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Developing An Integrated Model of Green Building Initiatives (GBI) in Malaysia: Issues and Challenges from Different Stakeholders Perspectives

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Abstract

Malaysia has advanced several policy and institutional initiatives to mainstream green buildings and low-carbon technologies. Despite a mature voluntary rating system Green Building Index (GBI) and national policy frameworks (National Green Technology Policy 2009; Green Technology Master Plan 2017–2030), the uptake of green building technologies remains uneven across developers, contractors, financiers, occupants, and government agencies. This systematic literature review synthesizes empirical and policy literature (2000–2024) to (i) identify barriers and enablers reported by different stakeholder groups; (ii) analyse how national policy has influenced adoption; and (iii) propose an integrated model to operationalize GBI uptake across Malaysia. Key barriers include cost and financing bottlenecks, limited technical capacity and supply-chain constraints, weak enforcement and incentives, fragmented institutional responsibility, and low public awareness. The proposed integrated model combines (a) governance & policy instruments, (b) financing & incentives, (c) standards & certification alignment (GBI), (d) capacity building & supply chain development, (e) stakeholder engagement & public awareness, and (f) monitoring, data & continuous improvement. The review concludes with actionable policy recommendations and research directions to scale green building initiatives in Malaysia.

Keywords: Green Building Initiatives, Green Building Index (GBI), Malaysia, National Green Technology Policy, Barriers, Stakeholders, Integrated Model, Sustainable Construction

Introduction

Buildings are a core sector for climate mitigation and sustainable development because they consume large shares of energy and are responsible for a sizeable portion of Green House

Gas (GHG) emissions worldwide. Globally, the construction and operation of buildings (including material production, construction, operation, and maintenance) account for approximately 25–40 % of final energy use and a comparable portion of CO_2 emissions (Othman & Yusuf, 2016). In Malaysia, rapid urbanization, rising living standards, and a growing services sector have driven strong growth in electricity demand for residential and commercial buildings, which together consume more than half of electricity in the end-use sectors (Othman & Yusuf, 2016; Zainal Abidin et al., 2012). This underscores the potential for energy-efficiency and green-building measures to deliver both environmental and economic benefits.

Recognizing the sector's importance, Malaysia introduced a suite of national policies over the past two decades to mainstream green technologies and low-carbon practices in buildings. The National Green Technology Policy (NGTP, 2009) articulated green technology as a strategic driver of economic growth and environmental protection, defining priority thrusts and national targets to promote energy efficiency, cleaner production, renewable energy, and green services (Ministry of Energy, Green Technology & Water [Malaysia], 2009). Building on the NGTP, the Green Technology Master Plan (GTMP, 2017–2030) was introduced as an actionable roadmap to mainstream green technology across 16 priority sub-sectors with the built environment explicitly identified as a high-impact area for energy efficiency, resource-use reduction, and low-carbon solutions. The GTMP sets sectoral targets, suggests policy instruments (including regulatory measures, incentives, and capacity-building programmes), and highlights the role of public procurement in stimulating market demand for green technologies (Prime Minister's Office [Malaysia], 2017).

Complementing national policy, Malaysia hosts a domestic voluntary green rating tool: the Green Building Index (GBI), administered by the Malaysia Green Building Confederation (now Malaysia Green Building Council). Since its inception in the late 2000s, the GBI has established locally relevant assessment criteria including energy efficiency, indoor environmental quality, water efficiency, materials and resources, sustainable site planning, and innovation and a certification pathway for both design and operational performance. Despite these policy foundations and the presence of an indigenous certification system, academic and industry literature consistently report that uptake of GBI in Malaysia remains uneven and slower than intended. Key barriers identified across empirical studies and reviews include: (a) perceived high upfront capital costs and uncertain lifecycle returns for green measures; (b) limited availability of local supply chains and technical expertise for green materials and systems; (c) market-demand shortfalls and low tenant/owner willingness to pay premiums; fragmented institutional responsibilities and reliance on voluntary (rather than mandatory) interventions (existing policy reviews); and (e) data and monitoring gaps that obscure actual operational performance and undercut evidence-based policymaking. Much of the literature argues that the policy-to-practice gap is not due to the absence of policy ambition but rather a set of market, institutional, and behavioural frictions that impede large-scale mainstreaming.

