

# Vision 2030 for a Green Building Code in Pakistan



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## **Acknowledgement**

This study was prepared on behalf of the EU SWITCH-Asia Sustainable Consumption and Production Facility (SCP Facility), under the supervision of Cosima Stahr and Arab Hoballah, by green building expert Jawed Ali Khan with his team members Yasmin Jawed, Uzma Zain, Faiqa Aziz, Abdul Qayyum, Zain ul Abedin, Adnan Amin and Faiz-ul-Sibtain. It was further supported by Jessica Weir, Madeline Schneider, and Anton Barckhausen from Adelphi consult GmbH, and was revised by Arab Hoballah.

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# List of Abbreviations

<b>ABAD</b>	Association of Builders and Developers
<b>BIM</b>	Building Information Modelling
<b>C&amp;W</b>	Communication & Works Department
<b>CSR</b>	Corporate Social Responsibility
<b>EU</b>	European Union
<b>GB</b>	Green Building
<b>GBC</b>	Green Building Code
<b>GHG</b>	Greenhouse Gases
<b>GIS</b>	Geographic Information System
<b>HVACR</b>	Heating Ventilation Air Conditioning and Refrigeration
<b>IAP</b>	Institute of Architects Pakistan
<b>IEQ</b>	Indoor Environmental Quality
<b>LGRDD</b>	Local Government and Rural Development Department
<b>MoCC</b>	Ministry of Climate Change
<b>MoHW</b>	Ministry of Housing & Works
<b>MSMEs</b>	Micro-, Small- & Medium-sized Enterprises
<b>NAP</b>	National Action Plan
<b>NAP-SCP</b>	National Action Plan on Sustainable Consumption and Production
<b>NEECA</b>	National Energy Efficiency and Conservation Authority
<b>NESPAK</b>	National Engineering Services Pakistan
<b>NGOs</b>	Non-Governmental Organisations
<b>O&amp;M</b>	Operations & Maintenance
<b>P&amp;D</b>	Planning & Development
<b>PCATP</b>	Pakistan Council of Architects and Town Planners
<b>PEC</b>	Pakistan Engineering Council
<b>PGBC</b>	Pakistan Green Building Council
<b>PIID</b>	Pakistan Institute of Interior Designers
<b>R&amp;D</b>	Research & Development
<b>SDMA</b>	State Disaster Management Authority
<b>SCP</b>	Sustainable Consumption and Production
<b>SCPF</b>	Sustainable Consumption and Production Facility
<b>SDGs</b>	Sustainable Development Goals
<b>TEVTA</b>	Technical Education & Vocational Training Authority
<b>UN</b>	United Nations
<b>WSSP</b>	Water & Sanitation Service Peshawar

# Foreword



“Vision 2030 for a Green Building Code in Pakistan”, produced by the team of professionals led by Jawed Ali Khan, is a milestone document. It succinctly describes outcome of the research supported by the EU SWITCH-Asia SCP Facility since 2018. It very ably identifies the state of building construction and the brunt of inefficient use of country’s scarce natural resources like water, energy, building construction materials, environmental degradation and its cost on economy.

The “Vision” builds on the outcome of a long-ranging and in-depth process of consultations held with the key stakeholders. It provides insight on the integration of sustainable consumption and production patterns with a focus on achieving resource efficiency throughout the lifecycle of the building, including its construction process. It also emphasizes on the adoption of green building technologies and practices. This will remain a challenge in Pakistan as adequate support needs to be provided in creating an enabling environment. This is crucial for the needed transformation and adoption of green building practices by the construction industry.

This document will play a vital role in creating an increasing market demand for greener buildings and uptake of green building techniques and practices, focusing on the production and application of environmentally supportive construction materials and sustainable building elements. Such evolution towards greener and more responsible practices is necessary to transform building construction processes into advance expertise of green building and to promote the use of locally manufactured products that are nontoxic, reusable and recyclable.

I am sure, by virtue of the overarching canvas, highlighting role of diverse professionals and stakeholders in realizing the Vision 2030 for development and adoption of Green Building Code, will greatly benefit the policy makers, professional bodies and institutions, builders and developers towards greening the building construction sector in Pakistan, greatly contributing to its transition to zero carbon.

**Mr. Malik Amin Aslam**  
Advisor to the Prime Minister for Climate Change  
Government of Pakistan, Islamabad

# 1. Introduction

## 1.1 Context

The European Union (EU)-funded SWITCH-Asia programme was launched in 2007 to support sustainable consumption and production (SCP), and to promote inclusive sustainable growth while contributing to the economic prosperity and poverty reduction in Asia, including Central Asia. It also aims to support the development of a green economy and the transition towards a low-carbon, resource-efficient and circular economy. Since its inception, seven calls for proposals were successfully implemented from 2007 to 2017 (worth 280 million Euro). More than 100 projects were financed, and support was provided to over 400 Asian and European not-for-profit partners and approximately 100 private sector associates, benefiting up to 70,000 Asian micro-, small- and medium-sized enterprises (MSMEs). The second phase of SWITCH-Asia was launched in 2018 and the programme was extended to Central Asia. It thus now covers 24 countries (viz., Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka, Cambodia, China, Democratic People's Republic (DPR) Korea, Indonesia, Laos, Malaysia, Myanmar, Philippines, Thailand, Vietnam, Mongolia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan).

The SWITCH-Asia Sustainable Consumption and Production Facility (SCPF) aims at providing a platform to promote SCP policies and principles in Asia, and enhance the awareness and dialogue of local stakeholders on the theme. To achieve these goals, the SCPF fosters dynamic and evolving exchange through online and offline platforms with the intent to connect key experts, entities and stakeholders, who share an interest for impactful actions to further enable sustainable housing, a top priority for Asian countries, through relevant responsible consumption and production patterns. Such platforms should enable participants to discuss ideas and lessons learnt and consequently, to identify and develop joint actions. In this context, the assignment 'Promoting SCP implementation in Pakistan including around Pakistan's National Action Plan on SDG 12 ('Green Buildings Code')' aims to promote efficient resource use in the building sector of Pakistan by executing some of the aspects of Pakistan's National Action Plan on SDG 12, thereby contributing to the development and operationalisation of Pakistan's Green Building Code (GBC).

## 1.2 Objective

This culminating report specifically aims to **finalise the recommendations for the thematic scope, priorities, and related national actions for the implementation of the GBC in the context of a vision for a fully implemented Code in 2030**. It further summarises and integrates the gap analysis and recommendations from the stakeholder consultations and workshop carried out during the assignment, and presents the process and institutional set-up of a GBC in order to **better inform policy makers and administrators as well as other key stakeholders**.

## 1.3 Findings of the gap analysis

Considering the emerging trend of green interventions for new and existing buildings, the *Policy Guidelines for Green Building Code for Pakistan* were analysed to help support the development of a roadmap towards the successful implementation of a GBC. The analysis sought to identify current green building (GB) policy guidelines, as well as the key issues, gaps, challenges and opportunities to be faced in the design of the GBC. The points in Table 1 emerged during the review of the *Policy Guidelines*.

*Table 1: Analysis of the Policy Guidelines for a GBC for Pakistan: Major findings*

Key issues	Gaps	Challenges	Opportunities
<ul style="list-style-type: none"> <li>• There is currently an emphasis on energy and water efficiency.</li> <li>• Support from all stakeholder groups will be required for the development and subsequent adoption of a GBC.</li> <li>• The roadmap for the implementation of the code needs to provide a common platform for all stakeholders in the building sector for assessing the needs and the ways forward to formalising the code.</li> <li>• A GBC is presented as an all-encompassing global solution, which will replace the Pakistan Building Code; this is very ambitious.</li> <li>• A solid implementation plan and a long-term roadmap are required.</li> <li>• SCP principles need to be integrated into the GBC.</li> </ul>	<ul style="list-style-type: none"> <li>• Lack an integrated design process.</li> <li>• Do not include a proper reference to the existing national codes, already notified in Pakistan since 2009. Better integration of a GBC into the existing regulatory framework is important.</li> <li>• Climate zonation required to make the GBC applicable to the entire country is missing.</li> <li>• Historical climatic design data is becoming less representative of the future climate, which needs to be duly considered.</li> <li>• Do not address vernacular and passive architecture applications.</li> <li>• Do not address the need for research for advancing towards net zero carbon criteria.</li> <li>• Do not address integrating awareness of GB into formal education.</li> <li>• Do not mention the need for planning of greening of the existing building stock through retrofitting.</li> </ul>	<ul style="list-style-type: none"> <li>• The GB concept is still new for local markets. More effort is needed to develop its value in the market as well as in the community.</li> <li>• The public sector, especially, needs to be sensitised, and necessary amendments need to be included in building byelaws, regulations, standards, GB materials regulations and specifications, both for the public and private sectors.</li> <li>• Need to develop, simultaneously, handbooks and guidebooks for building practitioners.</li> <li>• Need to increase investment confidence.</li> </ul>	<ul style="list-style-type: none"> <li>• The prevailing construction practices based on conventional building methods need to be modernised.</li> <li>• A major transition towards adopting green building methods can be made through the transfer of technology from developed countries.</li> <li>• A GBC will support Pakistan in achieving the targets and goals of SDGs 3 (Good Health and Well Being), 6 (Clean Water and Sanitation), 7 (Affordable and Clean Energy), 8 (Decent Work and Economic Growth), 9 (Industry, Innovation and Infrastructure), 11 (Sustainable Cities and Communities), 13 (Climate Action), 15 (Life on Land), 17 (Partnerships to achieve the Goal), and especially SDG 12 (Responsible Consumption and Production).</li> <li>• A huge potential exists for GBs to support Pakistan’s environmental targets, including reduction in greenhouse gas (GHG) emissions.</li> <li>• The development of a GBC in Pakistan is vital for effective benchmarking of a green building construction industry in the country.</li> <li>• Public buildings offer a major opportunity for initiating pilot projects.</li> <li>• Selection and use of a base document.</li> </ul>

## 1.4 Findings of stakeholder engagement

Consultations in the form of stakeholder interviews carried out in the fall of 2020, and a multi-stakeholder workshop held in March 2021, revealed that the conventional construction practices in Pakistan are already undergoing somewhat of a paradigm shift due to exposure to green building construction technologies and practices worldwide. **However, adoption of GB technologies and practices will remain a challenge in Pakistan until adequate support is provided by the government and an enabling environment is created for the construction and building sectors.** Stakeholder suggestions for the proposed roadmap (see the Annex) and GBC included the need to take measures to enhance participation of all stakeholders to promote GB practices, dissemination of information on green building materials and equipment for the construction industry, research and development of green building technologies, and supporting technical, financial, and legal instruments to help enforce and implement the GBC. It was also mentioned that the study carried out by EU SWITCH-Asia SCPF and the MoCC was the first ever reconnaissance of the subject to raise awareness among key stakeholders in Pakistan, and that the assignment strongly points out, at the policy level, the importance of a GBC. However, there is a further need of a National Task Force, development of an implementation plan, development of handbooks in local languages, and the need to establish a techno-legal regime for compliance and monitoring. Overall, the stakeholder engagement activities were able to strengthen industry and academia linkages by taking 44 stakeholders on board.

### **Key findings from the consultations and multi-stakeholder workshop included:**

- To attain parity with the global standard, the preparation and enactment of a GBC is a dire need.
- It will not be easy to adopt a GBC in Pakistan due to its demography, local culture and lack of knowledge or capacities in GB in institutions at urban, town and rural levels.
- Many GBCs already exist in other countries and it would be best to learn from them. It would also be useful to align the GBC for Pakistan with the UN's SDGs, with a focus on renewable energy sources.
- To enhance green construction, innovative design solutions have to be worked out from the stage of building conception, site selection and orientation, while at the same time understanding the relevance of climate responsive materials and low carbon design.
- GB terminology needs to be elaborated in English and the national language, Urdu. It is not just important for the people residing in, constructing or designing the buildings to know and understand the terminology, but also for those connected to a GB through its life cycle, such as artisans, masons, work-supervisors, inspectors.
- Comprehensive knowledge on GB must be provided, through training, to architects, engineers and urban design professionals.
- Industry and academia linkages are advised in future renditions of the roadmap.
- Implementing a GBC in Pakistan will have a number of positive environmental impacts, including the efficient use of water, energy and other natural resources.
- A national level techno-legal framework for effective implementation of the GBC is also an important feature to add to the roadmap.
- Mechanisms for development, distribution and increasing availability of green materials used for GB should be given in the roadmap.
- The GBC, when finalised, must first be applied in all government-funded building projects and pilot projects to create awareness and trust, before a broad roll-out to privately-funded building projects becomes feasible.

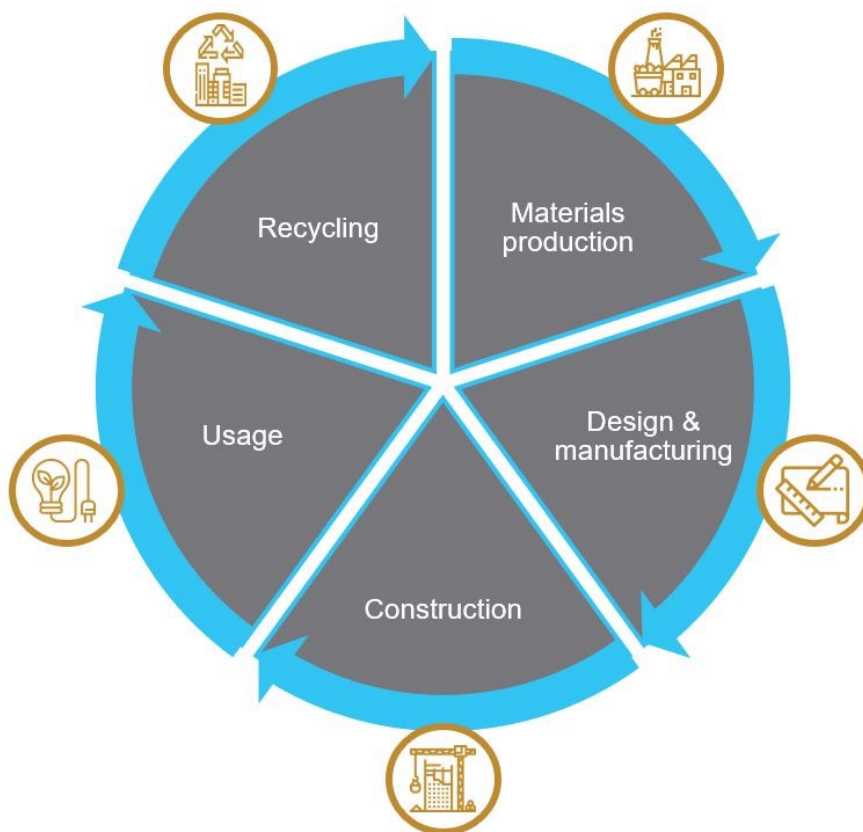


- Capacities of GBC implementing and evaluating personnel need to be enhanced. Moreover, a public awareness campaign, and providing financial relaxations/incentives to private developers of GBs should be prioritised.
- The GBC should be mandatory for building plan approvals to allow the construction of GBC-compliant structures throughout Pakistan.

