tiered, modular approach, ensuring progressive learning and accreditation across different skill levels:

| Tier | Focus Area/Module | Delivery Approach | Certification / Output |
|---|---|---|---|
| **Tier 1: Foundational** | Basic climate literacy, building lifecycle emissions, sustainable materials | E-learning modules via GBPN Knowledge Hub, workshops | Certificate of Participation |
| **Tier 2: Technical Proficiency** | Energy modelling, embodied carbon accounting, passive design | Specialized short courses, CPD sessions | CPD credits, sectoral endorsement |
| **Tier 3: Advanced Professional** | Whole-life carbon design, green procurement, MRV reporting | Accredited diploma/degree modules, professional certification | National Green Building Accreditation |
| **Tier 4: Trainer of Trainers (ToT)** | Pedagogical and leadership skills for capacity scaling | Regional training academies, mentorships | ToT Certification and Registry inclusion |

*Table 9-2: Training Framework*

**Source: GBPN (2025).**

Training will be designed collaboratively by AAK, NCA, TVETA, GBPN, and academic institutions, ensuring consistency with Kenya's National Qualifications Framework (KNQF) and recognition by TVETA and professional boards.

### 9.1.5 Accreditation and Certification System

To institutionalize skills recognition, the roadmap proposes the establishment of a National Green Building Accreditation Framework (N-GBAF), anchored in the following components:

1. **Accreditation Standards:** Developed jointly by GBPN, AAK, EBK, and KGBS, defining technical and ethical competencies.
2. **Certification Pathways:** Linked to CPD systems and open to all professionals who complete approved modules.
3. **Registry of Accredited Practitioners:** Hosted on the *National Knowledge Hub*, enabling transparency and visibility for qualified experts.
4. **Alignment with Global Certifications:** Recognition and equivalence mapping with systems such as IFC EDGE, LEED, and Green Star Africa to enhance global mobility and recognition.

This framework ensures that Kenya's professionals are equipped with globally benchmarked, locally relevant green building credentials.

### 9.1.6 Institutional Coordination

Implementation of training and accreditation will be coordinated through a National Capacity Development Partnership Platform (NCDPP), chaired by the State Department for Public Works, with membership from:

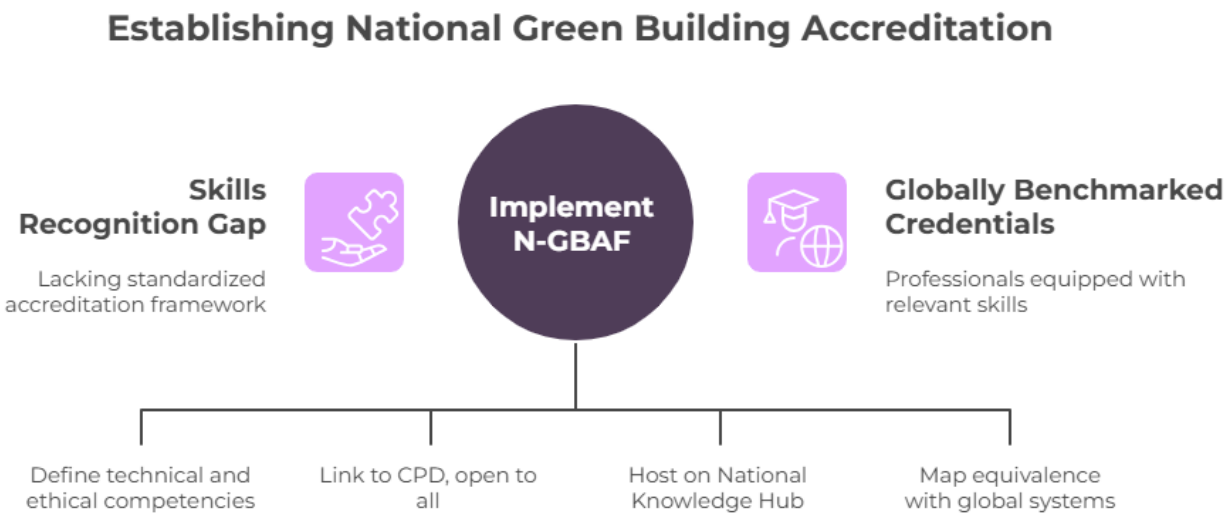



*Figure 9-2: Establishing Accreditation*

**Source: GBPN - Graphic by Napkin AI (2025).**

- AAK, EBK, IQSK, ISK, KGBS, and NCA
- Universities and TVET institutions
- GBPN, SEforALL, and UN-Habitat
- Council of Governors (for county-level rollout)

This platform will oversee curriculum development, accreditation standards, and monitoring of training outcomes, ensuring synergy and avoiding duplication across institutions.

### 9.1.7 Integration with the Knowledge Hub

The National Buildings Decarbonisation Knowledge Hub will serve as the digital backbone for training and accreditation by:

1. Hosting e-learning and blended training modules.
2. Tracking course completion and certification.
3. Providing a repository of resources, toolkits, and case studies.
4. Offering interactive dashboards showing professional participation by region and discipline.

Through the Hub, practitioners will access continuously updated learning content co-developed by Kenyan experts and international partners.

### 9.1.8 Monitoring and Evaluation

Success of the professional training and accreditation programme will be tracked through measurable indicators, including:

1. Number of professionals trained and accredited annually.
2. Number of CPD modules developed and delivered.
3. Integration of low-carbon curricula into university and TVET programmes.
4. Increase in green-certified projects designed or managed by accredited professionals.
5. Gender and youth representation in training cohorts.

Data from training providers and professional bodies will be reported through the MRV Knowledge Hub, feeding into the broader roadmap monitoring framework.

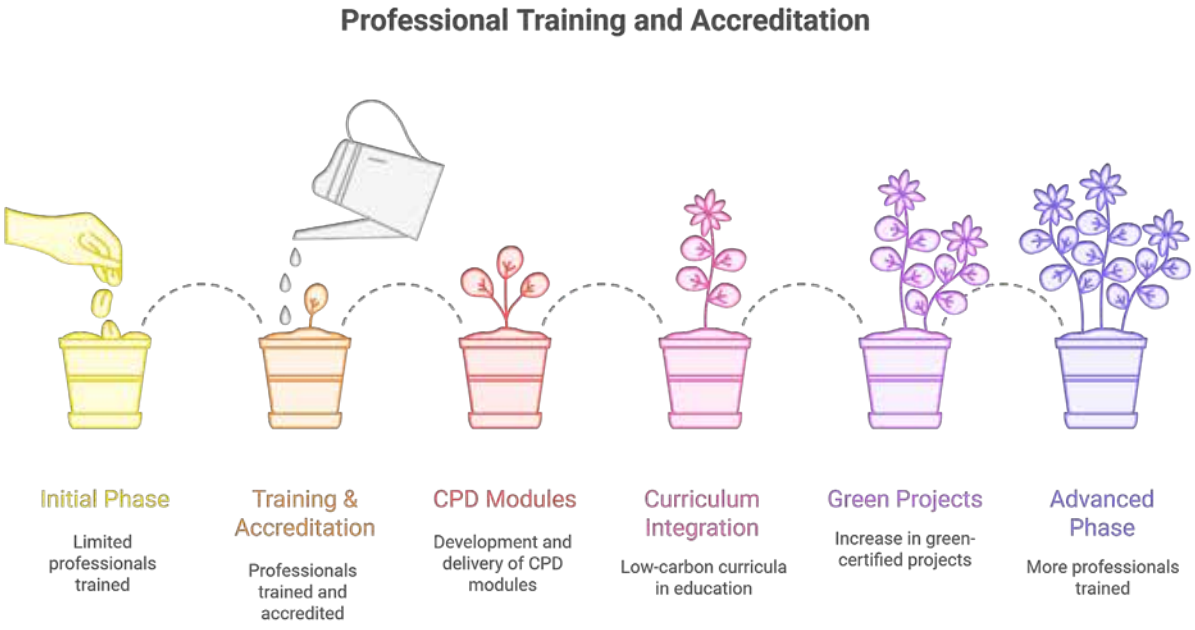



*Figure 9-3: Professional training metrics*

**Source: GBPN - Graphic by Napkin AI (2025).**

### 9.1.9 Expected Outcomes

1. A nationally accredited network of low-carbon building professionals.
2. Integration of climate-responsive design and construction in mainstream practice.
3. Enhanced industry confidence and quality assurance for green building delivery.
4. Institutionalization of lifelong learning within Kenya's built environment sector.
5. Stronger alignment between education, regulation, and implementation.

## 9.2 Public Awareness and Citizen Engagement

### 9.2.1 Introduction and Rationale

Decarbonisation of Kenya's building and construction sector is not only a technical or policy process, it is a societal transformation that requires the understanding, participation, and ownership of citizens.

Public awareness and citizen engagement therefore play a critical role in ensuring that the roadmap's actions are understood, supported, and sustained by all stakeholders, from urban professionals and developers to rural communities, fundi's, artisans, and end users of buildings. In a country as diverse as Kenya, with more than 40 languages and wide disparities in information access, a multi-channel, multilingual, and culturally grounded communication strategy is essential.

This section outlines the roadmap's strategy for public outreach, social inclusion, and participatory engagement to ensure that the transition to low-carbon, climate-resilient buildings is people-centered, accessible, and owned by all.

*Figure 9-4: Discussion*

**Source: Storyset**

### 9.2.2 Objectives

The objectives of the public awareness and citizen engagement strategy are to:

1. Build national awareness of the building sector's role in climate change and the opportunities for sustainable construction.
2. Foster behavioural change towards energy-efficient and resource-conscious building use.
3. Translate technical and policy content of the roadmap into accessible formats for diverse audiences.
4. Strengthen citizen participation in decision-making processes related to planning, building, and sustainability.
5. Create ownership and accountability among citizens, private actors, and local governments.

### 9.2.3 Target Audiences

The communication and engagement plan is designed to reach multiple groups through tailored messaging:

| Audience | Focus | Preferred Channels / Approaches |
|---|---|---|
| **General Public** | Awareness on benefits of sustainable buildings (health, comfort, affordability). | Radio, TV, social media, local forums, roadshows. |
| **Community and Religious Leaders** | Advocacy and local buy-in for low-carbon construction. | Community dialogues, barazas, faith-based networks. |
| **Youth and Students** | Inspiration for careers and innovation in green construction. | School clubs, digital campaigns, university challenges. |

| | | |
|---|---|---|
| **Professionals & Industry** | Continuous professional development and technical information. | Sectoral briefs, newsletters, webinars. |
| **County Governments** | Implementation guidance and public engagement tools. | County workshops, localized roadmap editions. |
| **Media Practitioners** | Knowledge and consistency in climate reporting. | Media training sessions and press briefings. |

*Table 9-3: Target Audiences*

**Source: GBPN (2025).**

### 9.2.4 Communication and Dissemination Plan

The public awareness plan will use five complementary communication pillars, ensuring reach across Kenya's socio-cultural and technological spectrum:

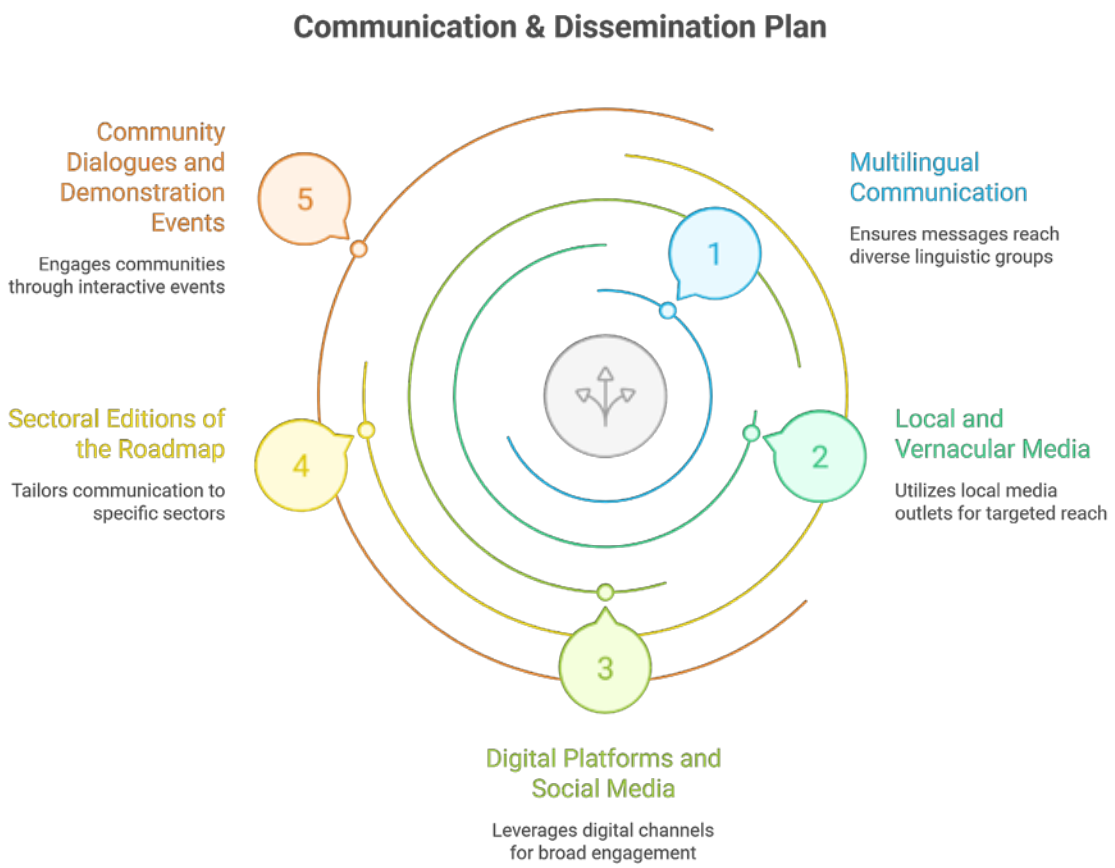



*Figure 9-5: Communication & dissemination plan*

**Source: GBPN - Graphic by Napkin AI (2025).**

| Pillar | Key Strategies | Responsible Actors |
|---|---|---|
| Multilingual Communication | Translate key roadmap messages into Kiswahili and at least five major Kenyan languages (Kikuyu, Luo, Kamba, Luhya, Somali). Simplify complex concepts into visual and oral narratives. | SDPW, GBPN, National Translation Services, CoG. |
| Local and Vernacular Media | Partner with community and vernacular radio/TV stations to host talk shows, jingles, and interviews on low-carbon building. | GBPN, KEPSA, NEMA, Media Council of Kenya. |
| Digital Platforms and Social Media | Use the Knowledge Hub, short explainer videos, infographics, and social media storytelling (Facebook, TikTok, X, YouTube). | GBPN, MoICT, private media partners. |
| Sectoral Editions of the Roadmap | Produce concise, targeted versions of the roadmap for key audiences: housing, public buildings, education, healthcare, and industry. | SDPW, GBPN, AAK, KGBS. |
| Community Dialogues and Demonstration Events | Partner with county governments and community-based organizations (CBOs) to host local exhibitions and public forums around pilot projects. | CoG, Counties, NCA, NGOs. |

*Table 9-4: Communication and Dissemination*
**Source: GBPN (2025).**

This approach recognizes that Kenyans consume information primarily through oral, visual, and interpersonal channels, making radio, local meetings, and vernacular storytelling key vehicles for impact.

### 9.2.5 Tools and Channels of Dissemination

The roadmap's public awareness efforts will be supported by a variety of tools:

1. **Visual Infographics and Posters:** Distributed through construction sites, schools, and county offices.
2. **Short Videos and Documentaries:** Featuring Kenyan case studies and testimonials from building users.
3. **Community Toolkits:** Simplified guides on sustainable building materials, energy efficiency, and water management.
4. **Interactive Web Portal:** The Knowledge Hub will host public dashboards and e-learning modules for non-specialist audiences.
5. **Mobile SMS and WhatsApp Campaigns:** Used for public service announcements and climate tips in partnership with telcos.
6. **Public Exhibitions and National Events:** Participation in major fairs (e.g., AAK Convention, BuildExpo, Devolution Conference) to showcase pilot projects and innovations.

### 9.2.6 Participatory Engagement Mechanisms

Engagement will go beyond one-way communication to foster dialogue and co-creation:

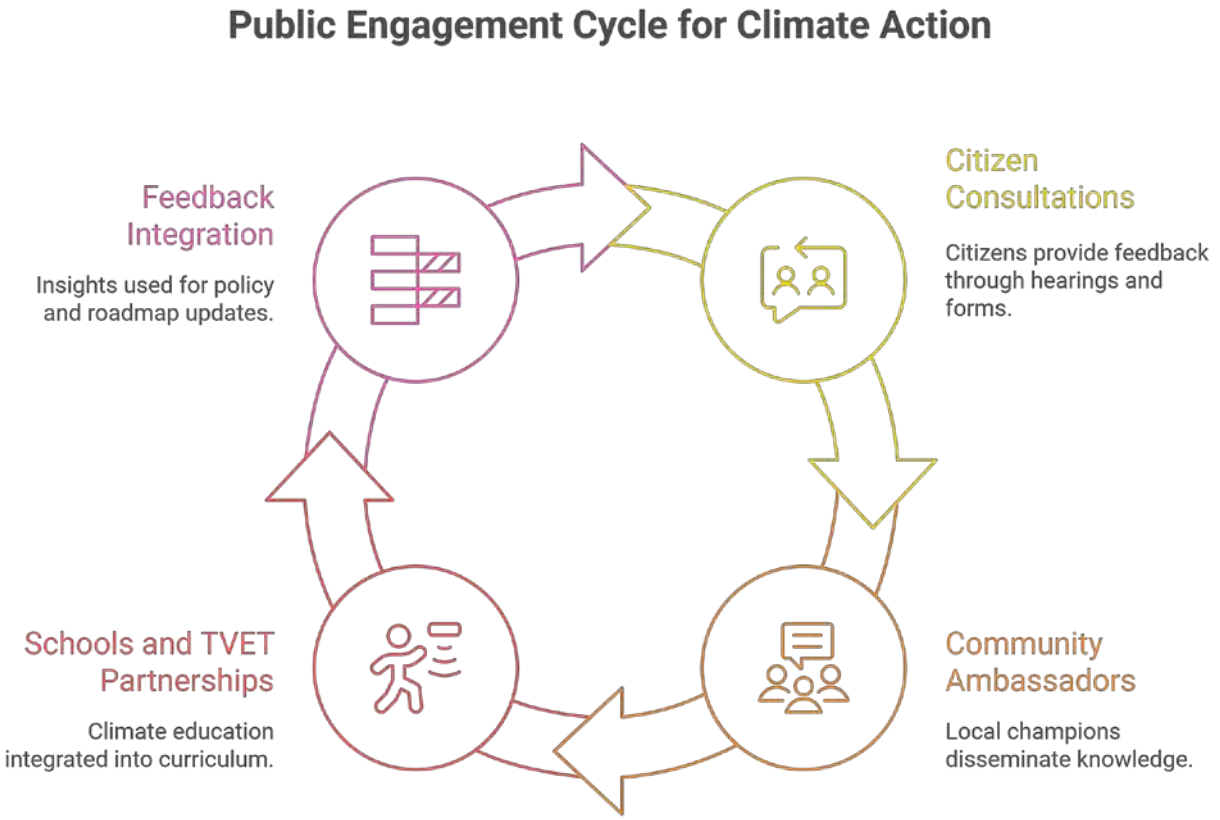



*Figure 9-6: Public engagement cycle*

**Source: GBPN - Graphic by Napkin AI (2025).**

1. **Citizen Consultations:** During roadmap review cycles, citizens and CSOs will provide feedback via public hearings and online forms.
2. **Community Ambassadors:** Trained local champions (especially youth and women) will disseminate knowledge at grassroots level.
3. **Schools and TVET Partnerships:** Climate clubs and training modules integrated into curriculum activities.
4. **Feedback Integration:** Insights from public engagement will feed into policy reviews, capacity building, and roadmap updates through the Knowledge Hub.This approach mirrors Kenya's public participation framework under the Constitution (Article 10) and supports inclusive climate governance in line with the Climate Change (Amendment) Act, 2023.

### 9.2.7 Implementation Phases

| Phase | Focus | Key Outputs |
|---|---|---|
| **Phase 1: Awareness (Year 1)** | Launch national campaign introducing the roadmap. | Translated materials, public events, and media coverage. |
| **Phase 2: Engagement (Year 2–3)** | Deepen participation through community dialogues and pilot site tours. | County engagement reports, community toolkits. |
| **Phase 3: Institutionalisation (Year 4–5)** | Embed communication and citizen engagement in policy processes. | Ongoing feedback loops and annual public perception surveys. |

*Table 9-5: Implementation Phase*

**Source: GBPN (2025).**

### 9.2.8 Monitoring and Evaluation

Success of the public awareness and engagement programme will be measured using indicators such as:

1. Number of public communication materials produced and disseminated.
2. Reach and frequency of radio and TV programming.
3. Number of citizens participating in consultations and events.
4. Diversity of languages and media channels used.
5. Levels of public understanding and behavioural change (survey-based).
6. Number of roadmap feedback submissions integrated into updates.

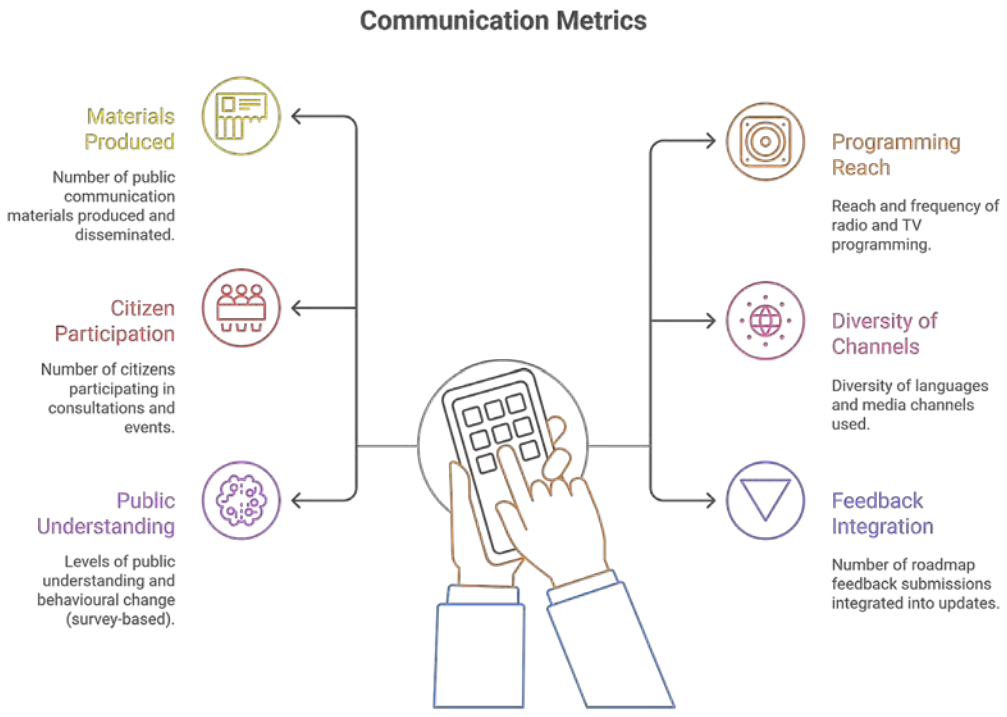



*Figure 9-7: Public engagement metrics*

**Source: GBPN - Graphic by Napkin AI (2025).**

Annual Public Awareness Progress Reports will be published through the Knowledge Hub, linked to the MRV framework described in Chapter 8.