Therefore, this paper aims to synthesize evidence through a systematic literature review that: (i) disaggregates barriers and enablers by stakeholder group (developers, contractors, designers/consultants, financiers, regulators, and occupants); (ii) situates the Malaysian policy architecture (NGTP and GTMP) and the role of GBI in shaping adoption dynamics; and (iii) proposes an integrated, evidence-based model to accelerate the mainstreaming of green-

building initiatives in Malaysia. The remainder of the paper follows systematic review procedures (search, screening, extraction, synthesis) and concludes with a multi-layered integrated model that aligns governance, finance, standards, capacity building, and monitoring as mutually reinforcing levers for scaling up GBI in Malaysia. The primary objective of this review is to systematically identify and analyse the major issues and challenges influencing the adoption of the GBI in Malaysia, with a particular emphasis on the varying perspectives and constraints experienced by different stakeholder groups, including developers, contractors, consultants, financiers, occupants, and regulatory authorities. In addition, the review seeks to critically evaluate the role and impact of key national policy instruments specifically the National Green Technology Policy (NGTP) 2009 and the Green Technology Master Plan (GTMP) 2017–2030 alongside voluntary standards such as the GBI, in shaping the uptake and effectiveness of green building practices. By synthesising insights from existing empirical and conceptual literature, this study aims to develop an evidence-based integrated model that addresses stakeholder-specific barriers, leverages enablers, and strengthens the implementation framework for GBI in Malaysia's built environment sector.

Methodology

This study adopted a Systematic Literature Review (SLR) approach, following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework to ensure methodological transparency and replicability (Moher et al., 2009). A comprehensive search strategy was employed to identify scholarly and policy-based evidence related to green building adoption in Malaysia, with a focus on the GBI, stakeholder-specific barriers and enablers, and the role of national policy instruments such as the National Green Technology Policy (NGTP, 2009) and the Green Technology Master Plan (GTMP, 2017–2030). Searches were conducted across multidisciplinary academic databases including Scopus, Web of Science, and Google Scholar, supplemented with grey literature sourced from ResearchGate, official government portals (e.g., Ministry of Energy, Science, Technology, Environment and Climate Change [MESTECC]), and agency repositories such as the Malaysian Green Technology and Climate Change Centre (MGTC). The search terms combined keywords and Boolean operators, such as "green building Malaysia", "Green Building Index", "green technology policy Malaysia", "barriers green building Malaysia", "stakeholders green building", and related permutations, to ensure a wide retrieval of relevant literature (Darko & Chan, 2016; Saidur et al., 2012).

Inclusion criteria encompassed peer-reviewed journal articles, government policy documents, conference proceedings, industry reports, and high-quality technical publications from the year 2000 to 2024 that explicitly addressed Malaysia's green building context, either solely or within a comparative regional framework (Haron et al., 2022; Zainul Abidin, 2010). Exclusion criteria were applied to eliminate non-English documents without accessible abstracts, opinion pieces lacking empirical evidence, and publications without credible citations. The review process involved three main stages: (i) identification, where all retrieved records were compiled; (ii) screening, where duplicates and irrelevant titles/abstracts were removed; and (iii) eligibility assessment, where the full text of potentially relevant documents was assessed against the inclusion criteria (Tranfield et al., 2003). The final inclusion stage yielded 78 key sources. Data extraction involved coding each source for primary stakeholder focus (e.g., developers, contractors, consultants, financiers, occupants, regulators), identified barriers and enablers, methodological approach, and core recommendations. Thematic

synthesis was conducted to integrate findings across studies, with cross-referencing of empirical evidence against Malaysian policy frameworks (NGTP, 2009; GTMP, 2017–2030). This triangulated process enabled the identification of recurring challenges and potential solutions for GBI adoption in Malaysia. A PRISMA flow diagram and detailed data extraction table were developed for supplementary presentation to enhance transparency and reproducibility.

Malaysian National Policy & Institutional Context for GBI

National Green Technology Policy (NGTP, 2009)

The National Green Technology Policy (NGTP, 2009) is Malaysia's foundational instrument for promoting green technology as a strategic driver of economic development, environmental preservation, and overall societal well-being. The policy defines "green technology" as products, equipment, and systems designed to conserve the natural environment and minimize negative human impacts (ADB's Law & Policy Reform Program, n.d.; Climate-Laws.org, 2009). It is built upon four key pillars (Energy, Environment, Economy, and Social) with the following objectives: minimizing energy consumption growth while enhancing development, fostering the green technology industry, building national innovation capacity, ensuring sustainable development, and enhancing public awareness (ADB's Law & Policy Reform Program; Climate-Laws.org, 2009).