## 1.5 Overview of processes and institutional set-up

An effective and impactful GBC requires a clear understanding of the development process and institutional set-up for the code. The term “green building” and its scope have been broadly defined in the report titled *Process and institutional set-up for a green building code in Pakistan* as, “a building that by design, construction, and operation reduces or eliminates negative impacts, in some cases creating positive impacts on our climate and natural environment,” (Khan, J.A., et al., 2022, p. 2).<sup>1</sup> The scope of the GBC should therefore cover all building types to a certain degree, whether mandatory, provisional or voluntary. Furthermore, the code itself should provide guidance on site planning and development, green building construction, resource efficiency, post-completion building actions, and code compliance for the entire life cycle of the building (see Figure 1).

*Figure 1: Stages of a building’s life cycle<sup>2</sup>*



<sup>1</sup> Khan, J.A., et al, 2022, Process and institutional set-up for a Green Building Code in Pakistan. Prepared on behalf of the EU SWITCH-Asia Sustainable Consumption and Production Facility (SCPF).

<sup>2</sup> Adapted from Schneider, M., et al., 2019, *Sustainable housing – addressing SCP in the housing sector: Scoping study*. Prepared on behalf of the EU SWITCH-Asia Sustainable Consumption and Production Facility (SCPF). <https://www.switch-asia.eu/resource/addressing-scp-in-the-housing-sector/>

### 1.5.1 Preparation of the GBC

The development of the code itself should involve the technical expertise of various experts under the overall supervision and responsibility of the Ministry of Climate Change (MoCC). The MoCC should assign a **Task Force** to take responsibility for the writing of the code and its content. Under the Task Force, various other **Technical Committees** should also contribute their expertise for related content. After reports have been received from the Technical Committees, a consultant will start drafting the criteria for themes proposed to be covered in the GBC in qualitative terms, or quantitative when possible, to ease the evaluation of and compliance with the GBC. The **Draft GBC** should then be circulated widely among key stakeholders for their input on the proposed sections, provisions, criteria, content and text. Suggestions, comments and observations from the stakeholders should be presented to the MoCC for incorporation into the draft, which would then be notified for a final review and formal vetting. The MoCC would then finalise the *Green Building Code for Pakistan* document and associated guidance manuals for practitioners, and formalise their approval by the required authorities. Once the final version is prepared, it should be widely circulated among all stakeholders and an awareness campaign initiated. This process will ensure ownership of the code by the government and the practitioners, as well as its practical relevance for both.

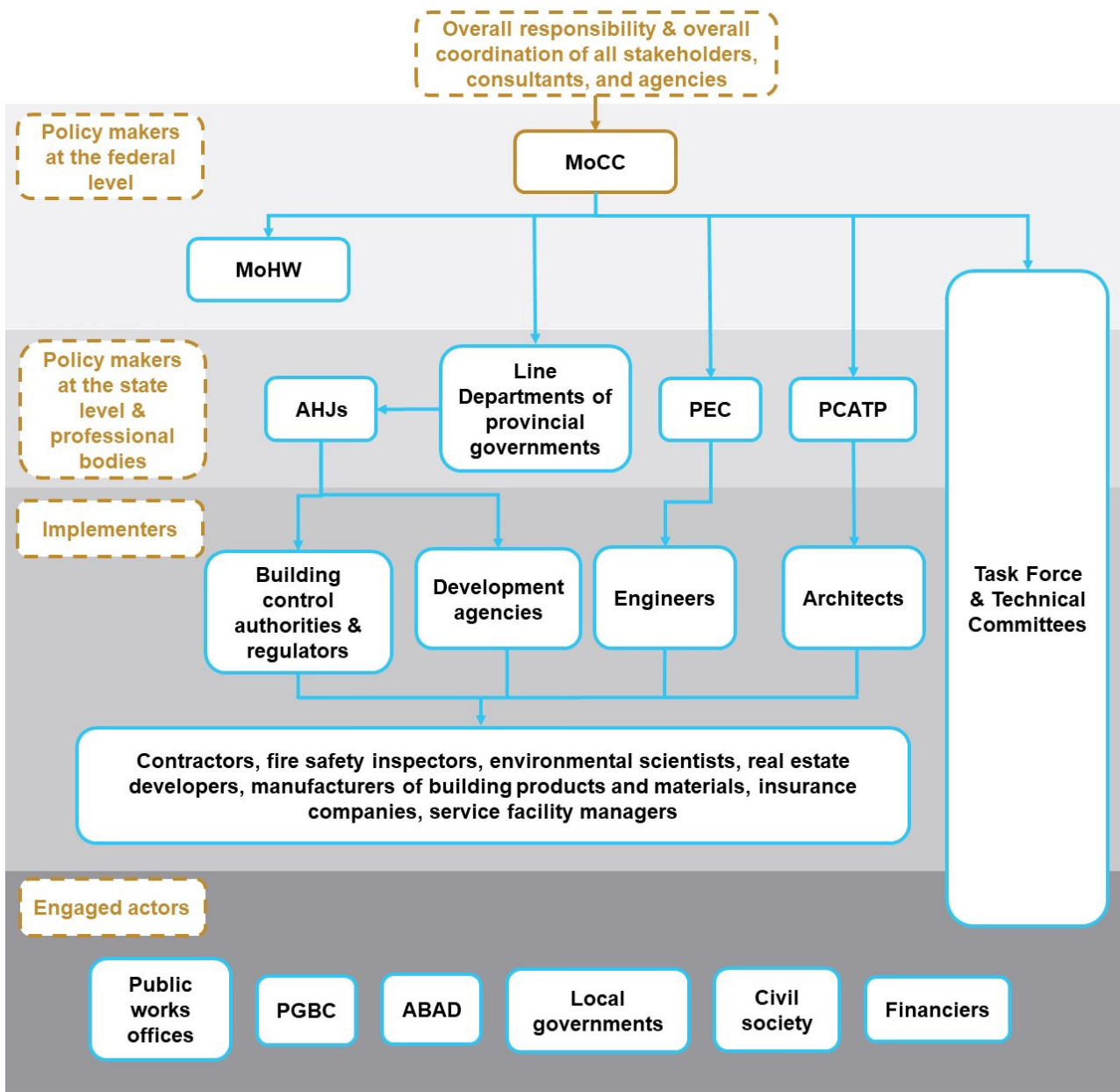
### 1.5.2 Institutional set-up

In regard to the governance structure for the GBC, the overall role of preparation and implementation, as well as coordination among all stakeholders, including federal ministries/agencies and provincial counterparts, rests with the MoCC. The aforementioned Task Force and Technical Committees will also play a vital role in the organisation and development of the GBC.

The policy makers (beyond the MoCC) who should also be involved in the development of the GBC include the Ministry of Housing & Works (MoHW) at the federal level, Line Departments in provincial governments, the Pakistan Engineering Council (PEC), and the Pakistan Council of Architects and Town Planners (PCATP).

The on-the-ground implementers of the GBC will primarily consist of building control authorities, or offices in the local building control and development agencies. The institutional set-up is visualised in Figure 2.

Figure 2: Proposed institutional set-up for the GBC



# 2. Vision 2030

## 2.1 Vision

Pakistan can greatly benefit from urgently transforming plans for national green construction through developing a GBC. Looking at precedents and success stories from the international arena, a vision for 2030 for the building sector in Pakistan, as being well on its way to becoming a totally transformed green scenario, can easily be envisaged. In this scenario, the key strategic objectives, as shown in Figure 3, are achieved. These objectives represent key points in the roadmap and development of the GBC, as well as goals for GB in Pakistan in general. If these objectives are to be met by 2030, the code should be fully implemented, the roadmap carefully followed, and the interim goals achieved.

Figure 3: Key strategic objectives for Vision 2030



Flagship programmes with national reach, such as the Prime Minister's *5 Million Naya Pakistan Housing Programme*, will have shown the cost-benefits of GBs and how they are possible on a large scale. Advances in materials production, and planning and design of GBs would integrate green materials that are approved for use, rated according to a widely-used green materials rating system, and subsidised. Construction practices would focus on the efficient use of energy and resources and the reuse and recycling of building materials, where possible. Users of the code and of GBs will be educated on the benefits of GBs, creating a demand for such buildings as workplaces, institutions and homes. Overall, this would result in a building sector where SCP principles are fully integrated along all stages of the building life cycle. Moreover, buildings and communities will have integrated "green" thinking into society and communities, which would inculcate a "green" mindset in Pakistan.

## 2.2 Way forward

The way forward to achieve such an ambitious vision for 2030 may be viewed considering the progress already achieved in paving the way as shown by analytical studies for facilitating the process of development of the GBC for Pakistan since 2018. Many assignments in Pakistan have already focused on providing policy and technical guidelines for the GBC, therefore the natural next step would be to take actions towards finalising a code that is practical and usable. For moving towards the next steps for GB in Pakistan, a multi-pronged strategy is proposed. **The prime focus of the multi-pronged strategy is to simultaneously steer the process of formulation of the GBC, through:**

1. Supporting the MoCC to constitute a national Task Force comprising key stakeholders to steer the process of formulating/drafting the GBC, and constitution of Expert Technical Committees on various key issues such as GBC Rating & Compliance System, Incentives for Market Development, Green Building Design and Materials, Environmental and Sociological Aspects, Adaptability, Green Financial Model Development, and International Resource Materials;
2. Supporting the Task Force to provide technical training, monitoring and certification of Green Buildings under the *5 Million Naya Pakistan Housing Programme* in collaboration with MoCC. This would serve as an excellent pilot project for GB on a large scale;
3. Providing support for research and development (R&D) through capacity building, training, promoting joint research, and collaboration with international and regional GB institutions; and
4. Supporting the creation of an enabling environment, and GB market development.

The long-term roadmap therefore needs to address and create comprehensive sub-maps for each stakeholder's profile and needs. In light of the existing gaps, the current proposed roadmap for the GBC (see the Annex) and the subsequent GBC documents must maintain a clear direction, help to develop a culture of "green" thinking, engage all stakeholders and reach out to the remotest clients, encompass different building life cycles in different geographies, induce "green" services and support systems, and finally, act as a starting point for influencing investing, engineering, planning, and all production and consumption of the built environment.

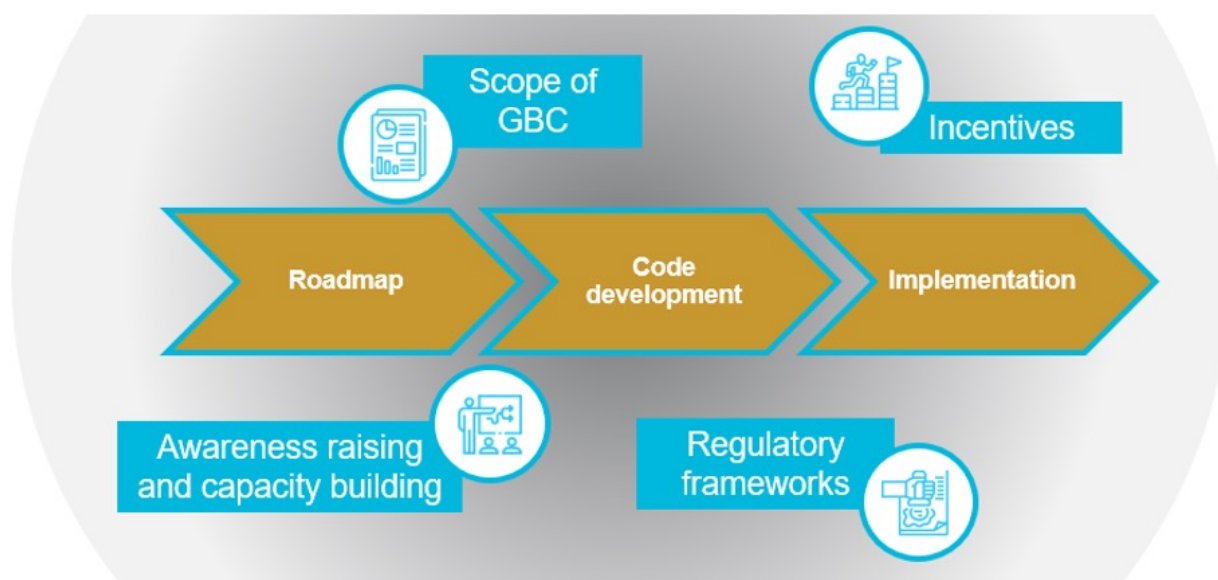
The writing of the code itself would require in-depth training and orientation of the Task Force and Technical Committees, preferably exposing them to international experiences and giving room for devising a strategy. The transformation towards this "green" culture will also require changes in rules of procurement bodies, training of public servants, law makers, judiciary, armed forces, bureaucracy, traders and merchants, academics, higher education bodies, all at the same time thus making "green" a part of the political, social, and religious agenda for all groups of users.