### 9.2.9 Expected Outcomes

1. Widespread understanding of low-carbon construction benefits among citizens and professionals.
2. Increased demand for sustainable building materials and practices.
3. Enhanced community participation in planning and climate-related decision-making.
4. Improved inclusivity, equity, and ownership of Kenya's decarbonisation journey.
5. Establishment of a national culture of sustainability rooted in local narratives and languages.

## 9.3 Academia and Research Partnerships

### 9.3.1 Introduction and Rationale

Academic and research institutions play a central role in enabling evidence-based policymaking, innovation, and workforce development in Kenya's building and construction sector.

As the country advances toward a low-carbon and climate-resilient built environment, universities, technical training institutes, and research centres provide the intellectual infrastructure for:

1. Generating new knowledge,
2. Developing context-specific solutions, and
3. Training the next generation of architects, engineers, planners, and policy leaders.

Building strong academia–policy–industry linkages is therefore critical to sustaining the implementation of the roadmap and embedding decarbonisation principles into Kenya's education, research, and professional practice ecosystems.

### 9.3.2 Objectives

The Academia and Research Partnership strategy aims to:

1. Institutionalize research collaboration on low-carbon materials, design, and construction systems.
2. Integrate roadmap-aligned curricula into architecture, engineering, planning, and construction programs.
3. Strengthen data and innovation capacity for MRV, materials testing, and life-cycle assessment (LCA).
4. Promote student engagement through applied research, competitions, and field-based learning.
5. Bridge the research–policy–practice divide through co-creation of evidence with public and private actors.

### 9.3.3 Strategic Approach

The roadmap adopts a collaborative cluster model, aligning research and academic engagement with the six national working groups established under the roadmap development process. Each working group serves as a research and innovation cluster, linking academia, government, and industry around specific themes that mirror Global ABC's international research domains.

### 9.3.4 Priority Research and Academic Themes

To ensure synergy between research, policy, and implementation, the priority academic themes are structured around the six working groups guiding Kenya's roadmap. This alignment ensures national ownership, relevance, and consistency with Global ABC's global framework.

| Working Group / Research Domain | Key Research Focus Areas | Potential Academic & Research Partners | Global ABC Alignment |
|---|---|---|---|
| **New Buildings** | Assess emissions and energy profiles of newly constructed buildings; evaluate code compliance and enforcement; develop design prototypes for net-zero housing and commercial developments. | University of Nairobi, JKUAT, AAK, NCA | New Buildings and Construction |
| **Existing Buildings** | Evaluate performance of existing stock; identify retrofit potential and cost-benefit models; test retrofit materials and technologies; document success cases for scaling. | Strathmore Energy Research Centre, TUK, EPRA, NEMA | Existing Buildings and Retrofits |
| **Energy Efficiency** | Study energy demand patterns and user behaviour; evaluate appliance standards; design smart building and renewable integration models for diverse building types. | Strathmore University, KenGen, MoE, GBPN,KPLC | Energy Efficiency & Systems Integration |
| **Building Materials and Construction Supply Chain** | Develop localized emission factors for construction materials; test low-carbon materials (bamboo, pozzolana, compressed earth blocks); study embodied carbon, industrial symbiosis, and circular economy pathways. | JKUAT, KEFRI, KIRDI, KAM,KEBS,KEPRO | Construction Supply Chain |
| **Spatial and Urban Planning** | Research the links between urban form, density, transport, and emissions; integrate climate resilience into spatial planning; develop spatial models for low-carbon urban growth. | University of Nairobi, Kenyatta University, CoG, UN-Habitat | Spatial Planning and Urban Form |
| **Enabling Factors** | Examine institutional coordination, financing instruments, incentive structures, capacity development models, and policy coherence for decarbonisation. | KIPPRA, TVETA, MECCF, GBPN | Governance, Finance, and Capacity Building |

*Table 9-6: Priority Themes*

**Source: GBPN (2025).**

This structure ensures that every research effort directly contributes to the roadmap's implementation priorities, reinforces national working group outputs, and strengthens Kenya's role in regional and global knowledge exchange.

### 9.3.5 Integration of the Roadmap into Academia

To ensure long-term impact, the roadmap will be integrated into the education system through the following pathways:

**1. Curriculum Alignment:**

- Embed concepts of carbon accounting, energy efficiency, and circular construction within undergraduate and postgraduate programs in architecture, engineering, and planning.
- Develop elective courses on *"Climate-Responsive Design and Decarbonisation"* jointly by AAK, Kenyan Schools of Architecture, and GBPN.

**2. Student Research and Theses:**

- Encourage final-year projects and postgraduate research that address roadmap themes, supported by small research grants.

**3. Academic–Industry Labs:**

- Establish Living Labs in collaboration with pilot projects under the roadmap (see Chapter 7) for applied experimentation and knowledge transfer.

**4. Joint Supervision and Exchange Programs:**

- Partner with international institutions through Global ABC, GBPN, and UN-Habitat networks to enhance academic exchange and mentorship.

### 9.3.6 Research and Data Infrastructure

The National Buildings Decarbonisation Knowledge Hub will serve as the central research data repository and collaboration platform. It will:

1. Host datasets on materials, emissions, and building performance.
2. Provide open access to publications, theses, and case studies.
3. Enable digital collaboration among researchers, counties, and policymakers.
4. Facilitate training in digital tools such as BIM, LCA software, and MRV analytics.

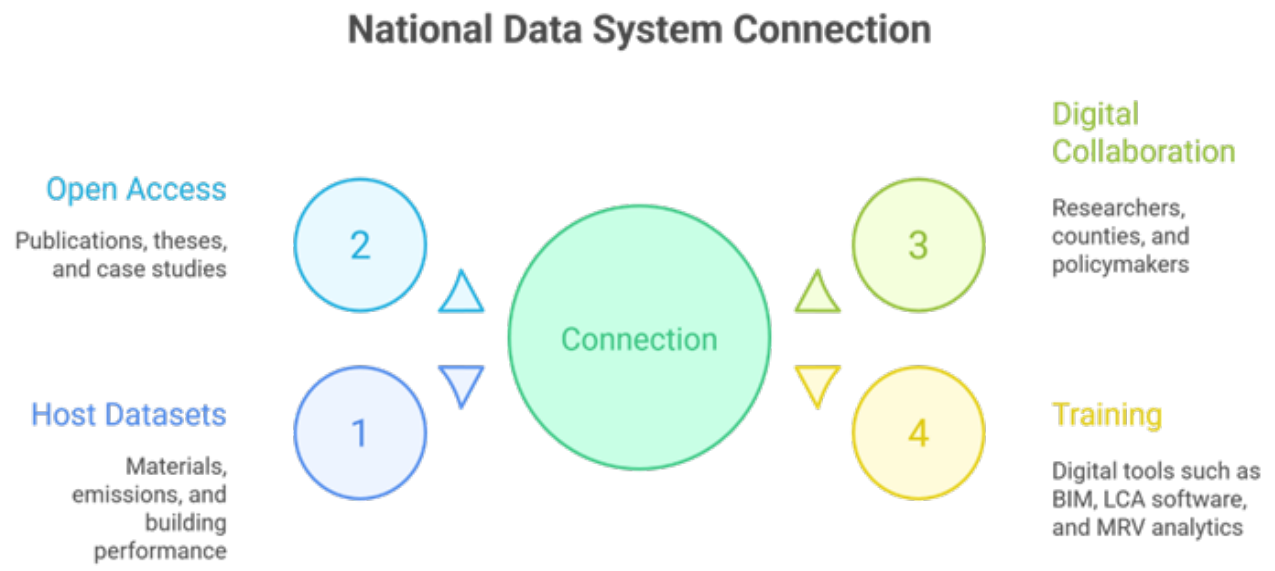



*Figure 9-8: National Data System Connection*

**Source: GBPN - Graphic by Napkin AI (2025).**

Data from academia will also feed directly into the national MRV+ system (see Chapter 8), strengthening Kenya's evidence base for reporting and innovation.

### 9.3.7 Institutional Partnerships and Coordination

The roadmap envisions a **National Academic and Research Network for Building Decarbonisation (NARN-BD)** coordinated under the State Department for Public Works and GBPN, with participation from:

| Partner Type | Institutions / Actors |
|---|---|
| Public Universities | JKUAT, University of Nairobi, Kenyatta University, TUK, Meru University |
| Technical and TVET Institutions | TVETA, NITA, Regional Training Centres |
| Research Institutions | KIRDI, KEFRI, KIPPRA, Kenya Building Research Centre (KBRC) |
| Professional Bodies | AAK, EBK, IQSK, ISK, KGBS |
| International Partners | UN-Habitat, SEforALL, IFC, WRI, Global ABC, UNEP |
| Private Sector / Industry | KAM, NCA, manufacturers, developers |

*Table 9-7: Partnerships & Coordination*

**Source: GBPN (2025).**

This network will coordinate applied research, facilitate funding mobilization, and promote innovation exchange between academia and industry.

### 9.3.8 Incentives and Funding for Research Collaboration

To sustain engagement, the roadmap proposes:

1. **Research Grants and Scholarships:** Funded through national budgets, international partners (UNEP, GBPN, SEforALL, World Bank), and private sponsors.
2. **Innovation Challenge Funds:** Targeted competitions for students and start-ups developing low-carbon materials or construction technologies.
3. **Tax Incentives and PPPs:** Encourage private investment in research facilities and test labs.
4. **Publication Support:** Grants for peer-reviewed research to strengthen Kenya's global visibility in sustainable building science.

### 9.3.9 Monitoring and Evaluation

Progress in academic and research partnerships will be tracked using indicators such as:

1. Number of universities integrating roadmap content into curricula.
2. Number of research projects and theses aligned with roadmap objectives.
3. Volume of new data and publications hosted on the Knowledge Hub.
4. Number of collaborative research grants and innovation challenges launched.
5. Level of student and faculty participation in pilot projects and policy dialogues.