Green Technology Master Plan (GTMP, 2017–2030)

To operationalize NGTP targets, the Green Technology Master Plan (GTMP, 2017–2030) provides a roadmap to mainstream green technology across key sectors, particularly energy and buildings (Green Quarter, 2018). GTMP outlines specific actions, such as reducing energy use in government buildings by 5% in Kuala Lumpur by 2020, promotes a green building rating scheme, and addresses critical challenges such as high technology costs, absent regulatory drivers in building energy codes, inadequate sustainability standards for materials, and skill shortages in construction (Green Quarter, 2018). The plan also encourages standardizing audit tools, waste reduction on-site, and increasing the use of recycled materials in construction.

Green Building Index (GBI) and Industry Initiatives

Launched in January 2009, the Green Building Index (GBI) is Malaysia's native voluntary certification system for sustainable buildings, tailored for the tropical context. Developed by the Malaysian Green Building Confederation (now Council), GBI was modeled on international systems such as BREEAM and LEED but adapted for local environmental conditions (ResearchGate, 2013). It evaluates buildings across categories like energy efficiency, indoor environmental quality, sustainable site planning, resource use, and innovation, and supports certification through training and project assessment services.

Issues and Challenges (by Stakeholder Groups)

This section synthesizes key barriers and frictions identified in the literature and industry reports on Green Building Index (GBI) adoption in Malaysia. Across multiple stakeholder groups such as developers and owners, contractors and suppliers, designers and consultants, financiers, regulators, and occupants recurring challenges include high upfront costs, limited technical capacity, fragmented institutions, weak incentives, and deficient awareness, all of which hinder meaningful uptake of green building initiatives.

Developers & Owners

Developers and building owners frequently cite high upfront capital costs and uncertain returns on investment as major deterrents to adopting green building technologies (Samari et al., 2013). The long payback periods and premium pricing associated with green materials or systems make the business case less attractive, especially in contexts where energy prices remain moderate or tenants are unwilling to pay extra for sustainability features (Samari et al., 2013; Lim et al., 2018). The perceived financial risk thus dissipates motivation to invest in GBI-compliant construction.

Contractors & Suppliers

Contractors and suppliers face their own set of obstacles, notably a lack of technical capacity, local expertise, and supply infrastructure for green building solutions. Studies show that many contractors are unfamiliar with appropriate green materials or specialized construction techniques, and there is a dearth of domestic industries producing certified green products (Jaffar, 2022; Bond University, n.d.). This combination of skills deficit and supply risk reduces the feasibility and confidence in implementing green building projects.

Designers & Consultants

Effective green building design depends on cohesive early-stage collaboration among architects, mechanical-electrical-plumbing (MEP) engineers, and sustainability consultants. However, fragmentation in the construction delivery process frequently undermines integrated design efforts, leading to suboptimal outcomes (Witpress, 2011). Without streamlined workflows and shared understanding among professionals, the potential of green building designs cannot be fully realized.

Financial Sector (Banks & Investors)

Despite overall growth in green finance, the Malaysian financial sector still lacks tailored products and risk-sharing instruments that support green building investment. Conventional lending frameworks often view green projects as speculative due to perceived technology and performance uncertainties, and green bonds or dedicated green loan products tied directly to GBI certification remain underdeveloped (MIDA, 2024).

Regulators & Government Agencies

Malaysia's national policies NGTP (2009) and GTMP (2017–2030) lay a strategic foundation for green building mainstreaming. However, implementation remains fragmented across ministries and state authorities, and many GBI-related interventions remain voluntary (Witpress, 2011). This institutional fragmentation, compounded by limited enforcement mechanisms and inconsistent regulatory coordination, undermines the systemic uptake of green building practices.

Occupants & Users

End-users and building occupants are often unaware of the benefits of green buildings, and their behavior can negate even well-designed sustainability measures (Jaffar, 2022). Public awareness campaigns remain limited in scope and reach, reducing market demand for green buildings and minimizing stakeholder pressure for developers to adopt GBI features.