### 3. Direction and Recommendations

Moving towards the vision for 2030—from roadmap, to code, to practice—will involve many stakeholders and interim steps. In order to further guide the direction of the roadmap for the development of a GBC in Pakistan, recommendations have been drawn based on the literature review of Pakistan’s Policy Guidelines, stakeholder consultations and workshops, and international best practices for GBCs. This section provides an overview of the topical areas in which recommendations have been developed. The proposed recommendations will serve as a basis for the further work described in Chapter 2.2.

No measure, by itself, can secure resource efficiency in the GB sector. In general, strategies must be comprehensive, indicating inter-sectoral simultaneous approaches. The GB planning should therefore be considered as an integrated system, and all green building objectives should be reflected in national programmes of GBC, even if their practical implementation will depend on local governments.

Figure 4: Key topical areas for policy makers to move from roadmap to code to practice



#### 3.1 Recommendations for policy makers

In 2017, the National Action Plan on Sustainable Consumption and Production (NAP-SCP) for Pakistan was developed, which outlined a roadmap for the country to achieve sustainable socio-economic development by eliminating inefficiencies and over-exploitation of the resource base to protect environmental degradation. The NAP-SCP recommended the following strategic actions for Sustainable Buildings and Cities:

- Revise town planning and building regulations in the light of SCP principles and approved National Policies, and ensure their enforcement.
- Develop mechanisms for the laying of infrastructure services like sewerage and drainage lines as per town planning regulations and building byelaws.
- Encourage private sector participation in the delivery of services and infrastructure for making smart cities.

The roadmap for the development of a GBC is, thus, an extended action on the many strategic actions required by the NAP on SCP. A GBC is also an opportunity to revise and improve the existing codes and related regulations, and to integrate new green paradigms into Pakistan's construction industry. A major paradigm shift is anticipated towards a global approach for adoption of green building construction and technology, addressing the adverse impacts of buildings on climate change as identified by the SDGs. Developing a long-term energy efficiency plan will contribute to regulating the future energy consumption in buildings. Also, a long-term view would provide signals to industry to ensure readiness at an economical cost, and to better inform the enforcement and compliance entities.

### 3.1.1 Awareness raising and capacity building

A gradual adoption of green building principles and technologies should be initiated with coordinated efforts and involvement of all relevant stakeholders. Activities to move towards the use of GB technologies include **awareness raising and capacity building to familiarise stakeholders with the GBC**. Implementing a GBC in Pakistan will have a number of positive environmental impacts, which include efficient use of water, energy and other natural resources. Additionally, it could result in economic savings, better health, comfort and community benefits. Awareness raising activities and capacity building should:

- Present a strategic overview of all relevant and essential elements of green built environment, keeping in view the local needs and requirements;
- Provide mechanisms for development, distribution, and availability of green materials compliant with the GBC;
- Mainstream principles of sustainable construction into education of architects, construction engineers and technicians, and, other relevant professions;
- Promote the transfer of technologies from countries already advanced in the implementation of a GBC; and
- Include electronic media, journalists and social media engagement for accelerated adoption.

To **support linkage with industry and academia**, a dedicated educational programme and enlistment mechanism should be developed to bring on board Green Building Construction and Performance Rating Professionals. **Customised training programmes** for different tiers should also be developed by the Pakistan Engineering Council (PEC), Pakistan Council of Architects and Town Planners (PCATP), Institute of Architects Pakistan (IAP), Pakistan Institute of Interior Designers (PIID), National Energy Efficiency and Conservation Authority (NEECA), etc., together with agencies such as the Provincial Designated Agencies, State Disaster Management Authority (SDMA), Municipal Committees, Development Authorities, National Engineering Services Pakistan (NESPAK), Heating Ventilation Air Conditioning and Refrigeration (HVACR) Society, and public sector universities, to name a few. Training and capacity building of the professional cadre should include officers of Communication & Works (C&W), Local Government and Rural Development Department (LGRDD), Irrigation, Public Health, Water & Sanitation Service Peshawar (WSSP), and Planning & Development (P&D) Departments to contribute to the implementation of the code. Moreover, **an additional programme should be launched for creating a cadre of accredited professionals in GB** in different occupations, such as planning, design and construction. In this context, Technical Education & Vocational Training Authority (TEVTA) can play a vital role in creating employment opportunities and new concepts of building life cycle (designing, constructing and dismantling).

### 3.1.2 Scope of the GBC

In Pakistan, the **prevailing codes require updating and revisions** according to recent developments and growth of urban centres, and government policies. The development of the GBC is thus an opportunity to revise and improve the scope of existing codes. The new GBC should provide adequate reference to all the national building codes already notified, and avoid their duplication

unless necessary. To promote its widespread adoption, **a mandatory and an optional route should be envisaged for the GBC for at least an initial five-year grace-period.**

International Green Building Rating Systems and Certifications are commonly tailored to local conditions for the total quality management of a GBC in the construction sector. Considering the stark geographic and climatic differences between regions of Pakistan, this should be a focus in the development of the code. In addition, the GBC should be **applicable to all Local Government Systems and to all housing types (rural/urban, formal/informal).** The code should cater to specific related services, systems, skills and training. **The GBC should also be linked with local building and planning control, and permissions/approvals.**

In the course of implementing specific measures, it is necessary to consider the local socio-economic, institutional and geographical conditions. The GBC should be **based on resource-efficient and environment-friendly construction practices,** and take into account the use of the building, in accordance with updated scientific data according to international benchmarks. The scope of the code should **consider a building's entire life cycle,** including pre- and post-construction operations **such as planning, demolition or refurbishment opportunities.** Under the code, measures should also be taken to **improve indoor environmental quality (IEQ) for the health and productivity of occupants.**

### 3.1.3 Regulatory frameworks

The government should undertake **GB initiatives in all legislative and regulatory frameworks. Priority should be given to GB** while implementing the National Housing Policy, Naya Pakistan Housing Schemes, and concerned sectors' National Plans by setting up goals to overcome climate change in the country. For rapid promotion of GB construction, while introducing GBC, the government should issue **rebates or credit programmes,** which would help the house or building owners to opt for green buildings instead of conventional construction. It will also be imperative to develop a **national-level technological and legal framework** for effective implementation of the GBC.

### 3.1.4 Incentives

**Special incentives should be developed** to encourage widespread implementation of the GBC in Pakistan. Such offerings could include but not be limited to zero-taxation, other tax incentive schemes, lowest mark-up rate on construction loans, one window operation, and duty-free import of green technologies. **Long-term cost and benefit analysis should be communicated** to assist in developing a potential market/clientele to adopt the GBC. Similarly, the State Bank of Pakistan could offer an **attractive refinancing scheme for inclusion of renewable energies in construction,** for example, offering a mark-up of 6% per annum, paired with various loss-back guarantees for risk mitigation. This method has had a proven impact on the market and has helped raise public awareness regarding renewable energy in many regions, especially for solar solutions.

Inclusion of **future-proof enhancements** should also be applied, as in Denmark where classification levels of GB were directed towards future minimum standards, thus encouraging builders and developers by providing them security to reach future versions of the code before they become mandatory.

## 3.2 Recommendations for other stakeholder groups

Specific actions for key stakeholder groups have been developed in order to further guide the development of the GBC in the context of builders, investors and civil society. **Capacity building and awareness-raising activities focusing on these recommendations should be promoted by the MoCC to encourage different stakeholder groups to use the code.** Furthermore, the actors within these groups should be informed of the benefits of the recommended actions and how they can contribute to a widespread uptake of the code, further benefitting all actors.



### 3.2.1 Builders, professional bodies & practitioners

Builders, including developers and contractors, can contribute to a widespread uptake of the GBC by **greening their supply chains**. This can be done in several ways, for example, by integrating resource efficiency and clean technologies, promoting GB design by incorporating provisions of insulation and thermally efficient windows, and using renewable energy technologies to reduce heating costs and effects of GHG emissions.

In regard to planning, design, and technology, it is recommended that in the planning and design of the project GB methods and products used in the building design should be considered. Especially, the envelope should use low-carbon materials and carbon should be quantified for the use phase. In this sense, **carbon intensity should be measured for all stages of a building's life cycle**. Building Information Modelling (BIM) and 3D model-based planning can additionally make this process easier for builders to predict how the building will utilise resources, especially energy, once the building is complete.

**Vernacular and indigenous architecture, and local knowledge** provide insights into practices of sustainable construction relevant to local conditions and establish a regional identity. These methods already exist to help improve building planning for efficient design. Documenting and formalising these methods can thus enhance GB principles.

### 3.2.2 Investors

Similar to incentive offers from the government and policy makers, **incentive instruments should also be considered in the private finance sector**. These can include, but not be limited to, subsidy and rebate programmes, low interest mortgage loans, support for a voluntary certification system, and technical assistance. Similar to the German model, different thresholds can be applied to the GBC, with **higher subsidies available when a higher standard is reached**. Low-cost housing finance can be especially helpful in attracting a larger number of people towards GB. **Commercial banks offering attractive financing** can engage new customers by offering loans for GB construction.

Green building concepts have a **strong bond with Corporate Social Responsibility**. Organisations operating in Pakistan have a responsibility not only towards the country's environment and resources, but also towards benefitting the local communities. Commitment of the leadership of these organisations can help support GB from the bottom-up for a more widespread adoption.

### 3.2.3 Civil Society

Building infrastructure put in place today should meet the emission criteria of the future. Therefore, greater attention must be paid not only to **the energy efficiency requirements** in building codes and planning, but also to **supporting climate and environmental targets, as well as adaptation capabilities**. In fact, rapidly adopting green built technologies worldwide to extend the opportunity to cope with adverse impacts of buildings on climate change as identified by SDGs, will require the **support of non-governmental organisations (NGOs) and the general public**. In order to ensure that a market demand is created, it is necessary to have a **link between green construction, energy efficiency and affordability, social welfare and reduced social inequality**. A purely technocratic approach to GB efficiency, especially in the shelter sector, is unacceptable from a socio-political point of view, and must be pursued together with housing affordability.

## 4. Conclusions

This final report of the assignment '*Promoting SCP implementation in Pakistan including around Pakistan's National Action Plan on SDG 12 ('Green Buildings Code')*' has finalised the recommendations for the thematic scope, priorities, and related national actions for the implementation of the GBC in the context of a vision for a fully implemented code in 2030. The report has also summarised the gap analysis and recommendations from the stakeholder consultations and multi-stakeholder workshop carried out during the assignment, and has provided an overview of the proposed process and institutional set-up for a GBC. Moreover, it has created a basis to better inform policymakers and administrators on the process of development of a GBC, and a roadmap towards a green future for the building sector of Pakistan.

The realisation of the vision for a fully-implemented and flourishing GBC in Pakistan by 2030 is off to a promising start with the completion of this assignment. Work on the next phase and the actual writing of the GBC for Pakistan should be in line with the government's directives and integrated with SCP principles. This report has summarised key points of this assignment and has shown that there is awareness and sensitivity towards going green, and that Pakistan's GBC could be easily integrated into the building sector by 2030. There are many paths available to adopt and adapt from global experiences, and the roadmap can easily move to practice in a few years after the completion and adoption of a GBC document, with active participation of all stakeholders. On the whole, following the recommendations laid out in Chapter 3 has a huge potential to lead to the achievement of this vision. **The key recommendations for policy makers and other stakeholders laid out in this report are shown in Figure 5.**

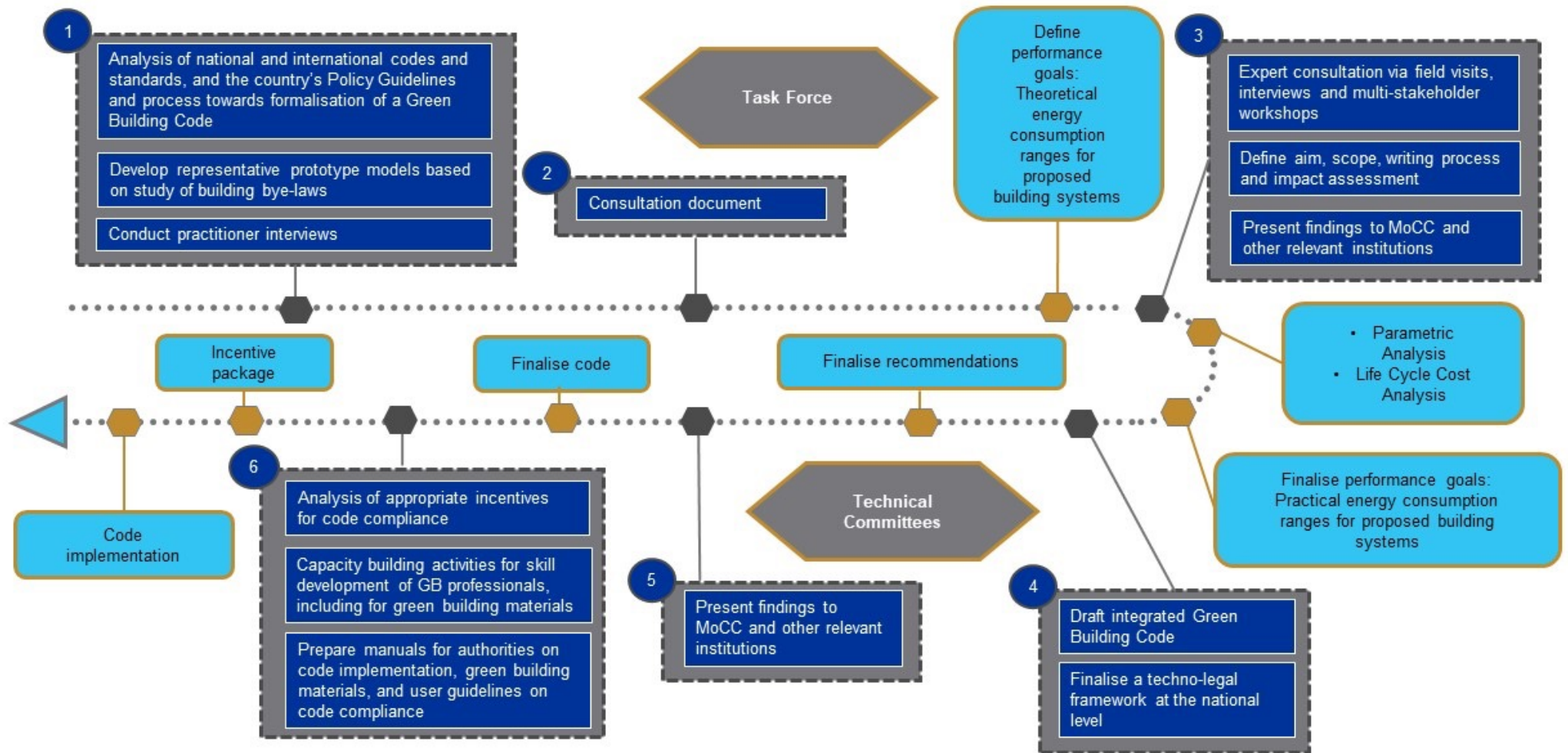
All in all, moving from roadmap to code to widespread implementation will require great effort, not only at the federal level under the MoCC, but also from the wider array of stakeholders that GBs will impact. The government, practitioners, builders, developers, financiers, investors, academia, NGOs, and civil society will together be responsible for the success of Pakistan's GBC. The way forward begins now, and the next steps must be quickly, yet carefully, taken to ensure a green future for Pakistan's building sector.