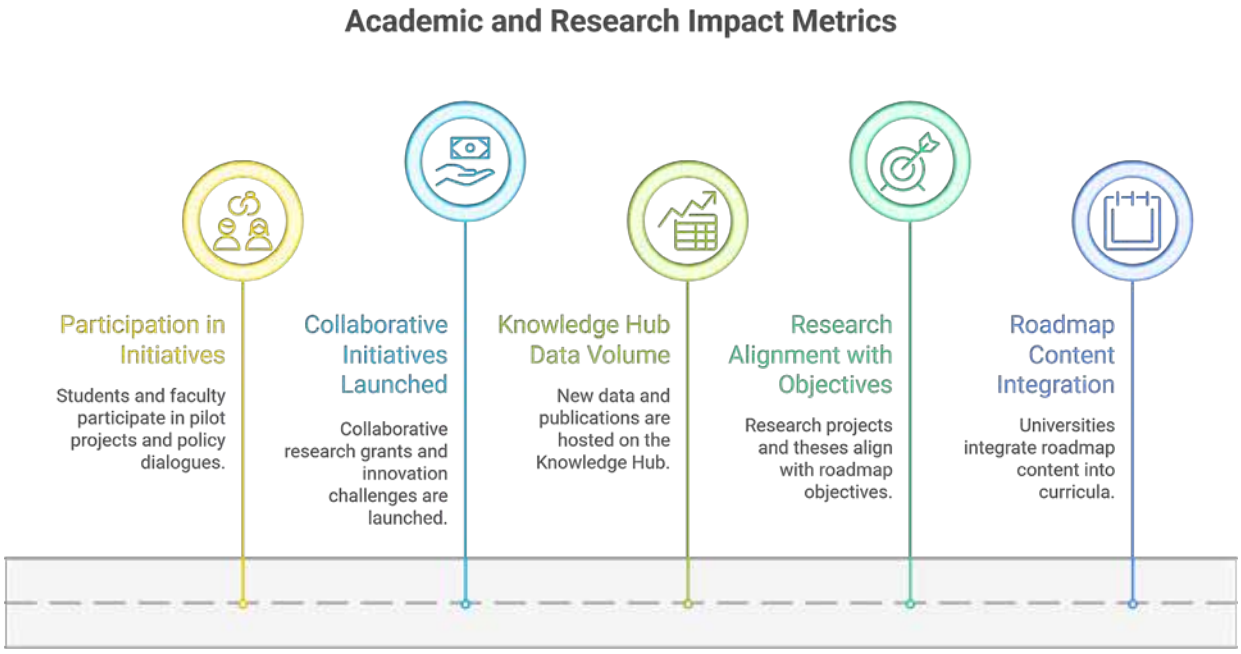



*Figure 9-9: Academic & Research metrics*
**Source: GBPN - Graphic by Napkin AI (2025).**

**Annual Research and Innovation Briefs** will be published by GBPN in collaboration with partner universities to disseminate findings and inform policy refinement.

### 9.3.10 Expected Outcomes

Institutionalized collaboration between academia, government, and industry.

1. Strengthened research capacity and data systems for sectoral decarbonisation.
2. Integration of climate-responsive design principles into education and professional practice.
3. Generation of locally grounded innovations and materials solutions.
4. Enhanced evidence base for policymaking and international reporting.

## 9.4 The GBPN Knowledge Hub – Role and Functions

### 9.4.1 Introduction and Rationale

As Kenya transitions towards a low-carbon, climate-resilient built environment, the ability to generate, share, and act on knowledge becomes central to the success of the roadmap. The GBPN Knowledge Hub is the digital and institutional anchor for this transformation.

Conceived as an open-access, multi-stakeholder platform, the Hub connects data, research, policy, and practice, serving as the central repository, coordination point, and capacity-building tool for the implementation of the National Buildings and Construction Decarbonisation Roadmap.

It ensures that evidence collected through MRV systems, insights generated by academia, and lessons learned from industry are systematically organized, shared, and used to drive continuous improvement across the sector.

### 9.4.2 Objectives of the Knowledge Hub

The GBPN Knowledge Hub aims to:

1. Serve as the central data and knowledge platform for the building decarbonisation ecosystem in Kenya.
2. Enable transparent tracking of emissions, progress, and policy outcomes through digital dashboards.
3. Facilitate capacity building and learning for professionals, counties, and policymakers.
4. Support research collaboration and data-driven innovation through access to verified datasets and analytical tools.
5. Promote national and international visibility of Kenya's progress through open, verifiable, and accessible information.

### 9.4.3 Core Roles and Functions

The Knowledge Hub operates across four primary functions that collectively advance Kenya's roadmap implementation:

| Function | Description | Key Users / Partners |
|---|---|---|
| A. Data Repository and Analytics | Central platform for data on embodied and operational emissions, material flows, and MRV indicators. Integrates data from counties, industry, and national systems through APIs. | SDPW, CCD, NEMA, GBPN, Counties |
| B. Capacity Building and Learning Portal | Hosts e-learning courses, webinars, CPD modules, and certification programs aligned with Section 9.1. Tracks training outcomes and professional accreditation. | AAK, EBK, TVETA, Universities |
| C. Knowledge Exchange and Research Collaboration | Digital space for academic, industry, and policy collaboration. Includes research libraries, case studies, and innovation challenges. | Universities, GBPN, Global ABC, WRI, IFC |
| D. Communication and Public Awareness Gateway | Supports the public outreach plan (Section 9.2) through infographics, toolkits, and multilingual content. Provides real-time updates on national progress. | Citizens, Media, CoG, NGOs |

*Table 9-8: Core Roles & Functions*

**Source: GBPN (2025).**

Together, these functions position the Hub as Kenya's digital engine for knowledge-driven decarbonisation, bridging the gap between data and decision-making.

### 9.4.4 Governance and Structure

The Knowledge Hub will operate under a shared governance framework to ensure institutional continuity, data integrity, and inclusivity.

| Governance Layer | Role | Key Actors |
|---|---|---|
| Strategic Oversight | Provides strategic direction, resource mobilization, and inter-ministerial coordination. | State Department for Public Works (Chair), CCD, CoG, GBPN |
| Technical Secretariat | Manages daily operations, system updates, and stakeholder coordination. | GBPN (Lead), SDPW, contracted IT partner |
| Data & Content Contributors | Provide datasets, publications, training modules, and case studies. | Counties, Universities, Professional Bodies, Industry Partners |
| User Community | Access data, e-learning, and interactive tools; provide feedback through structured forums. | Public, Professionals, Media, Donors |

*Table 9-9: Governance & Structure*

**Source: GBPN (2025).**

This layered model ensures transparency, co-ownership, and sustainability of the Hub, anchored within existing national digital ecosystems.

### 9.4.5 Integration with National and Global Systems

To avoid duplication and ensure interoperability, the Knowledge Hub is integrated with existing national and international digital systems:

1. **National MRV+ Platform (CCD):** Data exchange for climate reporting.
2. **National Spatial Data Infrastructure (NSDI) (MoLPWHUD):** Geospatial data on building stock and emissions.
3. **EPRA and NEMA systems:** Energy and environmental compliance data integration.
4. **SEforALL Open Building Insights (OBI):** Real-time access to building energy and typology data.
5. **Global ABC Building Climate Tracker and UNEP GBSR:** Automatic updates to Kenya's international reporting and visibility.

This interoperability strengthens Kenya's capacity for transparent climate reporting and aligns with the UNFCCC Enhanced Transparency Framework (ETF).

### 9.4.6 Technical and Functional Architecture

The Hub's technical framework will be based on open-source, modular architecture to ensure adaptability and scalability:

| Component | Description |
|---|---|
| **Data Layer** | Centralized, cloud-based storage linked to APIs for counties, ministries, and partner databases. |
| **Analytics and Visualization Layer** | Dashboards for emissions tracking, training statistics, and policy performance indicators. |
| **Learning Management System (LMS)** | Integrated platform for hosting and tracking CPD courses, tutorials, and ToT programs. |
| **Research Repository** | Library for peer-reviewed publications, case studies, and academic outputs. |
| **User Interface and Communication Layer** | Public-facing portal available in English, Kiswahili, and select local languages; mobile-responsive. |

*Table 9-10: Technical & functional Architecture*

**Source: GBPN (2025).**

This architecture will be developed in partnership with Kenyan IT firms and international partners, ensuring compliance with the Data Protection Act (2019) and global cybersecurity standards.

### 9.4.7 Knowledge Flow and Feedback Mechanisms

The Hub will facilitate multi-directional knowledge flow, ensuring that data and insights are continuously used for learning and improvement:

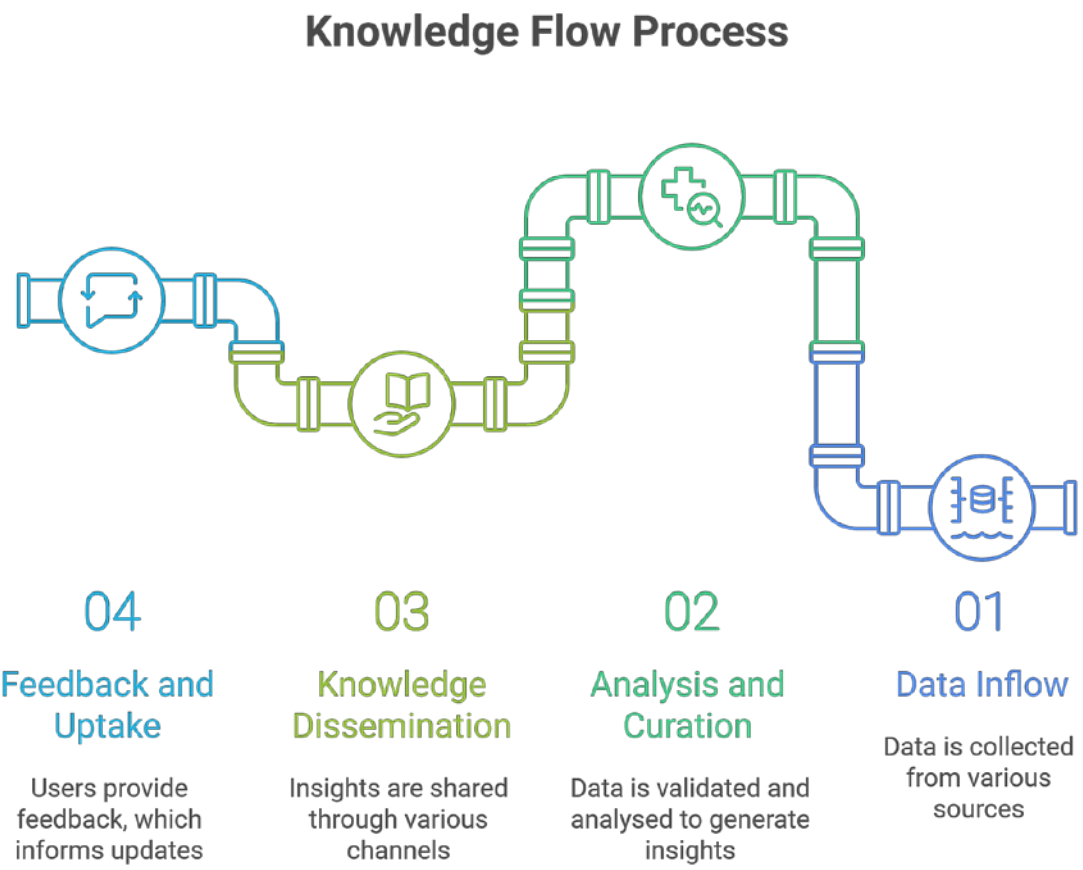



*Figure 9-10: Knowledge flow process*

**Source: GBPN - Graphic by Napkin AI (2025).**

1. **Data Inflow:** From counties, projects, research, and MRV systems.
2. **Analysis and Curation:** GBPN and partners validate and analyse data to generate insights.
3. **Knowledge Dissemination:** Information shared through dashboards, reports, and training materials.
4. **Feedback and Uptake:** Users provide feedback, which informs roadmap updates, code revisions, and training needs (linked to MRV feedback loops in Section 8.4).

This cyclical model ensures continuous improvement, positioning the Hub as a learning ecosystem rather than a static database.

### 9.4.8 Sustainability and Financing

To ensure long-term sustainability, the Hub's financing strategy will combine:


*Figure 9-11: Financing Strategy*

**Source: GBPN - Graphic by Napkin AI (2025).**

1. **Government co-funding** through SDPW's budget for digital transformation.
2. **International support** from GBPN, SEforALL, Global ABC, and multilateral partners.
3. **Partnership contributions** from professional bodies, universities, and development agencies.
4. **Private sector participation,** particularly from technology providers and construction industry players.

A public–private partnership (PPP) model will be explored for hosting, maintenance, and content curation, ensuring operational continuity beyond the roadmap period.