Cross-Cutting Challenges

Certain issues cut across all stakeholder groups. Low building performance data and weak monitoring systems hinder rigorous post-occupancy evaluation, which in turn limits performance transparency and evidence-based policymaking (Witpress, 2011). Additionally, split incentives where developers bear high upfront costs but tenants reap efficiency benefits along with short investment horizons, are systemic misalignments that curb long-term green building investments.

Findings from the Review

The systematic literature review revealed six broad thematic findings that capture the current landscape, challenges, and opportunities for Green Building Initiatives (GBI) in Malaysia. Firstly, while strong policy foundations exist, significant operational gaps remain. The National Green Technology Policy (NGTP, 2009) and the Green Technology Master Plan (GTMP, 2017–2030) provide a comprehensive strategic roadmap with clear priority actions targeting energy efficiency and sustainability across sectors, including buildings (Prime Minister's Office of Malaysia, 2017; ppj.gov.my, 2009). However, many of these policy measures depend heavily on voluntary compliance and suffer from uneven institutional implementation across federal and state agencies. This fragmented governance structure dilutes policy effectiveness, creating inconsistencies in the enforcement and adoption of green technologies at the building sector level (Prime Minister's Office of Malaysia, 2017).

Secondly, the Green Building Index (GBI) serves as Malaysia's locally developed voluntary certification framework and remains the central mechanism to encourage sustainable building practices. Despite its relevance and comprehensive evaluation criteria—including energy efficiency, indoor environmental quality, water efficiency, and sustainable site planning—GBI uptake continues to be constrained by factors such as perceived high costs, limited stakeholder awareness, and weak enforcement mechanisms (Green Building Index, 2024). Consequently, certification tends to occur on a project-by-project basis rather than becoming a mainstream industry standard, limiting its transformative impact on the construction market (Green Building Index, 2024). Thirdly, the review confirms that stakeholder-specific barriers persist consistently across studies. Developers emphasize high upfront costs and uncertain market demand for green-certified buildings, which weakens their motivation to adopt GBI (Samari et al., 2013). Contractors point to limited technical capacity and supply chain issues, including a lack of trained professionals and access to certified green materials (Jaffar, 2022). Financial institutions remain cautious due to perceived risks and the scarcity of dedicated green financing products, such as green loans or bonds linked to building certifications (MIDA, 2024). Occupants and end-users demonstrate low awareness and understanding of the benefits of green buildings, which reduces demand-driven incentives for developers and investors (Lim et al., 2018).

Fourth, capacity building and supply chain development emerge as critical enablers for broader GBI adoption. Numerous studies highlight the need for structured training programs, accredited professional certification, and continuous professional development (CPD) to equip designers, contractors, and facility managers with the necessary skills to implement green technologies effectively. Simultaneously, boosting local production and availability of green building materials is essential to reduce cost premiums and supply risks (Witpress, 2011). Fifth, financing and incentive mechanisms play a pivotal role in overcoming economic

barriers. Evidence suggests that blended finance models combining public and private capital—along with tax incentives, expedited building approvals, and green loans or bonds, significantly facilitate green building projects when deployed (DFDL, n.d.; MIDA, 2024). However, such financial instruments are still nascent in Malaysia and require scaling to catalyze widespread adoption.

Finally, monitoring and data collection remain weak yet essential components for sustained progress. The absence of robust post-occupancy evaluation data on energy and water performance hampers the ability to validate green building benefits, refine policies, and send credible market signals to stakeholders. Establishing national databases and mandatory reporting frameworks would improve transparency and enable evidence-based policymaking and financing decisions (Witpress, 2011; Prime Minister's Office of Malaysia, 2017).

Findings

The Malaysian experience with GBI epitomizes a classic policy-to-practice gap, where robust national policy frameworks coexist with an indigenous certification system yet fail to achieve widespread scaling of sustainable building practices. This disparity is primarily rooted in complex economic, institutional, and behavioral barriers that constrain effective implementation on the ground (Prime Minister's Office of Malaysia, 2017). From an institutional theory perspective, this phenomenon can be understood through the concept of path dependency, where entrenched traditional construction practices and procurement norms persist despite policy directives advocating change (North, 1990; Scott, 2014). In Malaysia, prevailing industry routines favor conventional methods due to perceived risks, cost concerns, and limited familiarity with green building technologies. Contractors' risk aversion and developers' short-term investment horizons reinforce these path-dependent behaviors, limiting innovation adoption and slowing sector-wide transformation (Zahari et al., 2019). New institutionalist theory further underscores the significance of social norms and institutional arrangements in shaping actor behavior, emphasizing that alignment across government agencies, financial institutions, and market players is essential to overcome fragmentation and inertia (Powell & DiMaggio, 1991).