Figure 5: Key recommendations for the GBC



# 5. Annex

## Proposed roadmap for the GBC



# ANNEXES

## ANNEX 1

**Implementation opportunities and challenges of the Policy Guidelines for the development of a Green Building Code in Pakistan**

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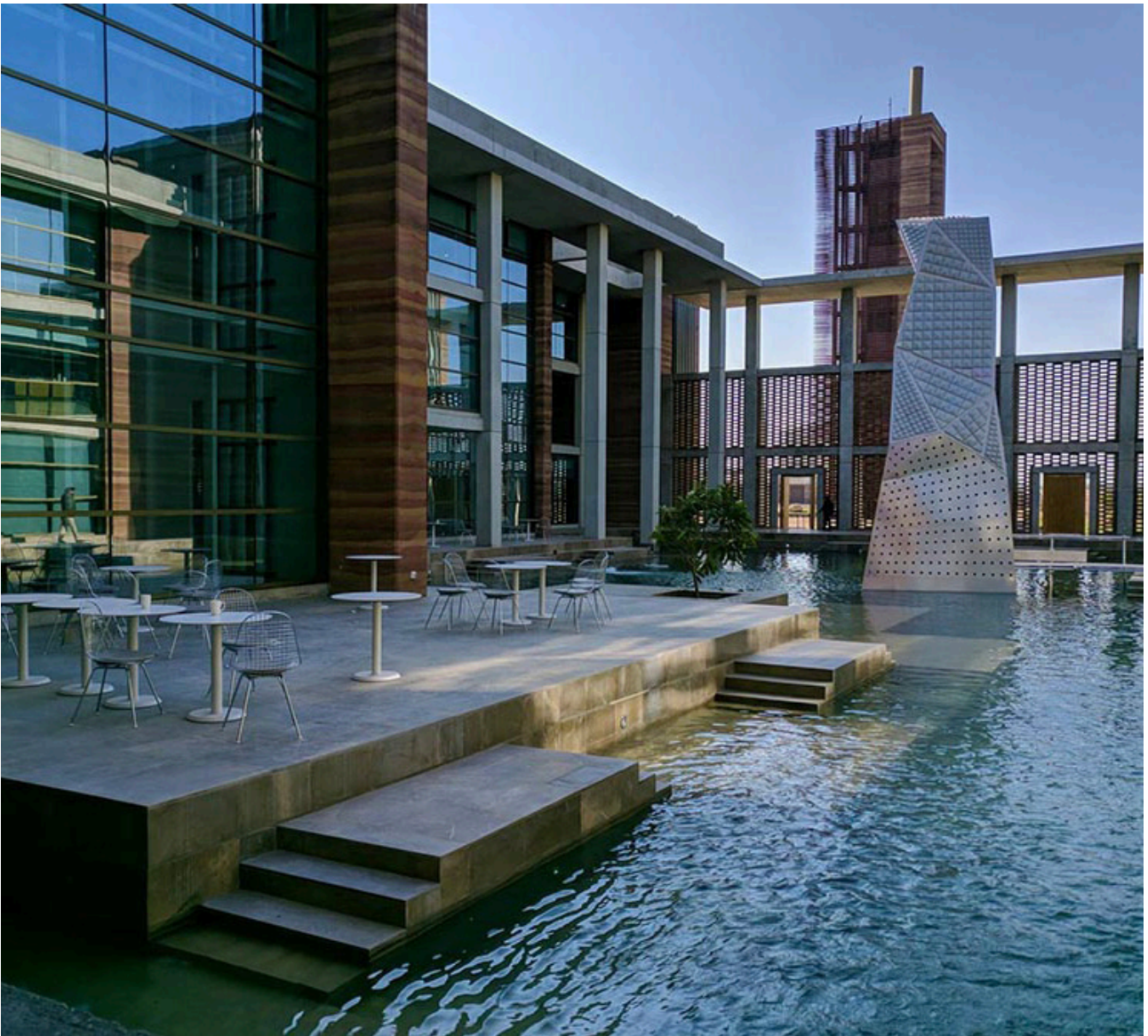
## ANNEX 2

**Process and institutional set-up for a Green Building Code in Pakistan**

## ANNEX 1

# Implementation opportunities and challenges of the Policy Guidelines for the development of a Green Building Code in Pakistan

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# List of Abbreviations

<b>COVID-19</b>	Coronavirus Disease 2019
<b>CO<sub>2</sub></b>	Carbon dioxide
<b>CO<sub>2</sub>e</b>	Carbon dioxide equivalent
<b>EU</b>	European Union
<b>GB</b>	Green Building
<b>GBC</b>	Green Building Code
<b>GHG</b>	Greenhouse Gas
<b>GIS</b>	Geographic Information System
<b>LULUCF</b>	Land use, land use change, and forestry
<b>MoCC</b>	Ministry of Climate Change
<b>NAP-SCP</b>	National Action Plan on SCP
<b>NEECA</b>	National Energy Efficiency and Conservation Authority
<b>SCP</b>	Sustainable Consumption and Production
<b>SCPF</b>	Sustainable Consumption and Production Facility
<b>SDGs</b>	Sustainable Development Goals
<b>UN</b>	United Nations



# 1. Context

In 2018, the second phase of the SWITCH-Asia Sustainable Consumption and Production Facility (SCPF) was launched with EU-funding. The programme aims at providing a platform to promote sustainable consumption and production (SCP) policies and principles in Asia and enhance the awareness and dialogue of local stakeholders on the theme. To achieve these goals, the SCPF fosters exchange through platforms, key experts, entities and stakeholders who share the interest for impactful actions to further enable sustainable housing, a top priority for all Asian countries, through relevant responsible consumption and production patterns, and to discuss ideas and lessons learned and consequently, to identify and develop joint actions.

Pakistan has started to recognise “green” frameworks, and has been actively promoting a sustainable development process, resulting in the gradual strengthening of sustainability and resilience in its building sector; for example, through the ‘National Action Plan on the UN’s Sustainable Development Goal (SDG) 12, Sustainable Consumption and Production (SCP)’ and in setting out the ‘Policy Guidelines for Pakistan Green Building Code’. Pakistan’s Green Vision for 2025 further prioritises SCP in the building sector by seeking to achieve “eco-friendly” construction for all new buildings.

The current project was set up under the framework of the SWITCH-Asia SCP Facility with the **objective** to provide guidance to the Ministry of Climate Change (MoCC) in the development of the Green Building Code (GBC) based on their existing Policy Guidelines, as well as on international best experiences. Furthermore, SCP is promoted throughout the development of a roadmap towards the implementation of the building code, integrating aspects of Pakistan’s National Plan on SDG12.

This report aims to support the integration of SCP principles in the Green Building Code and to provide a solid basis for identifying the thematic scope, priorities and related national actions for the development of a Green Building Code in Pakistan. In light of the emerging green interventions for new and existing buildings, the analysis would enable experts in devising a roadmap that addresses major issues, gaps, challenges and opportunities. This study, therefore, analyses the current green building (GB) policy guidelines, then defines the opportunities and challenges to resolve major roadblocks to be faced in design of a Green Building Code in Pakistan, including defining the gaps and missing links. Finally, opportunities, perceived challenges and insights from key stakeholders are presented, and conclusions on the way forward are drawn.

## 2. Analysis of Pakistan’s Policy Guidelines and process towards formalisation of a Green Building Code

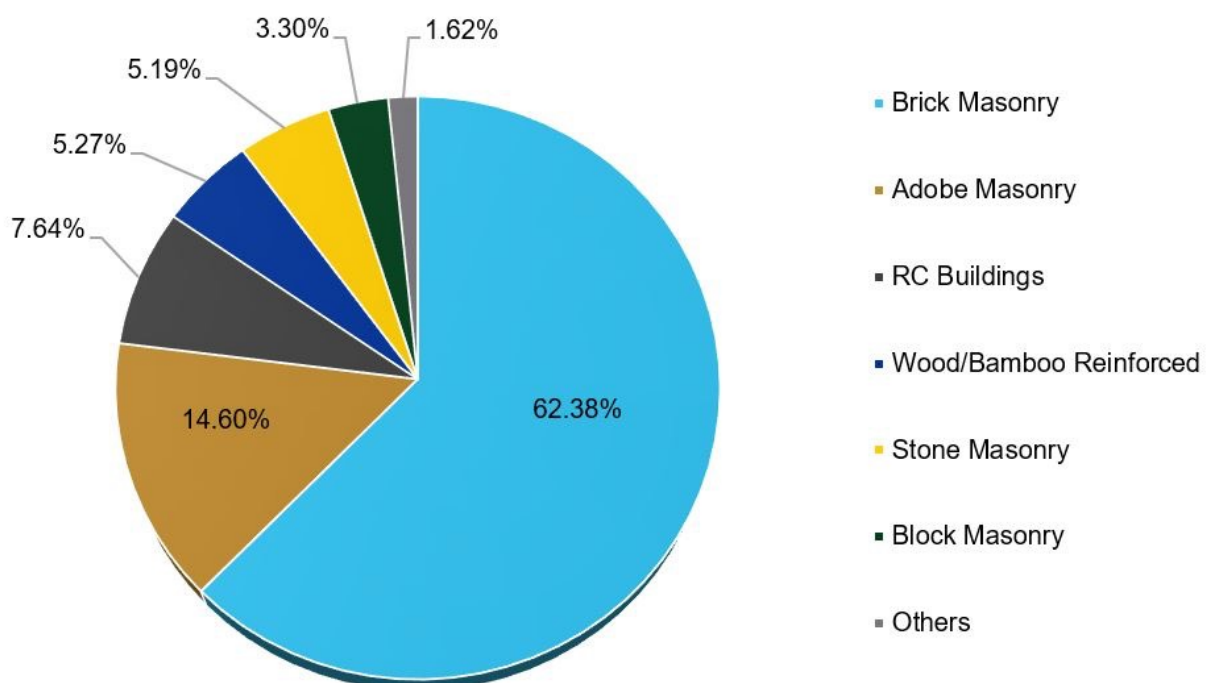
To understand the implementation opportunities and challenges for a Green Building Code in Pakistan, it is important, first, to analyse the current status of green building in Pakistan and the existing policy environment. This section provides an overview of the need for a Green Building Code in Pakistan, and the potential of green buildings to support Pakistan’s climate and environmental targets. It also provides an overview of the existing Policy Guidelines for a Green Building Code in Pakistan.

### 2.1 Relevance of green buildings in Pakistan

#### 2.1.1 Need for green buildings in Pakistan

Pakistan is the fifth most populous country in the world, with a population of 219 million, which is 65% rural and 35 % urban. Approximately 30-35% of employment is directly or indirectly affiliated with the construction sector (Farooqui et al., 2008). Pakistan has a high rate of urbanisation, with new cities being established and many megaprojects in the pipeline, which results in an extraordinary amount of construction and building activity across the country. There is a demand of 500,000 new housing units per year. However, the capacity is limited to 200,000 units per year, thus creating an annual shortage of 300,000 units, in addition to the existing deficit of 10 million housing units (UN Habitat, 2018). The existing building construction is traditionally classified into various types: brick masonry buildings (62.38%), adobe (mud brick) masonry buildings (14.60%), reinforced concrete moment resisting frame buildings (7.64%), wood/ bamboo reinforced masonry buildings (5.27%), masonry buildings (5.19%), concrete block masonry buildings (3.30%), and 1.62% other (Ahmed et al., 2012).

Figure 1: Proportion of existing building types



Current practices, growth in urban centres and demand for housing clearly point to a need for new paradigms in Pakistan's construction sector to enable sustainable development. Furthermore, the prevailing building codes are outdated and require updating and revision, especially in light of recent developments and new government policies. For example, in 2017, the National Action Plan on Sustainable Consumption and Production (NAP-SCP) for Pakistan was developed, which outlines the roadmap for the country to achieve sustainable socio-economic development by eliminating inefficiencies and overexploitation of its resource base to protect against environmental degradation. In the context of green buildings, the NAP-SCP recommends the following strategic actions for Sustainable Buildings and Cities:

- Revise town planning and building regulations in the light of SCP Principles and approved National Policies, and ensure their enforcement;
- Promote green building design by incorporating provision of insulation and thermally efficient windows, and renewable energy technologies in the building byelaws to reduce heating and cooling costs and effects of greenhouse gas (GHG) emissions;
- Ensure strict compliance of provisions of building byelaws for construction of disaster-resilient buildings and infrastructure;
- Develop mechanisms for laying of infrastructure services like sewage and drainage lines as per town planning regulations and building byelaws;
- Encourage private sector participation in delivery of services and infrastructure for making smart cities; and
- Green the supply chain by resource efficiency and clean technologies.