### 9.4.9 Expected Outcomes

- A fully operational, interoperable Knowledge Hub linking data, training, and policy.
- Enhanced national capacity for evidence-based decision-making and transparency.
- Integration of research and professional training with live sectoral data.
- Broader public and international visibility of Kenya's decarbonisation achievements.
- A sustainable digital ecosystem enabling continuous innovation and learning in the built environment sector.

## 9.5 Differentiation between the *GBPN Knowledge hub* and the *National Knowledge Hub*

The GBPN Knowledge Hub is a global-to-national digital and institutional platform developed by the Global Buildings Performance Network (GBPN).

It serves as both:
1. A **repository** for evidence, data, and tools generated from GBPN's work across different countries, and
2. A **capacity-building and learning platform** for professionals, policymakers, and researchers.

The core purpose of which is to support countries in their building decarbonisation journeys by providing:
**a. Technical guidance (**e.g., carbon metric tools, life-cycle data frameworks),
**b. Knowledge exchange** among GBPN country teams (e.g., Kenya, Indonesia, India), and
**c. Capacity development resources** (e.g., training modules, toolkits, policy briefs).

On the other hand, The National Buildings Decarbonisation Knowledge Hub (shortened to the National Knowledge Hub) is a country-owned and hosted platform designed to become Kenya's permanent, institutionalized digital ecosystem for data, learning, and collaboration in the building and construction sector.

It is anchored within the State Department for Public Works (SDPW) and jointly managed with the Climate Change Directorate (CCD) and GBPN as a technical partner. Its core purpose is to institutionalize Kenya's roadmap implementation by:
**a. Housing all national data, research, and training outputs** generated through the roadmap process.
**b. Providing localized, context-specific tools and dashboards** for Kenyan users (counties, ministries, professionals).
c. Serving as the **official coordination and monitoring system for roadmap indicators,** linked to the National MRV+.
d. Acting as a **national repository and dissemination platform** for the building sector's climate data and research.

Relationship between the two:

| Aspect | GBPN Knowledge Hub | National Knowledge Hub (Kenya) |
|---|---|---|
| **Ownership** | Global – managed by GBPN, multi-country | National – managed by SDPW & CCD |
| **Scope** | Global and regional (multi-country knowledge) | National and subnational (Kenya-focused) |
| **Function** | Provides global methodologies, benchmarks, and tools | Localizes and operationalizes these within Kenya's context |
| **Data Flow** | Receives curated data from national hubs for benchmarking and research | Receives raw and processed data from counties, MRV systems, and institutions |
| **Users** | GBPN teams, international partners, global researchers | Kenyan government, counties, academia, industry professionals |
| **Output Examples** | Global reports, best practice guidance, benchmarking dashboards | National dashboards, training modules, policy briefs, localized research |
| **Linkage** | Upstream (feeds global analysis and benchmarking) | Downstream (implements and contextualizes global guidance) |

*Table 9-11: Relationship between GBPN and National Knowledge Hub*

**Source: GBPN (2025).**

# 10 Roadmap to 2040

## 10.1 Phased Action Plan (2026–2030, 2030–2035, 2035–2040)

### 10.1.1 Introduction

Achieving a decarbonised and climate-resilient building and construction sector by 2040 requires a structured, phased approach that balances ambition with capacity. The Kenya Buildings and Construction Decarbonisation Roadmap adopts a progressive three-phase implementation model to guide the transition from current practices to full sectoral transformation.

Each phase builds on the outcomes, systems, and learning of the previous one, ensuring that Kenya's pathway is sequenced, evidence-based, and grounded in national priorities. The action plan aligns with the National Climate Change Action Plan (NCCAP III), Vision 2030, Kenya's NDC commitments, and the Buildings Breakthrough Agenda, while being fully consistent with Global ABC's 1.5°C Buildings Framework.

### 10.1.2 Guiding Principles for Phased Implementation

The roadmap's phased approach is built on the following guiding principles:

1. **Incremental Transformation:** Progressively advance from capacity and baseline development to deep decarbonisation and circular economy integration.
2. **Evidence-Based Decision Making:** Each phase is informed by MRV results, feedback loops (*Section 8.4*), and updated research (*Section 9.3*).
3. **Inclusivity and Equity:** Ensure that counties, informal builders, SMEs, and women-led enterprises are integrated throughout.
4. **Localization and Scalability:** Pilot innovations first, then scale nationally through county systems and professional networks.
5. **Alignment with Global Commitments:** Maintain consistency with the Global ABC and UNFCCC frameworks while prioritizing Kenya's context and development needs.

### 10.1.3 Phased Implementation Timeline

The roadmap envisions three distinct but interconnected phases, each with specific priorities, milestones, and expected outcomes.

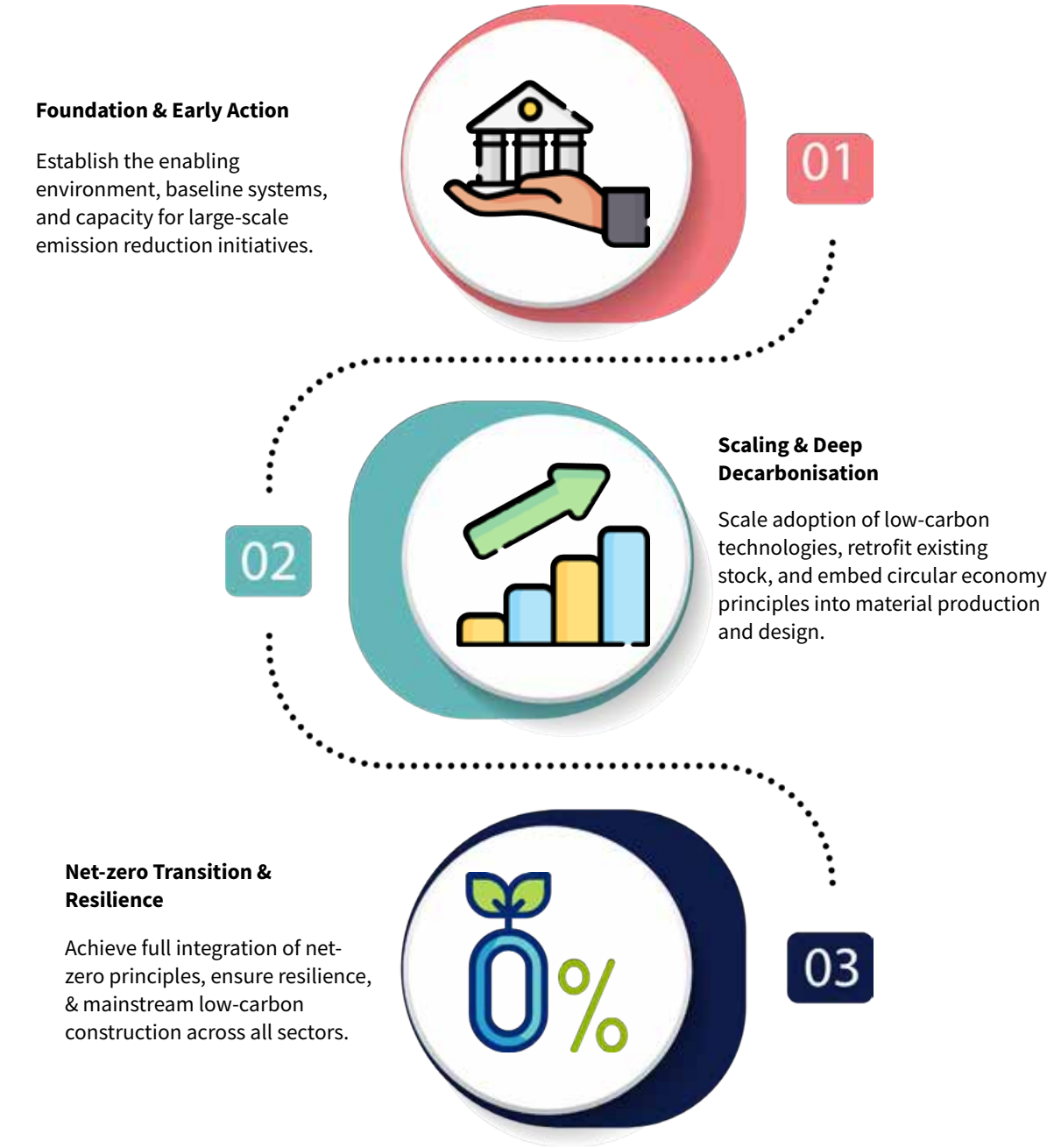



*Figure 10-1: Phased Implementation Timeline*

**Source: GBPN - Graphic by Freepik (2025).**

## Phase I (2026–2030): Foundations and Early Action

**Objective:** Establish the enabling environment, baseline systems, and capacity for large-scale emission reduction initiatives.

**Key Actions:**

1. Finalize and operationalize the **National Buildings Decarbonisation Knowledge Hub** (*Sections 9.4, 8.2*).
2. Complete the **national MRV system integration** and initiate annual emissions reporting.
3. Institutionalize **green building standards** within the Building Code (2024 Revision) and procurement guidelines.
4. Implement **pilot projects** in affordable housing, public schools, and county government buildings (*Section 7.5*).
5. Develop **localized emission factors** for key materials (cement, steel, bricks, and timber).
6. Train 5,000 professionals and artisans through the **GBPN–AAK–TVETA capacity-building program.**
7. Establish the **National Financing Framework** for green buildings, with incentives for early adopters.
8. Strengthen collaboration with **counties** to embed low-carbon design in County Spatial Plans and Building Approvals.

**Expected Outcomes:**

1. Functional MRV and Knowledge Hub systems.
2. At least 15% of new public buildings meet green standards.
3. Baseline emissions published and integrated into the national climate reporting framework.
4. Active participation of at least 25 counties in roadmap implementation.

## Phase II (2030–2035): Scaling and Deep Decarbonisation

**Objective:** Scale adoption of low-carbon technologies, retrofit existing stock, and embed circular economy principles into material production and design.

**Key Actions:**

1. Implement large-scale **retrofit programs** for public and affordable housing.
2. Expand **county-level implementation units,** integrating MRV and digital permitting systems.
3. Mandate **life-cycle carbon assessment (LCA)** for major construction projects.
4. Operationalize **local production of low-carbon materials,** including alternative cements and recycled aggregates.
5. Establish **industry innovation clusters** around cement, steel, and building technologies in partnership with universities.
6. Embed **climate-responsive planning** within national urban policy frameworks.
7. Develop a **national accreditation and rating system** for low-carbon buildings.
8. Scale **green finance mechanisms,** including county revolving funds and PPP-based financing models.

**Expected Outcomes:**

1. 40% reduction in embodied carbon intensity in new construction (baseline: 2025).
2. 25% of existing public buildings to be retrofitted for efficiency.
3. County-level integration of digital permitting and emissions tracking in 30 counties.
4. 100,000 housing units meeting or exceeding national low-carbon standards.
5. Active innovation clusters producing scalable material and design solutions.

### Phase III (2035–2040): Net-Zero Transition and Resilience

**Objective:** Achieve full integration of net-zero principles, ensure resilience, and mainstream low-carbon construction across all sectors.

**Key Actions:**

1. Enforce **net-zero design requirements** for all new buildings (public and private).
2. Scale up **carbon-neutral material production** and circular construction models.
3. Integrate **climate resilience and adaptation metrics** into all building and urban planning codes.
4. Link the Knowledge Hub and MRV data systems to **international carbon markets** and climate finance mechanisms.
5. Support **county climate innovation centers** to promote local entrepreneurship in low-carbon construction.
6. Integrate building decarbonisation targets into Kenya's **Vision 2040** and subsequent NDC cycles.
7. Conduct a comprehensive **mid-term review** of the roadmap to inform the 2040–2050 strategy.