Moreover, the literature highlights that isolated, ad-hoc project-level interventions such as singular incentives or voluntary certification schemes are insufficient to drive systemic change (Kibert, 2016; Ramesh et al., 2012). Comparative international evidence from countries with successful green building mainstreaming reveals that a combination of regulatory baselines, such as mandatory minimum performance standards, alongside market incentives, capacity-building programs, and comprehensive data and monitoring frameworks is crucial (IEA, 2020; U.S. Green Building Council, 2019). For instance, in Singapore and South Korea, mandatory energy efficiency codes coupled with subsidies and green financing have effectively increased green building adoption rates (Lee & Yik, 2018; Choi & Lee, 2020).

In Malaysia, while the Green Technology Master Plan (GTMP, 2017–2030) and National Green Technology Policy (NGTP, 2009) establish a solid policy foundation, the missing elements lie in integrated implementation mechanisms. The current reliance on voluntary compliance through the GBI lacks the enforcement and incentivization needed to achieve market-wide transformation (Prime Minister's Office of Malaysia, 2017). There is also a critical need for long-term financing instruments that reduce investment risks and promote green

technologies, as well as enforceable minimum performance standards that complement voluntary certifications to set a regulatory baseline for all new developments (ScienceDirect, 2023). Without these systemic supports, green building adoption risks remaining confined to niche projects rather than becoming the norm across Malaysia's built environment.

Therefore, bridging this policy-to-practice divide requires a holistic approach combining policy coherence, institutional alignment, robust financial mechanisms, and behavioural change interventions to create an enabling ecosystem for sustainable buildings. Institutional reforms that clarify roles and responsibilities across ministries and local authorities, alongside mandatory standards and integrated incentives, are critical to overcoming the current fragmentation and scaling Malaysia's green building agenda effectively (Prime Minister's Office of Malaysia, 2017; Zahari et al., 2019).

Proposed Integrated Model of GBI for Malaysia

Based on the systematic literature review and synthesis of Malaysia's policy landscape, stakeholder challenges, and international best practices, an integrated, multi-layered model is proposed to accelerate Green Building Initiatives (GBI) adoption in Malaysia. This model adopts a modular approach emphasizing coordination across governance, market, technical, and social dimensions to address persistent barriers and create a synergistic framework conducive to scaling green buildings (Zahari et al., 2019; Prime Minister's Office of Malaysia, 2017).

Model Components (Core Modules)

Governance & Policy Alignment (Top Layer)

Effective governance is foundational for harmonizing efforts across federal and state levels, clarifying institutional responsibilities, and setting enforceable mandates. The model calls for reconciling national policies such as the National Green Technology Policy (NGTP, 2009) and Green Technology Master Plan (GTMP, 2017–2030) with localized regulations to reduce fragmentation and improve coordination among ministries and local authorities (Prime Minister's Office of Malaysia, 2017). A phased introduction of minimum building performance standards such as mandatory energy efficiency thresholds is recommended to establish a regulatory baseline while retaining the Green Building Index (GBI) as a voluntary market differentiator that rewards higher performance and innovation (Zahari et al., 2019; International Energy Agency [IEA], 2020).

Incentives & Financing (Enabling Layer)

Financial mechanisms are crucial to bridging the cost gap perceived by developers and investors. The model advocates the development of targeted green financial products, including green loans with subsidized interest rates, tax rebates for green building premiums, green bonds, and guarantee schemes to de-risk investments (Malaysian Investment Development Authority [MIDA], 2021; DFDL, 2020). Importantly, incentives should be performance-based and linked to verifiable post-occupancy outcomes such as energy and water savings to ensure accountability and continuous improvement (IEA, 2020).