Thus, a roadmap for the development of the GBC is an extended action on many strategic actions required by the NAP-SCP. Development of the GBC will also give an opportunity to revise and improve the existing codes as well as related regulations to integrate new green paradigms into Pakistan's construction industry. A major paradigm shift is anticipated towards a global approach for adoption of green building construction methods and technology, and addressing the adverse impacts of buildings on climate change as identified by the SDGs. The need for Pakistan to act urgently is significant as it is amongst the most affected countries in regard to climate change, putting it in need for urgent transformation.

## **2.1.2 Potential of green buildings to support Pakistan's climate and environmental targets**

Pakistan's vulnerability to adverse impacts of climate change is well established and widely recognised. Despite Pakistan's diminutive contribution to global GHG emissions, it is the fifth most climate-affected country in the world, as indicated by the *Global Climate Risk Index 2020* developed by German Watch (2019). The effects of climate change are clearly evident in Pakistan; it faces a multitude of threats, ranging from melting glaciers, floods, drought, sea level rise, to spread of diseases. These climate change impacts pose severe risks to the ecology, society and economic activity, and are considered a major developmental challenge and threat to national security.

Pakistan's total estimated GHG emissions in 2015 amounted to 408.1 million tonnes of carbon dioxide equivalent (CO<sub>2</sub>e) with 45.5% share from energy, 42.7% from agriculture, 5.4% from industrial processes, 2.5% from land use, land-use change, and forestry (LULUCF), and 3.8% share from waste (Ministry of Climate Change, 2018). To contribute to global efforts, Pakistan intends to make progress in decoupling economic growth from carbon use in order to keep its emissions at the lowest possible level, thus playing its part as a responsible country. Pakistan, being a signatory to the United Nations (UN) 2030 Agenda that spells out the Sustainable Development Goals (SDGs), is committed to make efforts to meet the goals. A GBC would support the reduction of GHG emissions of the country by integrating carbon neutral or negative materials production, architectural design and planning, and emerging construction technologies into the construction phase, as well as by contributing to lower GHG emissions in the use phase, and through the recycling of demolition materials at the end of

the building's use. Green buildings and the GBC will contribute in particular to SDGs 11 (Sustainable Cities and Communities), 12 (Responsible Consumption and Production), and 13 (Climate Action), as it is an outcome of the strategic actions laid out in the NAP-SCP as already highlighted in section 2.1.1.

Because of its longevity, building infrastructure developed today should meet the emission and sustainability criteria of the future. It must also be able to cope with the expected regional impacts of climate change. Therefore, greater attention must be paid to energy efficiency, resource conserving requirements, and climate adaptation capabilities in Pakistan's building codes and planning practices. In fact, rapidly adopting green building technologies worldwide has extended the opportunity to cope with adverse impacts of buildings on climate change, as identified by SDGs. Hence, as Pakistan is significantly affected by climate change impacts, it can greatly benefit from urgently transforming plans for national green construction through developing a GBC.

Rapid adoption, implementation and enforcement of a GBC in Pakistan will also inculcate green thinking in the society, as well as influencing all major stakeholders. This new awareness could provide an impetus towards demand and integration of green or near-green building and construction practices. New research funding could be made available, deployment of new technologies and collaborative work could be initiated, and new green building materials could be developed locally. A new direction and shift of society towards a green future for the building sector would contribute to mitigating the impacts of climate change and improvement of environmental quality, and reduction in energy, water and other resource demands.

## 2.2 Analysis of Policy Guidelines for a Green Building Code in Pakistan

The Policy Guidelines for a Green Building Code in Pakistan were established in 2018 by the Government of Pakistan's Ministry of Climate Change, UN Habitat, SWITCH-Asia, and UN Environment to provide information and guidance to develop a comprehensive Green Building Code. The guidelines specify minimum performance criteria, along with appropriate adoption methods to achieve mandatory compliance, and generate a market demand for environmentally-conscious construction materials and building elements. The main goal of the guidelines is to ensure compliance and intent of the provision of a GBC. Innovative approaches, alternative materials, design and methods are not specifically addressed in this precursor to a GBC as they are planned to be introduced in later adaptations.

The Policy Guidelines prepared under the SWITCH-Asia Project in 2018 were reviewed by the project team, and the analysis is given below:

- a. Most sections are comprehensive and cover all crucial aspects, including an integrated design process. Time targets and the suggested work programme appear to be ambitious and should be reviewed before implementation.
- b. There is a subliminal emphasis towards energy and water efficiency.
- c. The development of a Green Building Code in Pakistan is identified as vital for effective benchmarking of a green building construction industry in the country.
- d. The Policy Guidelines emphasise that the role of planning is a crucial aspect, vital to the safe survival of people against the adverse impacts of global climate change conditions; this planning effort needs to be coordinated with the efficient use of green energy, water conservation and sustainability as part of overarching strategies.
- e. The Policy Guidelines present a GBC as an all-encompassing global solution, which will replace the Pakistan Building Code – this is very ambitious. The introduction also expresses intentions to ensure all good things without relating to socio-economic realities, and places the burden on the

national, provincial and local codes to do so.

- f. The Policy Guidelines advise that the Ministry of Housing, Ministry of Industries and Production, and Ministry of Energy should jointly promote the development of green building, green construction materials, and energy-efficient appliances for a rapid transformation to a green built environment across the country.
- g. The Policy Guidelines relate to the National Energy Efficiency and Conservation Authority (NEECA) document on the Policy Guidelines for the Energy Efficiency Code for buildings, whereas in practice a simplified, clear and less ambiguous policy would eliminate confusion and provide a focused direction for the development of the GBC and its enforcement.

## 2.3 Gaps and missing links in Pakistan's existing Policy Guidelines

A further review of literature related to green buildings indicated that essential key actions or steps were not included in the Policy Guidelines document. Integrating such elements will help to reduce the gap between intent and a realistic roadmap for a GBC. A global priority is to move towards near-zero carbon criteria for sustainability, along with contextualisation, integration, education, legislative support, and finally, demonstration through pilot projects. The comprehensive list below identifies the key gaps and missing links:

- a. The Policy Guidelines do not include a proper reference to the existing national codes, which have already been notified in Pakistan since 2009. Better integration of a GBC into existing regulatory framework is important.
- b. An integrative approach is a new concept for the construction sector of Pakistan, and is thus not included in the Guidelines. The approach would include:
  - Integration of state-of-the-art technologies
  - Health, safety and environmental compliance
  - Pollution control
  - Air quality management
  - Self-reliance in energy, water and waste
  - High performance in energy efficiency
  - Efficient utilisation of resources
  - Environmental management planning
  - Sustainable conservation and protection of flora and fauna
  - Wastewater treatment and reuse of grey and black water
  - Energy rating
  - Zero carbon footprint
  - Automated building management systems
  - Total quality management
  - Sustainable consumption and production principles.
- c. Climate zonation of Pakistan, which is required to make the GBC applicable to a larger part of the country, is missing in the Policy Guidelines. Due consideration for incorporating changing climatic conditions is also vital as the historical climate data is not keeping pace with climate change dynamics and thereby adversely affects the integrity of the design, operation, and management of built environment.
- d. Historical climatic design data is becoming less representative of the future climate, and needs to be duly considered in the design of green buildings by architects, planners and developers in Pakistan.

- e. The Policy Guidelines do not mention the impact of buildings on climate change nor the effect of change of climate on the buildings.
- f. The Policy Guidelines do not address vernacular and passive architecture applications.
- g. Pakistan lies in one of the most environmentally vulnerable regions of the world. Being situated along three major tectonic plates, the region is seismically active. Secondly, climate change is already affecting the weather patterns and posing food-security threats. Thirdly, because of the heavy dependence for energy on hydrocarbons, the energy price index in Pakistan is much higher when compared with several other countries. Therefore, the need for the Pakistan GBC to be developed for seismically-safe green construction, harnessing maximum sources of green energy (solar, wind, biomass etc.), and water and energy conservation by adopting green technologies to boost the economy, and provide the next generation with green housing at an affordable cost, should be emphasised.
- h. The Policy Guidelines do not address the need for research for advancing towards net zero carbon criteria.
- i. The Policy Guidelines do not address the need for integrating awareness of sustainable buildings into formal education, with possibilities of additional informal or religious education opportunities.
- j. As new buildings account for only 5-10% increase per year of the overall building stock, there remains a need for the planning of greening of the existing building stock through retrofitting and extending their life into the future for reasons of resource conservation.
- k. The use of flow charts or diagrams on the implementation and integration of the GBC would help to clarify the processes.
- l. A diagrammatic representation of key stakeholders would help to improve the legibility of the policy document.

## 2.4 Opportunities for the Green Building Code

### 2.4.1 The Opportunities

The gaps and missing links not only reveal the existing blind spots in the current Policy Guidelines, they also help to identify favourable chances for improvement. The following areas have been identified as key areas of opportunity for the new GBC:

**Use of guiding principles:** Providing clear guiding principles at the beginning of the roadmap with an integrated approach will help clarify the process before giving the details (Bureau of Reclamation, USA, 2017).

**Integrating awareness with education and beliefs:** The acceptance of any proposed code may increase by integrating awareness at an early stage with formal education, and also with informal education or religious education (Cole, 2013; UN Environment, 2018).

**Selection of base document:** As per international practice and standard development processes, the consultation document is very important. It is suggested that the International Green Construction Code (IGCC) 2018, developed in the United States of America, is used as the base document for the GBC as it represents “a model code that provides minimum requirements to safeguard the environment, public health, safety and general welfare through the establishment of requirements that are intended to reduce the negative impacts and increase the positive impacts of the built environment on the natural environment and building occupants” (International Code Council, 2018).

**Technologies and typologies:** Climate zonation, integrated with Geographic Information System (GIS) applications, would enable the GBC to minimise adverse impacts of climate change. Real-time climate data with GIS integration is vital for the qualification of GBC guidelines for climate zones.

**Introduction and acceptance of green construction and materials:** Acceptance of the GBC will encourage regular demand for suitable green construction materials and technologies. The possibility of a green building materials certification scheme and materials database could facilitate broader use.

**Change in legislation and government policies:** A cohesive working plan for the GBC will encourage public offices and concerned experts to research and clarify policies, legislation and regulatory frameworks in the context of a GBC.

**Handbooks, guides and skill enhancement:** Implementation of the GBC would require handbooks and guides for the development of new projects. The GBC will induce amongst all stakeholders, including professional bodies, a need for awareness campaigns, and training programmes and workshops for concerned architects, planners, engineers and other relevant stakeholders.

**Increased investment confidence:** By introducing a GBC, the government would gain the confidence of public and private sectors to make investments in green buildings and associated technologies. Green building initiatives are expected to be backed by various provisions and incentives offered in the context of a GBC.

**Implementation plan:** An implementation plan for a GBC needs a section on defining the direction, characteristics and categories of green materials, related services, systems, skills, and training. It is also vital to link the GBC with existing building and planning control/permissions/approvals and building laws.

**Incorporation of lessons learnt from pilot projects:** It is important to undertake verification and testing of all premises/models of various pilot projects, so that lessons learnt may be incorporated into the GBC. Public buildings, in particular, offer excellent openings for pilot projects. The pilot projects implemented will provide an ideal opportunity for induction of green building practices. This will also promote research and development, and trigger transformative processes for local economic growth, creation of new employment opportunities, technological transformation and innovation, as well as contribute to the reduction of GHG emissions. The lessons learnt from the pilot implementation of the Policy Guidelines will help in drafting a successful Green Building Code for Pakistan.

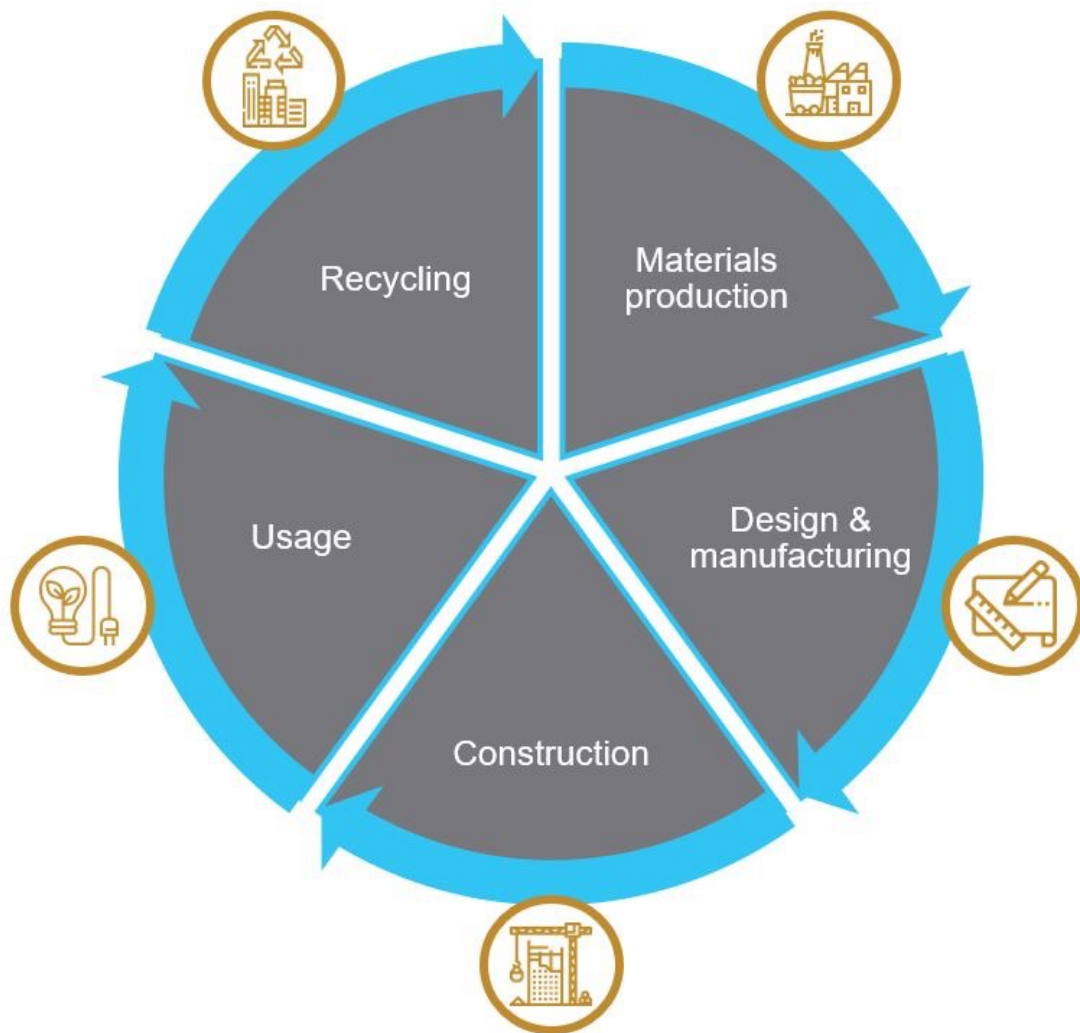
**Impact of climate change:** The Green Building Code should also address the effects of flooding, rainfall, heat waves and storms on the external and internal structures of buildings. Building design could then be adapted to specific climatic conditions, as could the use of building materials that can sustain effects of extreme variability and intensity of temperature and rainfall conditions caused due to climate change.