**Expected Outcomes:**

1. 65–75% reduction in total sectoral GHG emissions compared to 2025 levels.
2. 100% of new construction meeting net-zero standards.
3. Nationwide compliance with digital permitting and emissions tracking.
4. Full operationalization of the circular economy within the construction supply chain.
5. Kenya is positioned as a regional leader in sustainable building practices and knowledge exchange in Africa.

Kenya's phased action plan aligns with the Global ABC's "Buildings as a System" approach, which emphasizes integrated action across policy, finance, technology, and capacity. The three-phase model mirrors pathways employed in India and Indonesia.

### 10.1.4 Cross-Cutting Enablers Across All Phases

| Enabler | Key Elements | Anchoring Sections |
|---|---|---|
| **Governance and Institutional Coordination** | Continuous collaboration among SDPW, CCD, CoG, AAK, EBK, NCA, and GBPN | Section 7.2 & 8.3 |
| **Financing and Investment** | Blended finance models, PPPs, fiscal incentives, and carbon market engagement | Section 7.4 |

| | | |
|---|---|---|
| **Digital Systems and Knowledge Hub** | Interoperable MRV and learning systems for real-time tracking and capacity development | Sections 8.2 & 9.4 |
| **Capacity Building and Skills Development** | Training and accreditation programs for professionals, artisans, and counties | Section 9.1 |
| **Public Awareness and Citizen Engagement** | Continuous communication and advocacy for low-carbon lifestyles | Section 9.2 |
| **Research and Innovation** | Continuous collaboration with academia and industry through working groups | Section 9.3 |

*Table 10-1: Cross-cutting enablers across phases*

**Source: GBPN (2025).**

It is envisioned that by 2040, Kenya's building and construction sector will have undergone a systemic transformation. Moving from one characterized by fragmented policies and high emissions, to a cohesive, data-driven, and low-carbon ecosystem. The Phased Action Plan ensures that this transformation is realistic, inclusive, and cumulative while anchoring global ambition within national realities, and positioning Kenya as a model for Africa's sustainable urban future.

## 10.2 Milestones and Targets

### 10.2.1 Introduction

To ensure progress toward a decarbonised building and construction sector by 2040, the roadmap defines a set of clear, measurable, and time-bound milestones. These milestones translate the phased action plan (Section 10.1) into specific outputs, performance targets, and sectoral benchmarks, providing a transparent mechanism for tracking Kenya's transition across all major thematic areas of policy, materials, design, energy, and capacity.

The targets are aligned with:

1. Kenya's Nationally Determined Contributions (NDC, 2025–2030 cycle);
2. Vision 2030 and the *Affordable Housing Program*;
3. NCCAP III (2023–2027) and subsequent climate policy frameworks; and
4. Global ABC's Buildings Breakthrough target of making *near-zero-emission and resilient buildings the new normal by 2030.*

### 10.2.2 Guiding Principles

The milestones and targets have been developed based on the following principles:

1. **Progressive Ambition:** Escalating targets in each phase toward full decarbonisation by 2040.
2. **Comprehensive Coverage:** Inclusion of operational and embodied emissions, as well as enabling factors.
3. **Data-Driven:** Based on measurable indicators supported by the MRV framework (*Section 8*).
4. **Equity and Inclusion:** Targets account for participation by all counties, professional bodies, and social groups.
5. **Global Alignment:** Benchmarked against Global ABC metrics and UNFCCC transparency requirements.

### 10.2.3 Thematic Milestones and Targets

The milestones and targets are organized under **six strategic themes,** aligned with the national working groups and Global ABC's system-based approach.

### A. Policy, Regulation, and Governance

**2030-2035**

**Milestone:**

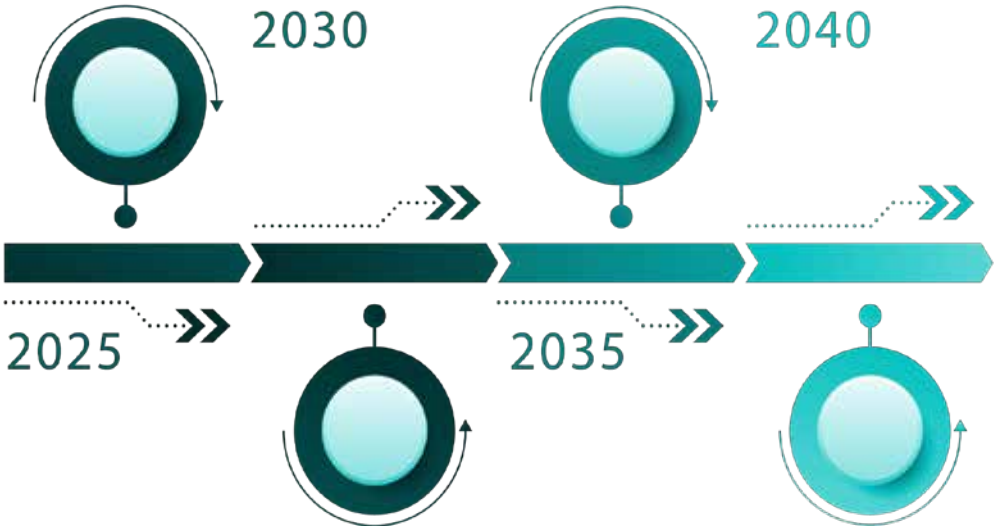
Comprehensive regulatory framework for embodied carbon

National digital permitting rolled out.

**Indicators:**

Mandatory LCA for major projects

80% of planning approvals processed digitally.




**2026-2030**

**Milestone:**

Green Amendment adopted & enforced in all 47 counties

Climate policy integration across housing and works ministries.

**Indicators:**

47 counties aligned to revised building code

100% of new public projects subject to climate screening.

**2035-2040**

**Milestone:**

Full integration of building sector targets in NDC & climate budgets

National carbon accounting system operational.

**Indicators:**

Sectoral emissions reporting institutionalized

100% compliance across ministries.

*Figure 10-2: Policy, regulation and governance timeline*

**Source: GBPN - Graphic by Freepik (2025).**

## B. Energy and Operational Efficiency

| Timeframe | Milestones | Targets / Indicators |
|---|---|---|
| **2026–2030** | Launch of national building energy performance standard; pilot efficiency retrofits in public buildings. | 15% reduction in energy intensity (baseline 2025). |
| **2030–2035** | Mandatory energy benchmarking for large buildings; expansion of renewables in new construction. | 40% of urban buildings to be powered by on-site or grid-tied renewables. |
| **2035–2040** | All new buildings meet net-zero operational energy targets. | 100% net-zero energy new construction; 50% reduction in sectoral operational emissions. |

*Table 10-2: Energy and operational efficiency timeline*

**Source: GBPN (2025).**

## C. Materials and Construction Supply Chain (Embodied Carbon)

| Timeframe | Milestones | Targets / Indicators |
|---|---|---|
| **2026–2030** | Local emission factors developed for cement, steel, and brick industries. | Baseline for embodied carbon established for 80% of production. |
| **2030–2035** | Incentives for low-carbon materials; circular material innovation clusters operational. | 40% reduction in embodied carbon intensity (2025 baseline). |
| **2035–2040** | Large-scale adoption of alternative materials; industrial circular economy fully integrated. | 70% reduction in embodied carbon intensity; >50% recycled or low-carbon material use. |

*Table 10-3: Material & construction supply chain timeline*

**Source: GBPN (2025).**

## D. Spatial and Urban Development

| Timeframe | Milestones | Targets / Indicators |
|---|---|---|
| 2026–2030 | Climate-smart urban planning integrated into 15 county spatial plans. | 15 counties implementing low-carbon zoning and density strategies. |
| **2030–2035** | Transit-oriented and compact urban models mainstreamed nationally. | 50% of new urban developments under climate-resilient spatial plans. |
| **2035–2040** | Net-zero urban growth principles embedded in all urban policy frameworks. | All major urban areas implement net-zero planning standards. |

*Table 10-4: Spatial & urban development timeline*

**Source: GBPN (2025).**

## E. Capacity Building and Knowledge Systems

| Timeframe | Milestones | Targets / Indicators |
|---|---|---|
| **2026–2030** | Establishment of the National Knowledge Hub; 5,000 professionals trained. | 100% of public training institutions offer green building modules. |
| **2030–2035** | Integration of roadmap content into university curricula; national certification program launched. | 10,000 certified low-carbon design professionals. |
| **2035–2040** | Continuous professional development institutionalized; real-time learning via the Knowledge Hub. | National training coverage reaches 80% of sector professionals. |

*Table 10-5: Capacity building & knowledge systems timeline*

**Source: GBPN (2025).**

## F. Finance, Innovation, and Market Transformation

| Timeframe | Milestones | Targets / Indicators |
|---|---|---|
| **2026–2030** | Establishment of a Green Building Financing Framework and incentive package. | 10 pilot projects financed under green criteria. |
| **2030–2035** | Development of national green bonds and climate risk disclosure guidelines. | 25% of construction financing is green-certified. |
| **2035–2040** | Integration with international carbon markets and private sector-led investment pipelines. | 50% of national construction finance is classified as green; carbon credits traded internationally. |

*Table 10-6: Finance, innovation and market transformation timeline*

**Source: GBPN (2025).**

### 10.2.4 Cross-Sectoral Integration Targets

| Theme | 2030 Target | 2035 Target | 2040 Target |
|---|---|---|---|
| **Total GHG Reduction** | 25% below 2025 baseline | 50% below baseline | 70–75% below baseline |
| **Green Building Adoption** | 15% of new builds | 50% of new builds | 100% of new builds |
| **Retrofit Coverage** | 10% of existing stock | 25% of existing stock | 50% of existing stock |
| **County Participation** | 25 counties | 35 counties | 47 counties |
| **Research & Innovation Outputs** | 20 applied research projects | 50 projects | 100+ projects, 10 patents |
| **Public Awareness Reach** | 10M Kenyans engaged | 25M Kenyans engaged | Full national coverage |

*Table 10-7: Cross sectional integration targets*

**Source: GBPN (2025).**

This milestone framework converts Kenya's long-term vision into a structured, measurable pathway toward 2040. By integrating policy reform, innovation, financing, and human capacity, it ensures that the building and construction sector can deliver measurable emission reductions while driving inclusive economic growth. The roadmap's monitoring and adaptive learning mechanisms will ensure Kenya remains agile, ambitious, and aligned with the global 1.5°C ambition.

### 10.2.5 Monitoring and Adjustment

Progress against these milestones will be tracked through the National MRV Framework (Section 8), integrated with Kenya's National MRV+ system managed by the Climate Change Directorate. Annual reporting and mid-term reviews will allow recalibration of targets in line with evolving data, technology, and finance realities.

### 10.2.6 Alignment with Global Benchmarks

These milestones align with the Global ABC "Zero-Emission, Efficient and Resilient Buildings" pathway, particularly:

I. *Milestone 1 (by 2030):* All countries to have building decarbonisation roadmaps and operational policies.
II. *Milestone 2 (by 2035):* Major markets have adopted zero-carbon building standards and financing mechanisms.
II. *Milestone 3 (by 2040):* Majority of global building stock is zero-emission and resilient.

Kenya's targets, while context-specific, ensure that the country contributes meaningfully to the global decarbonisation trajectory, demonstrating leadership for sub-Saharan Africa.

## 10.3 Risks, Opportunities, and Mitigation Strategies

### 10.3.1 Introduction

The transition to a low-carbon, climate-resilient building and construction sector by 2040 presents both risks and opportunities. These stem from institutional, financial, technical, and socio-economic factors that can either accelerate or constrain Kenya's ability to achieve the targets outlined in the roadmap.