Standards, Certification & Compliance (Implementation Layer)

The GBI criteria should be closely aligned with evolving national standards and mandatory building codes to ensure consistency and simplify compliance. Streamlined certification

pathways, especially for Small and Medium-Sized Enterprises (SMEs) and early adopters, alongside subsidies and technical support, can reduce barriers to certification (Green Building Index, 2023). Additionally, simplification of procedures and reduction of certification fees for public sector projects would enable government buildings to lead by example and stimulate market confidence (Prime Minister's Office of Malaysia, 2017).

Capacity Building & Supply Chain Development (Operational Layer)
Addressing technical capacity gaps requires national accreditation programs and continuous professional development (CPD) for key actors, including designers, contractors, and facility managers. Expanding local supply chains to manufacture and provide certified green materials and technologies can reduce cost premiums and improve accessibility (Zahari et al., 2019; ResearchGate, 2022).

Stakeholder Engagement & Market Demand (Social Layer)
Building occupant and tenant awareness is vital to complement technical measures. Targeted awareness campaigns and green leasing frameworks can mitigate split incentives between owners and users, encouraging demand for green-certified buildings (ScienceDirect, 2023). Demonstration projects and strategic use of public procurement policies mandating minimum GBI certification levels can further catalyze private sector uptake (Prime Minister's Office of Malaysia, 2017).

Monitoring, Data, & Continuous Improvement (Feedback Layer)
Robust monitoring systems are essential for evaluating building performance and refining policies. The model proposes mandatory baseline reporting and post-occupancy evaluation covering energy, water, and indoor environmental quality (IEQ) indicators. Establishing a national building performance database—preferably open-access—will support evidence-based policymaking, financing decisions, and market transparency (ScienceDirect, 2023).

Interaction of Model Components
These components interact dynamically. Governance structures set policy and regulatory frameworks enabling incentive programs. Financial incentives create the business case that motivates adoption, while capacity building reduces delivery risks and implementation costs. Certification ensures quality and market recognition, fostering stakeholder confidence. Engagement strategies stimulate demand and align occupant behavior, and monitoring creates a feedback loop to inform ongoing improvements in policy, finance, and practice (Powell & DiMaggio, 1991; Zahari et al., 2019).

Operational Steps (Recommended Short-Term Policy Actions)
To operationalize the model, the following priority actions are recommended: The government should announce phased mandatory minimum performance standards (e.g., energy intensity limits) for new commercial buildings, with clear timelines to allow market adjustment (Prime Minister's Office of Malaysia, 2017). A pilot green financing facility, structured as a public-private blended fund, should be launched to subsidize green premiums and offer loan guarantees supporting developers and retrofit projects (MIDA, 2021). Establish a national building performance registry requiring certified projects and eventually all large buildings to submit annual energy and water usage data, ensuring transparency and benchmarking (ScienceDirect, 2023). Launch a nationwide capacity building program aligned

with GBI continuing professional development standards to equip contractors, designers, and maintenance teams with requisite skills (Zahari et al., 2019). Utilize public procurement as a market lever by mandating minimum GBI certification levels (e.g., GBI Silver) for government buildings in phased implementation to demonstrate leadership and stimulate demand (Prime Minister's Office of Malaysia, 2017). The proposed model can be seen as follows (Table 7.1):

Table 7.1
Proposed Model

Conclusion

This article systematically reviews the adoption of the Green Building Index (GBI) in Malaysia, highlighting the country's strong policy foundations through the National Green Technology Policy (NGTP, 2009) and Green Technology Master Plan (GTMP, 2017–2030), alongside the voluntary GBI certification framework, yet reveals persistent gaps between policy ambition and practical implementation. Drawing on 78 key sources, it identifies stakeholder-specific challenges, including high upfront costs for developers, limited technical expertise and supply chain readiness among contractors, fragmented institutional responsibilities, inadequate green financing, and low occupant awareness. The findings underscore that while Malaysia has established a solid roadmap, weak enforcement, reliance on voluntary measures, and insufficient capacity-building hinder mainstream adoption. To address these issues, the paper proposes an integrated multi-layered model combining governance and policy alignment, green financing mechanisms, standards and compliance, capacity-building, stakeholder

engagement, and robust monitoring systems. The model emphasizes mandatory performance standards, tailored financial instruments, streamlined certification, professional training, demand stimulation, and transparent data reporting to bridge the policy-to-practice gap and accelerate GBI mainstreaming across Malaysia's built environment.

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