#### **2.4.2 Insights for the integration of Sustainable Consumption and Production principles**

The roadmap for the development of a Green Building Code for Pakistan focuses on achieving SDG 12, which is in line with the NAP-SCP. The adoption of a GBC would promote the use of resource efficient and circular processes throughout the life cycle of a building, as shown in Figure 2. For example, measures for water conservation and management could lead to water efficiency through rainwater harvesting, efficient water conservation practices and fixtures, as well as recycling of grey water to reduce excessive burden and dependence on the public water supply system. Similarly, energy efficiency, the adoption of renewable energy, and the use of green building materials with low embodied energy will help in reducing GHG emissions up to 50% in the total embodied energy in the building sector (Venkatarama Reddy, 2009).

A large potential and scope exist for the utilisation of recyclable building materials to promote sustainable practices, which would directly contribute to all the components of the NAP-SCP. The introduction of a green approach and including provisions on green materials will increase the use of a life-cycle approach by all stakeholders along the entire supply chain of production and consumption of the built environment in Pakistan. The adoption of a life-cycle approach by the building industry and realisation of its benefits will develop a culture of sustainability, thus inducing research and development, education, and reporting systems at par with international practices. Adverse impacts of building activities will therefore be minimised, which will contribute to the improvement of human health, environmental quality, water and soil.

*Figure 2: SCP perspective of a building's life cycle*





### 3. Interviews with Key Stakeholders

During the summer of 2020, interviews took place with key stakeholders in the realm of green buildings and construction in Pakistan. A virtual mode of holding interviews was adopted as a methodology for reaching out to the participants due to the prevailing coronavirus disease (COVID-19) pandemic. Separate survey questionnaires were developed for five categories of key stakeholders, namely, government agencies; corporate sector; civil society and NGOs; builders and investors; and professional bodies, practitioners, and academia with the aim to assess the opportunities and challenges for developing a road map for a Green Building Code. Fifty-one questionnaires were sent out to potential participants and 11 responses were received (six from government agencies, five from the corporate sector, builders and developers, investors, and professional bodies, including architects and town planners).

The questionnaire results reveal that the conventional construction practices in Pakistan are already undergoing somewhat of a paradigm shift due to exposure to green building construction technologies and practices worldwide. **However, adoption of green building technologies and practices will remain a challenge in Pakistan until the government provides adequate support and creates an enabling environment, which is crucial for transformation and adoption of green building practices by the construction industry.**

Major issues identified by the respondents focus on factors influencing the green building market and its readiness. The recommendations included suggestions for measures to enhance participation of all stakeholders to promote green building practices, dissemination of information on green building materials and equipment for construction industry, the need for research and development of green building technologies, and supporting technical, financial and legal instruments to help enforce and implement the GBC. Overall, the interviews revealed that stakeholders identify similar opportunities and challenges as those presented in Chapter 2, that is, as those identified by the project team during the literature review of the Policy Guidelines. Further insights from the interviews have been incorporated into other sections of this publication and project reports, namely, *Consultations on implementation opportunities, challenges and roadmap for the development of a Green Building Code in Pakistan*, *Process and institutional set-up for a Green Building Code in Pakistan*, and *Vision 2030 for a Green Building Code in Pakistan*.

### 4. Conclusions

Pakistan, because of its unique geographical location, is one of the countries most vulnerable to climate change and to a variety of associated natural disasters. Historical climatic design data is becoming less representative of the future climate, which needs to be duly considered in green building design by architects, planners and developers in Pakistan. At the same time, rapid urbanisation has caused global construction trends for state-of-the-art buildings to progressively transform into green building construction methods. In this context, the Government of Pakistan is strongly urged to take similar actions to develop a Green Building Code in order to mitigate the existing and impending impacts of climate change and to meet the increasing construction needs in a sustainable manner.

This report set out to analyse the 'Policy Guidelines for Pakistan Green Building Code', to support the further integration of SCP principles in the Green Building Code, and to provide a solid basis for identifying the thematic scope, priorities and related national actions for the development of a Green Building Code in Pakistan. The opportunities and challenges to be faced in designing a Green Building Code have been described, including defining the gaps and missing links. Finally, opportunities, perceived challenges and insights from key stakeholders are presented.

This report primarily identified that prevailing construction practices and policies, based on conventional building methods, need to be modernised. Conventional construction methods of buildings in Pakistan have been consuming a major share of energy, and the building construction works have not yet been developed as per international standards and best practices by introducing conservation of resources (energy, land, water and materials), environmental protection, pollution reduction, and healthy and comfortable indoor space. A paradigm shift towards adopting green building methods by transfer of technology from developed countries has already started, with a green-benchmark being set after promulgation of Pakistan Environmental Protection Act 1997. Since then, the concept of green buildings has been further developed. Pakistan has also started to recognise “green” frameworks, and has been actively promoting sustainable development processes through the ‘National Action Plan on the UN’s Sustainable Development Goal (SDG) 12, Sustainable Consumption and Production (SCP)’, and most recently in the Policy Guidelines for Pakistan Green Building Code. Pakistan’s Green Vision for 2025 further sets out priorities for SCP in the building sector by seeking to achieve “eco-friendly” construction for all new buildings.

However, after a thorough analysis it is clear that the green building concept is still new for local markets, and more effort is needed to develop its value in the market as well as in the community. Many gaps remain including, but not limited to: market awareness regarding carbon emissions, integrative approach, support from all stakeholder groups, climate zonation, the use of vernacular and passive architecture, advancement towards net-zero emissions criteria, increasing awareness of stakeholders and capacity building measures, plans for retrofitting older buildings, and the use of voluntary compliance to kickstart a new code. Another key challenge is that support from all stakeholder groups would be required for the development and subsequent adoption of a GBC. Especially, the public sector needs to be sensitised and necessary amendments need to be included in building byelaws, regulations, standards, green building materials regulations, and specifications, both in public and private sectors. Most importantly, the roadmap for the implementation of the code needs to provide a common platform to all stakeholders in the construction market for assessing the needs and ways forward to formalising the code. At the same time, the market is gradually developing and key stakeholders share a positive outlook that the development of a GBC holds many opportunities, especially in the context of the integration of Sustainable Consumption and Production.

Progressive adoption, implementation, and enforcement of a Green Building Code in Pakistan will inculcate green thinking into all stakeholders and the society at large. This new awareness will provide an impetus towards demand for and integration of “green” or “near green” in building and construction practices. It will initiate deployment of new technologies and collaborative work, and will lead to the development of new green materials locally. The new direction and shift of society towards green buildings will contribute to mitigating the impacts of climate change and to the improvement of environmental quality, reduction in energy and water demands, and demands for other resources. Moreover, the development of and compliance with the GBC will contribute to achieving targets and goals of SDGs 3 (Good Health and Well Being), 6 (Clean Water and Sanitation), 7 (Affordable and Clean Energy), 8 (Decent Work and Economic Growth), 9 (Industry, Innovation and Infrastructure), 11 (Sustainable Cities and Communities), 13 (Climate Action), 15 (Life on Land), 17 (Partnerships to achieve the Goal), and especially SDG 12 (Responsible Consumption and Production) on the promotion of sustainable consumption and production.

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## ANNEX 2

# Process and institutional set-up for a Green Building Code in Pakistan

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# List of Abbreviations

<b>AASHE</b>	Association for the Advancement of Sustainability in Higher Education
<b>ABAD</b>	Association of Builders and Developers of Pakistan
<b>AKHF</b>	Khan Housing Foundation
<b>AHJs</b>	Authorities Having Jurisdiction
<b>AJ&amp;K</b>	Azad Jammu & Kashmir
<b>BBR18</b>	Boverkets byggregler (Swedish Building Code)
<b>BIM</b>	Building Information Modelling
<b>BR10</b>	Byggningsreglementet 2010 (Danish Building Regulations)
<b>CO<sub>2</sub></b>	Carbon Dioxide
<b>CS</b>	Compressive Strength
<b>CSR</b>	Corporate Social Responsibility
<b>EDGE</b>	Excellence in Design for Greater Efficiencies
<b>EIA</b>	Environmental Impact Assessment
<b>EnEV</b>	Energieeinsparverordnung (German Energy Regulations)
<b>EPD</b>	Environmental Product Declaration
<b>ERA</b>	Environmental Regulatory Authority
<b>EU</b>	European Union
<b>EUR</b>	Euro (€)
<b>FGEHA</b>	Federal Government Employees Housing Authority
<b>FYP</b>	Five Year Plan
<b>G-B</b>	Gilgit-Baltistan
<b>GB</b>	Green Building
<b>GBC</b>	Green Building Code
<b>GBIF</b>	Global Biodiversity Information Facility
<b>GFDRR</b>	Global Facility for Disaster Reduction and Recovery
<b>GHG</b>	Greenhouse Gas
<b>GIS</b>	Geographic Information Systems
<b>HVACR</b>	Heating, Ventilation, Air Conditioning and Refrigeration
<b>IBC®</b>	International Building Code
<b>ICC</b>	International Code Council
<b>IEQ</b>	Indoor Environmental Quality
<b>IFC</b>	International Finance Corporation
<b>IgCC®</b>	International Green Construction Code
<b>IT</b>	Information Technology
<b>IUCN</b>	International Union for the Conservation of Nature
<b>LCA</b>	Life Cycle Analysis/Assessment

<b>LEED</b>	Leadership in Energy and Environmental Design
<b>ML&amp;CD</b>	Military Lands and Cantonments Department
<b>MoCC</b>	Ministry of Climate Change
<b>MoHW</b>	Ministry of Housing and Works
<b>MoU</b>	Memorandum of Understanding
<b>MSMEs</b>	Micro, Small and Medium Enterprises
<b>NaVTTC</b>	National Vocational and Technical Training Commission
<b>NDMA</b>	National Disaster Management Authority
<b>NEECA</b>	National Energy Efficiency & Conservation Authority
<b>NESPAK</b>	National Engineering Services Pakistan
<b>NOA</b>	National Officers Academy
<b>NPHDA</b>	Naya Pakistan Housing & Development Authority
<b>NPHP</b>	Naya Pakistan Housing Programme
<b>NUST</b>	National University of Sciences and Technology
<b>O&amp;M</b>	Observation & Measurement
<b>Pak. PWD</b>	Pakistan Public Works Department
<b>PCATP</b>	Pakistan Council of Architects and Town Planners
<b>PDMA</b>	Pakistan Disaster Management Authority
<b>PEC</b>	Pakistan Engineering Council
<b>PGBC</b>	Pakistan Green Building Council
<b>PSQCA</b>	Pakistan Standards & Quality Control Authority
<b>R&amp;D</b>	Research & Development
<b>RBC</b>	Reinforced Brick Concrete
<b>RCC</b>	Reinforced Cement Concrete
<b>SCP</b>	Sustainable Consumption and Production
<b>SCPF</b>	Sustainable Consumption and Production Facility
<b>SDGs</b>	Sustainable Development Goals
<b>STARS®</b>	Sustainability Tracking, Assessment & Rating System™
<b>TEVTA</b>	Technical Education & Vocational Training Authority
<b>UN</b>	United Nations
<b>UNEP</b>	United Nations Environment Programme
<b>WGBC</b>	World Green Building Council



# 1 Context

## 1.1 Objective

The European Union (EU)-funded SWITCH-Asia programme was launched in 2007 to support sustainable consumption and production (SCP) and to promote inclusive sustainable growth while contributing to economic prosperity and poverty reduction in Asia. It also seeks to support the development of a green economy and the transition towards a low-carbon, resource-efficient and circular economy. Since its inception, seven calls for proposals were successfully implemented from 2007 to 2017 (worth 280 million Euro). The programme financed 100 projects, supported over 400 Asian and European not-for-profit partners, approximately 100 private sector associates, and benefitted up to 70,000 Asian micro-, small- and medium-sized enterprises (MSMEs). The second phase of SWITCH-Asia was launched in 2018 and the programme was extended to Central Asia. It now covers 24 countries (viz., Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka, Cambodia, China, Democratic People's Republic (DPR) Korea, Indonesia, Laos, Malaysia, Myanmar, Philippines, Thailand, Vietnam, Mongolia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan).

The SWITCH-Asia Sustainable Consumption and Production Facility (SCPF) aims to provide a platform to promote SCP policies and principles in Asia, and enhance the awareness and dialogue of local stakeholders on the theme. To achieve these goals, the SCPF fosters dynamic and evolving exchange through platforms to connect, both online and offline, key experts, entities and stakeholders who share an interest for impactful actions to further enable sustainable housing, a top priority for countries in the region, through relevant, responsible consumption and production patterns. Such platforms will enable participants to discuss ideas and lessons learned, and consequently, to identify and develop joint actions.