Understanding these dynamics and proactively designing mitigation and response mechanisms ensures that the roadmap remains adaptive, resilient, and inclusive throughout its implementation. This section outlines the major risks, identifies strategic opportunities, and proposes mitigation strategies to sustain progress and maximize co-benefits.

### 10.3.2 Risk Assessment Framework

The roadmap adopts a multi-dimensional risk framework consistent with the *Global ABC Roadmap Methodology* and the *World Bank Climate Action Enhancement Package (CAEP)*, categorizing risks into five major domains:

1. Policy and Institutional Risks
2. Technical and Data Risks
3. Financial and Market Risks
4. Social and Capacity Risks
5. Environmental and Physical Risks

Each risk category is evaluated in terms of its likelihood, impact, and mitigation mechanism, with responsibilities assigned across government, industry, and GBPN partners.

### 10.3.3 Key Risks and Mitigation Strategies

| Risk Category | Key Risks Identified | Mitigation Strategies | Lead Actors |
|---|---|---|---|
| **Policy and Institutional** | 1. Fragmented coordination between ministries and counties.<br>2. Delays in updating or enforcing building codes.<br>3. Overlapping mandates between regulatory bodies.<br>4. A lack of sub-national policy | 1. Strengthen inter-agency coordination through the National Inter-Ministerial Technical Committee (NITC).<br>2. Fast-track regulatory harmonization and digital permitting systems.<br>3. Embed roadmap indicators within NCCAP and county climate action plans.<br>4. Support Counties in developing sub-national legislation. | SDPW, CCD, CoG, NCA, AAK |
| **Technical and Data** | 1. Limited baseline data and local emission factors.<br>2. Inconsistent data collection at county level.<br>3. Inadequate MRV integration across ministries. | 1. Develop a unified data protocol via the *National Knowledge Hub*.<br>2. Conduct periodic data audits and build data capacity within counties.<br>3. Utilize SEforALL OBI and GBPN Carbon Metric Tools for consistency. | GBPN, CCD, SDPW, Counties |
| **Financial and Market** | 1. Limited access to affordable green finance.<br>2. Lack of fiscal incentives for low-carbon construction.<br>3. High cost of new technologies and materials. | 1. Operationalize the *National Green Building Financing Framework*.<br>2. Introduce tax incentives and preferential lending.<br>3. Expand blended finance and PPP models with development partners. | MoF, SDPW, KAM, KBA, IFC |
| **Social and Capacity** | 1. Skills gaps among artisans, contractors, and local officials.<br>2. Limited awareness of low-carbon benefits.<br>3. Risk of excluding informal builders and SMEs. | 1. Expand *GBPN–AAK–TVETA Training Programs* and certification.<br>2. Localize training materials in Kiswahili and vernacular languages.<br>3. Promote inclusion of informal sector and women-led enterprises. | AAK, TVETA, NITA, GBPN, NCA |

| | | | |
|---|---|---|---|
| **Environmental and Physical** | 1. Climate-related disruptions (floods, droughts) affecting materials and construction.<br>2. Unsustainable material extraction practices. | 1. Integrate climate adaptation criteria into design and planning codes.<br>2. Encourage use of resilient, locally available materials.<br>3. Promote circular construction and waste reuse. | NEMA, MoE, KEFRI, KIRDI |

*Table 10-8: Key risks and migitation strategies*

**Source: GBPN (2025).**

### 10.3.4 Opportunities Emerging from the Roadmap

Despite these risks, the roadmap creates a transformational opportunity space across economic, social, and environmental dimensions.

| Opportunity Area | Description | Potential Impact |
|---|---|---|
| Green Jobs and Skills | Development of new jobs in material innovation, retrofitting, digital permitting, and carbon accounting. | Over 300,000 green jobs by 2040, aligned with Vision 2030's employment goals. |
| Innovation and Research | Strengthened linkages between academia, industry, and government under the roadmap's research framework (Section 9.3). | Continuous pipeline of low-carbon innovations and technologies. |
| Finance and Investment | Emergence of new markets for green bonds, climate funds, and carbon credits. | Attraction of blended finance and FDI into Kenya's green building sector. |
| Data and Digital Transformation | Expansion of the *National Knowledge Hub* and MRV systems into interoperable platforms. | Improved transparency, efficiency, and evidence-based decision-making. |
| Regional Leadership | Kenya's roadmap serves as a model for sub-Saharan Africa under the *Buildings Breakthrough Agenda*. | Enhanced geopolitical influence and knowledge export potential. |

*Table 10-9: Opportunities arising from Roadmap*

**Source: GBPN (2025).**

These opportunities reinforce the value of the roadmap as both a climate action and development strategy, positioning the building sector as a driver of sustainable industrialization.

### 10.3.5 Adaptive Management and Resilience Building

The roadmap will employ an adaptive management model that enables continuous learning and adjustment based on monitoring outcomes, stakeholder feedback, and evolving global standards.

Key adaptive measures include:

1. **Annual risk and progress reviews** through the National Inter-Ministerial Technical Committee (NITC).
2. **Integration of MRV feedback loops** (*Section 8.4*) for early identification of implementation gaps.
3. **Periodic stakeholder consultations** through working groups to re-prioritize actions.
4. **Scenario analysis and foresight exercises** every five years to adjust to market, political and climate shifts.

This dynamic approach ensures that Kenya's decarbonisation trajectory remains flexible, resilient, and forward-looking.

Kenya's risk and mitigation framework aligns with global models while at the same time distinguishing itself through its bottom-up, sector-driven structure, ensuring that local and county-level risks are identified and managed where they occur.

By identifying and addressing risks early, Kenya ensures that the path to 2040 remains both ambitious and achievable. The roadmap's emphasis on institutional coordination, capacity development, digital integration, and adaptive learning positions the country to not only manage challenges but to convert them into innovation and investment opportunities.

Ultimately, this dual focus on risk management and opportunity creation cements Kenya's position as a regional frontrunner in resilient, low-carbon development, where the building sector becomes a catalyst for inclusive growth and climate leadership.

## 10.4 Call to Action

### 10.4.1 Introduction

The Kenya Buildings and Construction Decarbonisation Roadmap (2026–2040) represents more than a policy instrument, it is a national commitment to building differently, building responsibly, and building for the future. It captures Kenya's determination to align economic growth with environmental stewardship, and to demonstrate that development and decarbonisation can progress hand in hand.

This roadmap is both a destination and a journey. It is a living framework built by Kenya's industry, for Kenya's industry, and informed by global science and local experience. Now, as the country moves from planning to implementation, every stakeholder (public, private, academic, and community) has a role to play.

### 10.4.2 A Collective National Effort

Delivering on the vision of a net-zero, resilient building sector by 2040 requires coordinated and sustained effort. The government's leadership has set the foundation; the next chapter depends on action from every corner of the ecosystem.

1. **Government and Regulators:** Embed the roadmap within policy, planning, and procurement frameworks. Enforce standards, harmonize data systems, and channel climate finance toward implementation.
2. **Counties and Subnational Actors:** Localize and operationalize the roadmap, integrating low-carbon practices into county plans, permits, and public buildings.
3. **Industry and Professionals:** Lead innovation in design, materials, and construction. Adopt the standards, demonstrate new models, and mentor the next generation of green practitioners.
4. **Financial Institutions and Investors:** Align capital flows with the green transition. De-risk innovation, and prioritize projects that deliver climate and social returns.
5. **Academia and Researchers:** Continue to generate knowledge, monitor progress, and develop technologies that make decarbonisation practical and affordable.
6. **Communities and Citizens:** Demand better buildings (comfortable, efficient, and affordable) and participate in shaping a sustainable built environment.

Kenya's building transition is not a single agency's mandate, but a national movement powered by partnership, innovation, and accountability.

### 10.4.3 A Message to Our Partners and the Global Community

Kenya's approach, **bottom-up, inclusive, and sector-driven,** demonstrates that global climate ambition can be localized effectively and equitably. The country's leadership in co-chairing the International Coalition for Buildings and Construction (ICBC) and its alignment with the Buildings Breakthrough Agenda offer a platform for Africa's voice in shaping the global transition.

To our international partners and development allies:

- Join us in scaling our Knowledge Hub as a regional platform for Africa.
- Support our pilot projects and capacity-building programs to accelerate tangible impact.
- Collaborate in developing new finance models and data tools that make decarbonisation viable for emerging markets.

Kenya's journey can catalyze a broader continental transformation where African cities lead in resilience, innovation, and sustainable growth.

### 10.4.4 Turning Commitment into Impact

This roadmap provides a clear path from ambition to implementation, outlining what must be done, by whom, and by when. But success will depend on commitment, consistency, and coordination, the three pillars of transformative action.

The next five years (2026–2030) are crucial:

- To prove that low-carbon building is practical and scalable.
- To establish the systems and skills that make sustainable construction the new norm.
- To inspire confidence, among citizens, investors, and international partners, that Kenya's building sector is ready for the 2040 horizon.

### 10.4.5 Vision for 2040

By 2040, Kenya envisions a building sector that:

- Meets net-zero carbon targets across all new construction and major retrofits.
- Delivers healthy, affordable, and climate-resilient spaces for all citizens.
- Drives innovation and green industrialization, creating jobs and opportunities in a circular economy.
- Inspires Africa and the world by proving that sustainable building transformation is both achievable and beneficial.

This vision is within reach if the momentum built through this roadmap continues with the same collaboration, conviction, and creativity that shaped its development.

### 10.4.6 Closing Reflection

The buildings we design today will define how we live tomorrow. Through this roadmap, Kenya has chosen to design a future that is sustainable, just, and resilient and that balances growth with responsibility, and innovation with inclusion. Let this document not be the end of a process, but the beginning of a national transformation. Together, we can build a Kenya (and an Africa) that stands as a beacon of climate leadership.

# ANNEXES

## A.1 List of Stakeholders and Working Group Members

### A.1.1 Stakeholder consultation Summary:

#### LIST OF NAMES
#### CO-LEADS (past & present)

1. Arch. Mambo Matola
2. Wangui Mwangi
3. Jacquiline Kairu
4. Rita Gicheru
5. Sylvia Essendi
6. Lilian Kilatya
7. Michael Mathenge
8. Joan Watetu
9. Linda Njani
10. SueEllen Mumbi
11. Boniface Abudho
12. Ann Awino
13. Carl Otwak
14. Francis Mwangi
15. Zani Gichuki
16. Ben Makaa

#### JEDI CONSULTANT

1. Rosa Kihara

#### WORKING GROUP PARTICIPANTS

1. Alex Otieno
2. Amana Myrtle
3. Amrish Shah
4. Angela Mwanza
5. Annabel Nyole
6. Anne Kiburi
7. Anyango Makanyango
8. Ayon Clementina
9. Belinda O
10. Benson Ogayo
11. Beverlyne Sambay
12. Biobuild Collective
13. Boniface Abudho
14. Brendah Nyawara
15. Caroline Ray
16. Cheboi
17. Christine Muchuku
18. Cynthia Nafula
19. David Gatimu
20. Davis Kathia
21. Dennis Murimi
22. Diana Masika
23. Dennis Njue
24. Dr. Cecilia Wandiga
25. Dr. Joseph Mwiti Marangu
26. Dr. Juliet Moso
27. Dr. Mark Kenyatta
28. Elosy Kathambi
29. Geofrey Mwangi
30. Eric Muchunku
31. Esther Ishuga
32. Esther Nasenya Segero
33. Etta Madete
34. Faith Brendah Njeru
35. Felix Odhiambo
36. Fidelis Sakwa
37. Florence Nyole
38. George Abuto
39. George Arabbu
40. Georgina Wachuka
41. Gideon Olawo
42. Grace Wambui Kamau
43. Henry Nyakundi
44. Irene Musyoka
45. Jacob Olonde
46. Jacob Mwangi
47. Januaries Ngumbau Maitha
48. Jesse Magal
49. Joel Cenas
50. John Kabuye
51. John Munene Mutua
52. John Nduru
53. Kedogo Joseph
54. Kennedy Matheka

55. Kimani John
56. Konish Naidu
57. Larry Siboe
58. Lilian Mwangi
59. Lillian Beauttah
60. Linda Njani
61. Louis Kariuki
62. Mark Omuok
63. Maryam Wangeshi
64. Maryanne Wanjiku
65. Mary Ngaruiya
66. Maxwell Mudaki Kavai
67. Mercy Ateka
68. Mercy Kirema
69. Michelle Ouma
70. Millicent Adhiambo
71. Mugure Njendu
72. Mumbua Musyimi
73. Mwongera Murungi
74. Nasra Nanda
75. Nduma Bonface
76. Nelly Mutave
77. Nicholas Waruhiu
78. Nickson Otieno
79. Nilesh Mehta
80. Nyabuto Andrew
81. Olivanta Mwenda
82. Patience Mutisya
83. Patricia Gatere
84. Patrick Mwangi
85. Paul Elungat
86. Peter Ombalo
87. Phanice Mokeira Ombati
88. Rabuto Jared
89. Rehema Kabare
90. Rita Gicheru
91. Rosemary Litunya
92. Roy Githaiga
93. Samwel Kiprop
94. Sheila Chepngeno
95. Sheila Tanui
96. Sophia Nthuku
97. Stacy Kabi
98. Stephen Masila Muia
99. Sylvester Muthoka
100. Teresia Mnene
101. Teresia Nyokabi
102. Valerie Irungu
103. Wallace Kiragu

## LIST OF ORGANIZATIONS

1. Acorn Holdings Africa
2. Architectural Association of Kenya (AAK)
3. ARUP
4. Association of Construction Managers of Kenya (ACMK)
5. Biobuild Collective
6. Centre for Science and Technology Innovations (CSTI) - UNESCO Associated environmental research institute
7. Dedan Kimathi University of Technology (DKUT)
8. Energy and Petroleum Regulatory Authority (EPRA)
9. Financial Sector Deepening (FSD)
10. Institute of Engineers of Kenya (IEK)
11. Institute Of Quantity Surveyors Of Kenya (IQSK)
12. Institute of Surveyors of Kenya (ISK)
13. Jommo Kenyatta University of Agriculture and Technology (JKUAT)
14. Kenya Association of Manufacturers (KAM)
15. Kenya Green Building Society (KGBS)

16. Kenya Property Developers Association (KPDA)
17. Kilimani Community Foundation (KCF)
18. Meru University of Science and Technology (MUST)
19. Ministry Of Energy And Petroleum
20. Ministry of Lands, Public Works, Housing and Urban Development
21. National Buildings Inspectorate (NBI)
22. National Construction Authority (NCA)
23. National Housing Corporation (NHC)
24. Niko Green
25. Reall
26. Rickfes Construction
27. Shack Dwellers International (SDI)
28. State Department of Public Works
29. Sustainable Energy for All (SEforAll)
30. United Nations Environmental Programme (UNEP)
31. United Nations Office for Project Services (UNOPS)
32. University of Nairobi (UoN)
33. Women in Real Estate (WIRE)
34. World Resources Institute (WRI)

### A.1.2 Expert Review Panel:

1. Arch. S.K.Muli, Board of Registered Architects and Quantity Surveyors (BORAQS).
2. QS. Kithinji Nyagah, Nyagah B Kithinji & Co Advocates.
3. Mr. Gikonyo Gitonga, Axis Real Estate Limited.
4. Prof. Paul Maringa, Jomo Kenyatta University of Agriculture and Technology.
5. Dr. Cecilia Wandiga, Center for Science and Technology Innovations (CSTI).
6. Ms. Stella Mutai, HFC Kenya.
7. Ms. Caroline Karugu, Spencer West LLP.

## A.2 Technical Notes and Data Tables

### A.2.1 Tier 1 national emissions estimate covering all building categories

| Category | Floor Area (million $m^2$) | Energy Use ($kWh/m^2 \cdot yr$) | Energy Use (GWh/yr) | Emission Factor (kg $CO_2$/kWh) | $CO_2$ Emissions (Mt/yr) |
|---|---|---|---|---|---|
| Residential | 480 (a) | 45 (b) | 21,600 | 0.233 (c)[2] | 5.03 |
| Commercial & Public | 50 (d) | 100 (e) | 5,000 | 0.233 | 1.17 |
| Institutional / Institutional | 20 (d) | 80 (e) | 1,600 | 0.233 | 0.37 |
| Total Operational | 550 | — | 28,200 | — | 6.57 |
| Embodied Carbon | — | — | — | 370 $kg/m^2$ (f) | 3.45 Mt/yr[1] |

*Table A-1: National emissions estimates across building categories*

**Source: GBPN (2025).**

### Notes:

a. Residential floor area estimated from KNBS and UN-Habitat data on housing stock and average size.
b. Average energy use aligned with IEA proxy data and national electricity use patterns.
c. Kenya's grid emission factor from IEA/Kenya statistics.
d. Building stock distribution in non-residential categories based on KNBS and EPRA data.
e. Energy use intensity proxies from regional case studies and global GBPN/UNEP benchmarks.

Embodied carbon factor reflects global averages adjusted for Kenya, as per UNEP SBCI guidance

[1] Embodied $CO_2$ estimated as 370 kg/m$^2$ × 50 million m$^2$ new build stock per annum.

[2] Emission factor estimated as 0.233 kg$CO_2$ /kWh by adjusting for 25% T&D losses on the CDM approved Grid Emission Factor for Kenya of 0.317 kg $CO_2$/kWh

i.e. 0.317 kg $CO_2$/kWh × (1 – 0.25) ≈ 0.238 kg $CO_2$/kWh adjusted to 0.233 kg$CO_2$ /kWh for uncertainties.

## A.2.2 Projected Emissions (Unmitigated) to 2030

| Year | Operational Emissions (Mt$CO_2$) | Embodied Emissions (Mt$CO_2$) | Total Emissions (Mt$CO_2$) |
|---|---|---|---|
| **2023** | 6.6 | 3.4 | **10.0** |
| **2024** | 6.8 | 3.5 | **10.3** |
| **2025** | 7.0 | 3.6 | **10.6** |
| **2026** | 7.2 | 3.7 | **10.9** |
| **2027** | 7.4 | 3.8 | **11.2** |
| **2028** | 7.6 | 3.9 | **11.5** |
| **2029** | 7.8 | 4.0 | **11.8** |
| **2030** | 8.0 | 4.1 | **12.1** |

*Table A-2: Projected unmitigated emissions to 2030.*

**Source: GBPN (2025).**

### Assumptions and Projections:

**1. Estimated Building Stock Growth**

a. Annual urbanization rate: ~4.4%
b.. Estimated annual growth in total building stock: ~3%
(slightly lower due to rural areas and informal settlements)

**2. Estimate Energy Demand Growth**

a. EUI remains unchanged (no significant energy efficiency improvements)
b. Grid decarbonization assumed flat (no major clean energy uptake)
c. Increased appliance use, especially in urban and middle-income housing
d. Biomass dependency remains high in informal and rural sectors
e. Therefore, operational emissions expected to grow ~3% per year

**3. Construction Activity and Embodied Emissions**

a. New floor area added continues to rise (~50–55 million $m^2$/year)
b. Construction materials remain carbon-intensive (cement, steel)
c. Little to no uptake of low-carbon materials or lifecycle interventions
d. Embodied emissions assumed to grow ~2.5% annually

### A.2.3 Tier 2 Kenya-Specific Emissions Estimate (Semi-Disaggregated)

| Subsector | Assumptions/Inputs | Estimated Emissions ($MtCO_2$/year) |
|---|---|---|
| **Urban informal housing** | Lower energy use (~20 kWh/$m^2$), high use of charcoal/ firewood → higher emissions per useful kWh | **~1.4** |
| **Urban formal housing** | Grid-connected, mid-income; use mix of LPG/ electricity; higher energy use intensity | **~3.3** |
| **Rural residential** | Lower access to electricity; mostly biomass → captured indirectly in informal total | **Included above** |
| **Commercial buildings** | Offices, malls, hotels; EUI from stakeholder estimates ~110–130 kWh/$m^2$; heavy AC/light loads | **~1.3** |
| **Public / Institutional buildings** | Schools, health facilities, offices (often low efficiency); stakeholders report low maintenance, aging stock | **~0.5** |
| **Construction materials** | Estimated 50 million $m^2$ new construction/year × 370 $kgCO_2/m^2$ (Carbon Metric Tool) | **~3.45** |
| **Other indirect sources** | Transportation of materials, on-site equipment, off-grid diesel generation (unquantified) | **Not yet captured** |
| **Total** | | **~10.0** |

*Table A-3: Kenya-Specific Emissions (Semi-disaggregated)*

**Source: GBPN (2025).**

### A.2.4 Tier 3: Building Performance Metrics Summary (1D-Institutional)

| Metric Description | Value |
|---|---|
| Energy Use per $m^2$ (electricity + fuel) | 1.4 kWh/$m^2$ |
| Average Energy Use per $m^2$ (for building type) | 1.4 kWh/$m^2$ |
| Energy Use per Occupant (electricity + fuel) | 15.64 kWh/person |
| Average Energy Use per Occupant (for building type) | 15.64 kWh/person |
| GHG Emissions per $m^2$ (electricity + fuel) | 1.4 $kgCO_2e/m^2$ |
| Average GHG Emissions per $m^2$ (for building type) | 1.4 $kgCO_2e/m^2$ |
| GHG Emissions per Occupant (electricity + fuel) | 15.64 $kgCO_2e$/person |
| Average GHG Emissions per Occupant (for building type) | 15.64 $kgCO_2e$/person |

*Table A-3: Building Performance Metric Summary for example institutional building*

**Source: GBPN (2025).**

### Interpretation

This Tier 3 building seems to perform exactly in line with the building type average for energy use and emissions. However, the values are very low compared to typical benchmarks, which suggests this may be a:

1. Low-energy building (or)
2. Modelled using idealized or minimal input data

For reference, typical institutional buildings in Kenya use:

1. 80–250 kWh/$m^2$/year (electricity + fuel)
2. Emissions range: 20–80 $kgCO_2e/m^2$ depending on grid mix and efficiency

### A.2.5 Reasonable Benchmark Range for Institutional Buildings in Kenya

| Building Type | Typical Range (kWh/$m^2$/year) | Notes |
|---|---|---|
| **Schools** | **30–90** | Lower usage, daylighting; boarding schools higher |
| **Universities** | **80–150** | Labs, ICT, and lighting contribute to higher loads |
| **Health Facilities** | **100–250** | Medical equipment and HVAC increase energy demands |
| **Offices (Public)** | **100–180** | Lighting and air conditioning dominate loads |

*Table A-5: Benchmark range for institutional buildings*

**Source: GBPN (2025).**

## A.3 Emission Factors and Calculations

### A.3.1 Emission factors

- Embodied $CO_2$ estimated as 370 kg/$m^2$ × 50 million $m^2$ new build stock per annum.
- Emission factor estimated as 0.233 $kgCO_2$ /kWh by adjusting for 25% T&D losses on the CDM approved Grid Emission Factor for Kenya of 0.317 kg $CO_2$/kWh
- 0.317 kg $CO_2$/kWh × (1 – 0.25) ≈ 0.238 kg $CO_2$/kWh adjusted to 0.233 $kgCO_2$ /kWh for uncertainties.

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