The objective of the assignment '*Promoting SCP implementation in Pakistan including around Pakistan's National Action Plan on SDG 12 (Green Buildings Code)*' is to promote efficient resource use in the building sector of Pakistan by executing some aspects of Pakistan's National Action Plan on SDG 12, thereby contributing to the development and operationalisation of Pakistan's Green Building Code (GBC).

This report specifically develops recommendations on the aim, scope, writing process and preliminary impact assessment for a to-be-developed Pakistan GBC. First, it defines "Green Building" and outlines its relevance in the Pakistani context. Next, it presents the roadmap, along with the accompanying processes necessary for the development of a new GBC for Pakistan to achieve sustainable development in the construction sector, by preserving natural resources and improving the indoor habitats. It then proposes the scope of the GBC, including its components, analyses the local building stock and the types of buildings for which green codes should be included in the GBC. To make the GBC a comprehensive and cogent document, a separate chapter on the GBC writing process has also been included, based on the previous *Consultation Report*. In addition, this report proposes the institutional set-up for the effective implementation of a GBC and provides an assessment of the GBC impacts in quantitative terms. Finally, it reviews relevant building codes already existing in some EU and Asian countries and assesses them in order to further contribute to the successful development and implementation of a GBC for Pakistan.

## 1.2 Aim: Definition of “green building”

A “green building” (GB) is a building that by design, construction and operation reduces or eliminates negative effects, while in some cases creating positive effects on the climate and natural environment. GBs preserve valuable natural resources and improve the quality of life. Typically a major focus of GBs is on sustainability and energy efficiencies of the building materials and operational systems used.

Pakistan’s Policy Guidelines for Green Building Code defines “green buildings” as,

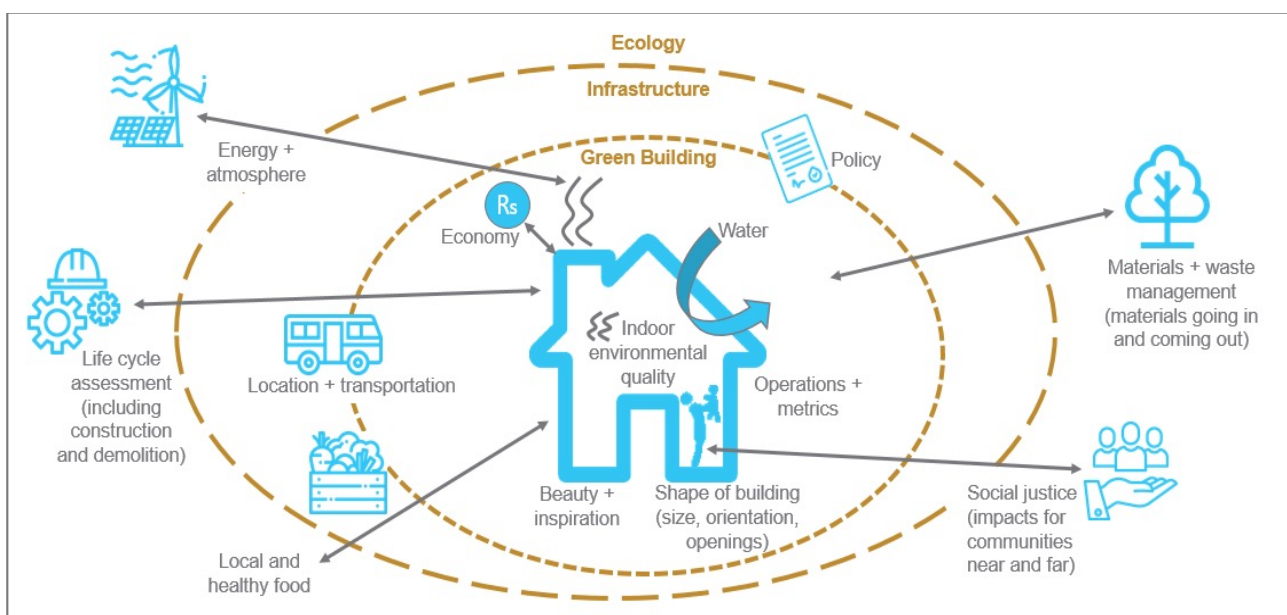
*“...both a structure and the application of processes that are environmentally responsible and resource efficient throughout a building’s life cycle; from planning to design, construction, operation, maintenance, renovation, and demolition” (Ministry of Climate Change et al., 2018, p. iv).*

In addition, other major players in the sector define a GB as:

- The planning, design, construction, and operation of buildings with the maximum conservation of resources (energy, land, water, and materials), environmental protection, pollution reduction, as well as providing people a healthy and comfortable indoor space (Chenyao Shen et al., 2020);
- Anticipating fundamental requirements to safeguard the environment, public health, safety, and general welfare (International Code Council, 2018); and
- Creating positive impacts on society, the climate and the natural environment, while at the same time preserving precious natural resources and improving our quality of life (World Green Building Council, 2020).

GB is a revolution in design and construction that provides a deeper understanding of problems and the numerous solutions emerging from creative work by architects, engineers, builders, contractors, economists, academics, industry, and allied professionals around the world. While an economy based on green principles is still a novel notion, GB represents a massive potential to contribute to economic prosperity and poverty reduction in Asia and Central Asia. Figure 1 provides a visual overview of GB themes.

**Figure 1: Factual and conceptual Green Building based on themes connected to broader social & ecological system<sup>1</sup>**



<sup>1</sup> Adapted from Cole, 2019

### 1.3 Findings from stakeholder consultations

Developing a process to set up a GBC requires the input of key stakeholders. Consultations took place throughout the assignment to gain socio-economic and technological insights to develop a comprehensive GBC for Pakistan, with a focus on Sustainable Consumption and Production (SCP) principles. The diverse set of stakeholders included representatives from Pakistani government agencies, United Nations (UN) and multi-donor agencies, civil society, builders and developers, architects, planners, corporate/private sector actors, financial institutions, and academia. Questionnaires were developed to solicit the opinions of concerned stakeholders towards developing a roadmap for a sustainable building regulation that encourages longstanding compliance. Participant responses revealed that the conventional construction practices in Pakistan are already undergoing a paradigm shift due to exposure to global GB construction technologies and practices. However, the adoption of GB technologies and practices based on the buildings' life cycle, without significant increase in cost, remains a challenge, and calls for government agencies to provide an enabling environment for the building industry to transform and adopt green building practices. The roadmap presented in the next chapter represents a view of the way forward that was supported by all the stakeholders. Table 1 presents the key findings of the stakeholder consultations.

*Table 1: Relevant findings from the stakeholder consultations*

To achieve parity with global standards, the preparation and enactment of a GBC is a dire need.
It is not easy to adopt a GBC in Pakistan due to its demography, local culture and lack of knowledge or capacities in GB in institutions and at urban, town and rural levels.
It would be best to follow internationally existing GBCs, as well as to align the GBC for Pakistan with UN's Sustainable Development Goals (SDGs), with greater focus on renewable energy sources.
To enhance green construction, innovative design solutions have to be worked out from the stage of building conception, site selection and orientation, while at the same time understanding the relevance of climate responsive materials and low carbon design.
GB terminology needs to be elaborated in English and the national language, Urdu. This would be for the people residing in, constructing or designing the buildings, and also for those connected to a GB through its life cycle, such as artisans, masons, work-supervisors, and inspectors.
Comprehensive knowledge of GB must be provided through training to architects, engineers and urban design professionals.
Industry and academia linkages are advised in future renditions of the roadmap.
Implementing a GBC in Pakistan will have a number of positive environmental consequences, such as efficient use of water, energy and natural resources.
A national-level techno-legal framework for effective implementation of the GBC is an important feature to add to the roadmap.
Mechanisms for the development, distribution and increasing the availability of green materials used for GB should be given in the roadmap.

A bottom-up approach to order the adoption and application of the GBC will not be feasible. The GBC, when finalised, must be first applied in all Government-funded building projects and pilot projects.

Capacities of GBC implementing and evaluating personnel need to be enhanced. Moreover, a public awareness campaign and providing financial relaxations and incentives to the private developers of GBs should be prioritised.

The GBC should be mandatory for building plan approvals to allow the construction of GBC-compliant structures throughout Pakistan.

## 1.4 Integrated green built environment and SCP approach


An integrated green-built-environment, with an eye towards SCP, has been widely accepted globally. In order for Pakistan to follow suit, it is important to identify key interventions and steps for a transformation to this type of paradigm and thinking. Applying an integrated approach to the Pakistani context requires the challenges and gaps to be identified and a way forward proposed. The interventions listed below represent global trends that have emerged in regard to GB. Table 2 relates these trends to key indicators, vulnerabilities in Pakistan, and proposed strategies for dealing with them in the GBC.

- Gradually flourishing “green” endeavors of various research & development (R&D) sectors have resulted in the promulgation of “green” laws, regulations, byelaws and polices, keeping in view the SDGs and the United Nations programme on climate change.
- Major gaps, challenges, issues, and opportunities in the adaptation of GB worldwide have already been identified for an international context.
- Low embodied-energy and sustainable building materials and technologies already significantly contribute in reducing the carbon footprint considering the life cycle assessment (LCA) of buildings. Hundreds of building materials worldwide have been selected and evaluated in this regard.
- Maintaining sustainable sites is made possible by following the appropriate implementation of environmental considerations, such as compliance within structures of environmental impact assessment (EIA).
- Efficient utilisation of natural resources during building construction, maintenance and LCA is already practised in many countries.
- Effective regulatory frameworks are often included in byelaws, including multi-stage monitoring and inspection of buildings by respective Authorities Having Jurisdiction (AHJs).
- Communal participation in GB planning has been established for stronger compliance and dissemination of information at the community level.
- GB architecture, design and planning have resulted in widespread promotion of green construction, inspiring leading global construction companies, and the construction industry at large, to adopt GB methods and technologies.
- Installation of energy-efficient-lighting and allied equipment is an advanced component of GB.
- Salient features of GB now include integrated water resource management for efficient use of water, rainwater harvesting, wastewater treatment and segregation in grey and black, and its reuse, recycling, etc.; and waste management such as solid waste management and waste segregation, waste to energy, recycling, reuse, etc.

- Building Information Modelling (BIM), which is based on integrated inputs of all building systems such as Heating, Ventilation, Air Conditioning and Refrigeration (HVACR), Water, Energy, Indoor Air Quality, Pollution Control Technologies, Green and Clean Energy production by Solar, Wind, Biogas, etc., plays a vital role for the complete LCA of GBs.
- Addressing ergonomic stress can help to ensure a healthy and safe environment with allied benefits, and is important for marketing GBs to end users.

*Table 2: Integrated green building environment in the Pakistani context*

INDICATORS	VULNERABILITY	CHALLENGE	GAPS	WAY FORWARD
<b>Extreme Heat</b> 	Gradually increasing temperature of urban areas across the country—40°C and above.	Low embodied-energy-based construction materials not yet introduced or used for GB construction.	Lack of pollution control and green technologies; lack of awareness, training and capacity building on GB technologies.	Building byelaws of all AHJs shall be revised and updated in line with modernised green construction methods adopted worldwide to overcome extreme temperatures.
<b>Urban Flooding</b> 	Storm water lashes downstream areas causing huge economic and infrastructure damage as well as loss of life every year.	Increased precipitation; poor urbanization patterns; construction of houses in downstream waterways and encroachments on nullahs.	Lack of sewage system, storm-water drainage, and solid waste management system.	GBs to be built applying appropriate Geographic Information System (GIS) applications/analysis during urban planning, keeping in view architectural and hydrological patterns, sewage and services lines, modelling of the landscape, etc.
<b>Water Scarcity</b> 	Acute water shortage in all cities of Pakistan causing drastic decline in per capita water availability, especially over the last decade.	Uncontrolled extraction of groundwater; lack of rainwater harvesting; delayed initiatives for achieving set goals and targets of all public policies.	Huge gap in water demand and supply; lack of water efficiency and reuse/recycling technologies; delays in water sector development; poor water storage, of up to 30 days only.	Regulate groundwater extraction by law; initiate green plumbing for water efficiency and reuse in green buildings; make rainwater harvesting mandatory in rain-fed regions of the country.

INDICATORS	VULNERABILITY	CHALLENGE	GAPS	WAY FORWARD
<b>Earthquake</b> 	Pakistan lies in a seismically active region of the world where the occurrence of earthquakes has drastically increased.	Updating of seismic code-2007 is overdue by 15 years; delay in introduction of seismically durable and safe construction materials and methods.	Revision of Pakistan's building code is needed; introduction of alternative construction materials and methods.	Pakistan needs an integrated GBC addressing national issues, major threats and climate change impacts.

## 1.5 Green built environment to overcome natural hazards

The existing conventional built environment of Pakistan is extremely prone to multiple hazards. According to the INFORM Index for Risk Management (2017), developed by the EU's Joint Research Committee, Pakistan lacks the coping capacities against natural and climatic hazards. It ranks 13 among 191 countries on the global scale in terms of risk and of needing international assistance in the near future to prepare for and prevent the impacts of hazards (see Table 3). The risk is especially high for hazards of natural disasters (exposure to earthquakes, floods, etc.), migration from high-risk areas and the resulting human conflict. The conventional built environment, therefore, urgently needs to be transformed into an integrated green-built-environment in line with well-recognized international standards and best practices adopted worldwide.

*Table 3: Index for risk management in Pakistan<sup>2</sup>*

TYPE OF HAZARD	VALUE	OVERALL GLOBAL RANK
<b>Hazard &amp; Exposure</b>	<b>9.0</b>	<b>13</b>
Natural	7.2	
Human	10.0	
<b>Vulnerability</b>	<b>5.5</b>	
Social-economic Vulnerability	3.9	
Vulnerable Groups	6.7	
<b>Lack of Coping Capacity</b>	<b>5.7</b>	
Institutional	5.4	
Infrastructure	6.0	

At the same time, GB technologies offer a high potential to make this transition. Table 4 provides an overview of key indicators for risks due to population growth on the conventional building stock and how these can be overcome using GB methodologies.

<sup>2</sup> Adapted from European Commission, Joint Research Centre, Marin-Ferrer, M., Poljanšek, K., Vernaccini, L., 2017.

Table 4: Potential for transformation to green built environment in Pakistan

INDICATORS OF NEED FOR LONG-TERM & SHORT-TERM NATIONAL PLANS	POTENTIAL FOR INTRODUCTION OF EMERGING GB TECHNOLOGIES
<ul style="list-style-type: none"> <li>• Fifth most populous country, with 212 million people</li> <li>• Significant increase in demand of new housing units of 500,000 per year</li> <li>• Limited construction capacity of 200,000 housing units per year leaves a shortage of 300,000 units per year</li> <li>• Existing deficit of about 10 million housing units</li> </ul>	<ul style="list-style-type: none"> <li>• Alternative green construction technologies, e.g., fibre and steel reinforced materials</li> <li>• Market potential for green construction materials</li> <li>• Increasing demand for renewable energy (wind, solar, biogas)</li> <li>• Efficient use of water through rainwater harvesting, water treatment, etc.</li> <li>• Solid waste management</li> <li>• Green investments/loans by banks</li> </ul>

## 2 Roadmap to develop Pakistan’s Green Building Code

In order to achieve successful development, acceptance and implementation of a new GBC for Pakistan, a clear path must be established. Figure 2 visualises the proposed roadmap (updated as per recommendations from the stakeholder consultations) for the development of the GBC. It presents a strategic overview of all relevant and essential elements, while keeping in view the local needs and requirements.

The beginning of the process entails **an analysis of existing national and international codes** and standards, in addition to the analysis of the existing *Policy Guidelines for Green Building Code in Pakistan*. Representative prototypes and models based on the literature review should be consolidated into a consultation document intended to guide the process of development and writing of the new GBC.

Another critical primary step is the constitution of a national level **Task Force** for the development of the GBC by the Ministry of Climate Change (MoCC) in collaboration with the Ministry of Housing and Works (MoHW), and professional bodies such as the Pakistan Engineering Council (PEC), Pakistan Council of Architects and Town Planners (PCATP), and other similar agencies. The Task Force should be comprised of relevant experts from the engineering sector, industry and academia, regulatory bodies, concerned ministries/line departments, major stakeholders and, if required, international experts. The GBC should be developed through a participatory process engaging all those noted above and additional key stakeholders including, but not limited to, the National Energy Efficiency & Conservation Authority (NEECA), United Nations Environment Programme (UNEP), EU SWITCH-Asia, and UN-Habitat. The Task Force should set up expert **Technical Committees** to focus on various aspects of the GBC; for example, on Green Performance Rating Systems to study various rating tools and systems, and recommend a system supporting the standard implementation of the GBC in Pakistan. Other Technical Committees could focus on topics such as Removal of Barriers to Technology Transfer, Incentives for Market Development and Adoption of GB Technology, to name a few. Throughout the development of the GBC, **expert consultations**, stakeholder and practitioner

interviews, and field visits should take place.

Next, a techno-legal framework should be prepared for the GBC, which would clarify the **aim, scope, code-writing process and impact assessment**. It should also specify components for its effective implementation at the federal and provincial levels, such as:

- Accreditation, testing and calibration of electrical, mechanical and water supply equipment and systems;
- Definition of performance goals, including theoretical energy consumption ranges for proposed building systems;
- Parametric analysis and life-cycle cost analysis;
- Adaptation and adoption by construction industry of modernized green building architectural, structural and energy systems, designed through software technologies (for example, BIM);
- Production of green construction materials and methods as per international standards, and marking with Green Rating Stars;
- Capacity building for skilled and unskilled human resource for designing and constructing green buildings;
- Capacity building of AHJs;
- Preparation of a Schedule of Works as per the GBC, as well as standards and specifications for both existing and new buildings;
- Ensuring compatibility of specified construction standards and specifications with information technology (IT) software-based applications for adoption of up-to-date construction practices; and
- Capacity building of architects, engineers, designers, and skilled workforce (e.g., masons).

To enhance knowledge and understanding of GBs, a comprehensive and integrated programme for **capacity building and skill development** must be developed. Induction of GB concepts and innovative technologies could be introduced by vocational training institutions, engineering and technical universities. These facilities may be developed through public-private partnership, and should promote strong linkages with industry and academia for producing accredited professionals and creating a cadre of professionals for municipalities and building control authorities to support the GBC.

To support acceptance and implementation, the government should additionally develop an **incentive programme** to attract builders, developers and investors to GB practices. The adoption of the programme should be voluntary for at least five years in the initial phase, after which compliance may be made mandatory. The public sector should take the lead for mandatory compliance along with starting awareness campaigns and provision of appropriate knowledge to the community and end users. Some initial ideas for incentives could be used to guide the implementation of sustainable, low-carbon, efficient resource-use and environment-friendly construction practices. In accordance with the updated scientific data as per international benchmarks for effective monitoring of quality construction practices, such incentives could potentially include:

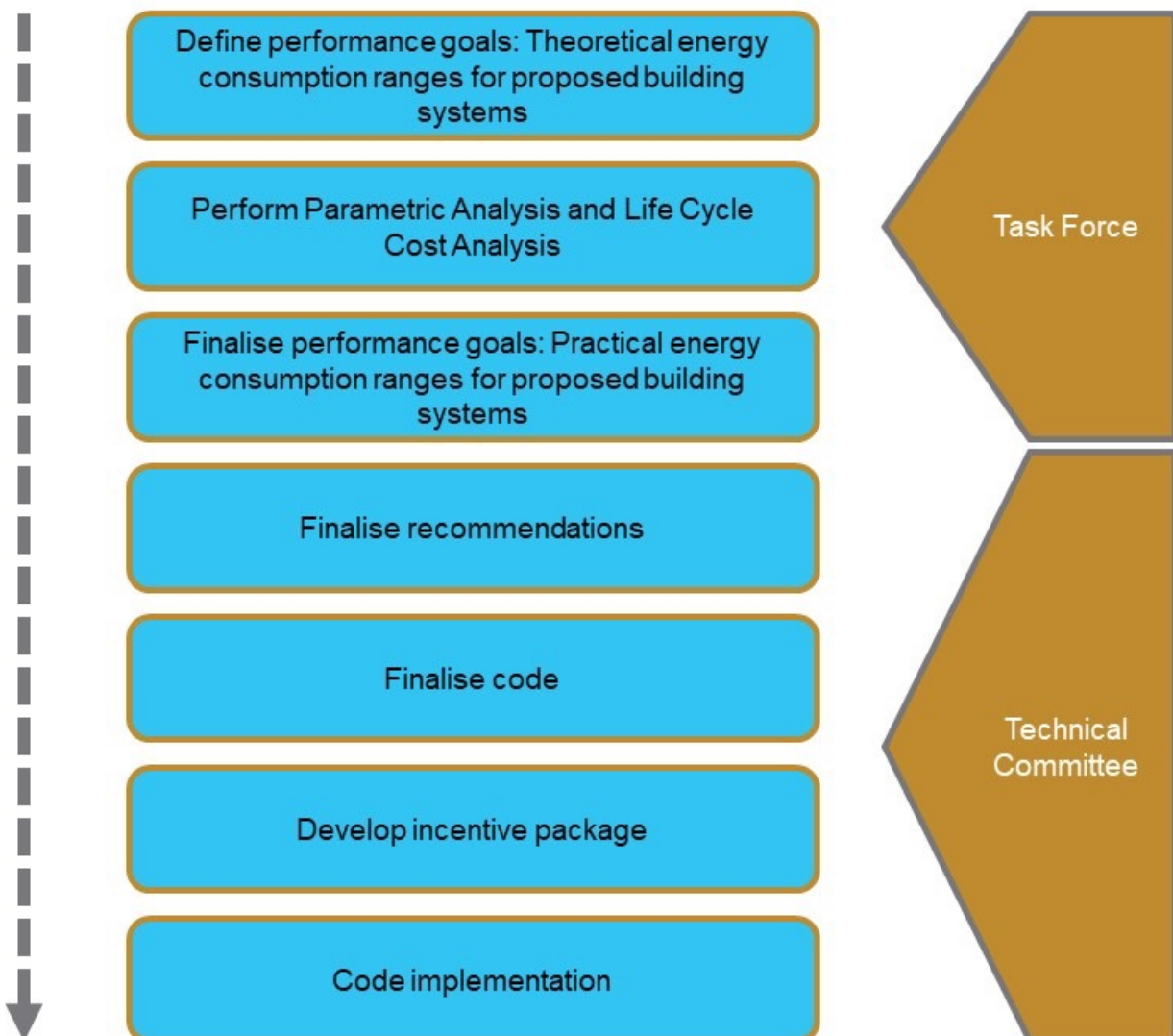
- Promoting GB practices adopted worldwide
- Capacity and skill building
- Enforcement and compliance of the GBC through fiscal and financial measures such as
- Low or zero tax on certified sustainable materials;
- Low interest loans for those using green materials and methodologies;
- Green mortgages for those purchasing housing using GB materials and methodologies;



- Tax exemptions and carbon credits;
- Tax rebate for owners of green buildings;
- Monetary Incentives the builder and the end user;
- Reduced taxes on green materials import.

The principle of corporate social responsibility (CSR) may also be used as a vehicle to promote and support programmes on innovation and local production of green building materials by small- and medium-scale entrepreneurs to benefit the local societies. Leadership and commitment at the corporate level can help penetrate the GB concepts into the larger society. The GBC implementing authorities should declare some mandatory sustainable measures for all corporations and industries, for example, to invest 5 to 10 per cent in green energy generation.

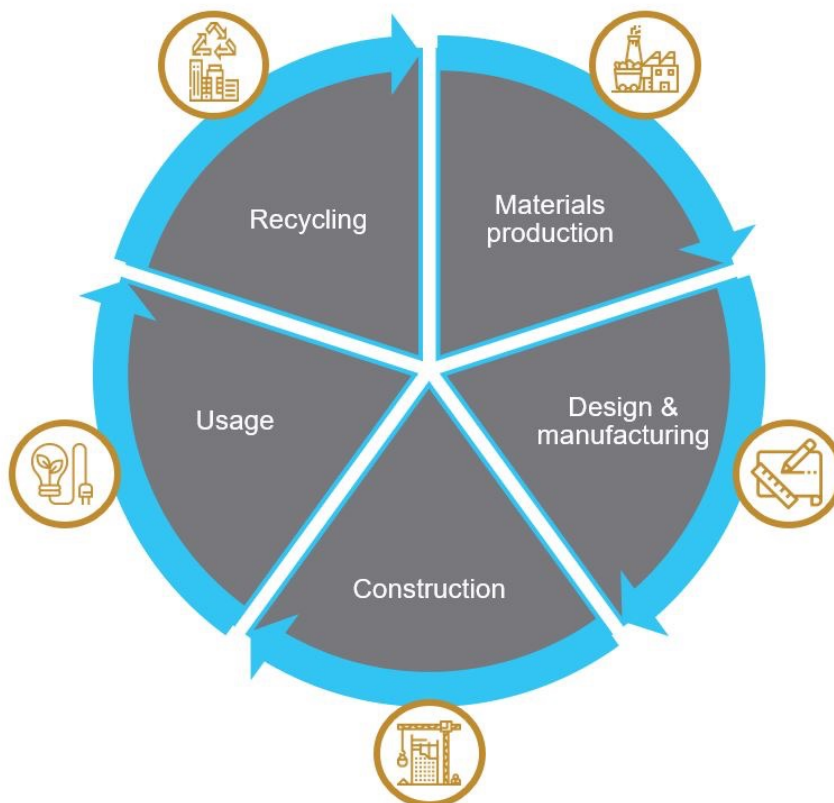
*Figure 2: Simplified roadmap for development of the Green Building Code*



### 3 Scope

The main purpose of a building code is to protect public health, safety and general welfare as it relates to the construction and occupancy of buildings and structures. The building code becomes law of a particular jurisdiction when formally enacted by the appropriate governmental or private authority. Having written the Pakistan Building Code in 1986, the MoCC has some experience in issues of environmental protection and building sustainability. Developing the new GBC will allow them to further provide a credible regulatory framework for creating a greener building stock. The GBC should recommend a model code approach, which would allow the local jurisdictions to adopt energy and water-use efficiency, sustainable building materials, minimise heat island effects, and improve indoor air quality in the design, construction and post-completion stages of green buildings. The GBC should also take into account the local conditions such as weather/climate and geographical considerations; and comply with the local, provincial and federal laws. The review of suggestions received from the major stakeholders of the GBC suggests that the scope of the GBC should also incorporate the requirements of modern buildings’ construction, observation and measurement (O&M) processes, and ensure environmental sustainability at all stages of a building’s life cycle (see Figure 3 below).<sup>3</sup> Stakeholders further suggested that it should include provisions for existing buildings’ renovations, alteration or retrofitting.

Figure 3: Stages of a building’s life cycle



<sup>3</sup> Adapted from SWITCH-Asia Sustainable Consumption and Production Facility, 2019.

## 3.1 Basis for the GBC

### 3.1.1 Existing codes

The framers of Pakistan's GBC must ensure that it incorporates the principles of SCP. At present four building codes are operative in the country:

- Building Code of Pakistan (1986);
- Seismic Provisions Code (2007);
- Building Energy Code (2008); and
- Fire Safety Provisions Code (2017).

In addition, the local "Building Regulations/Standards" are framed by the local governments, which determine the primary requirements for occupants' safety, health, accessibility, hazards, earthquakes, and structural protection of buildings, in their respective jurisdictions. These existing codes are well-suited to act as a framework and outline for the writing of the GBC. The Building Energy Code, for example, can provide insights for the minimum benchmarks of energy efficiency targets.

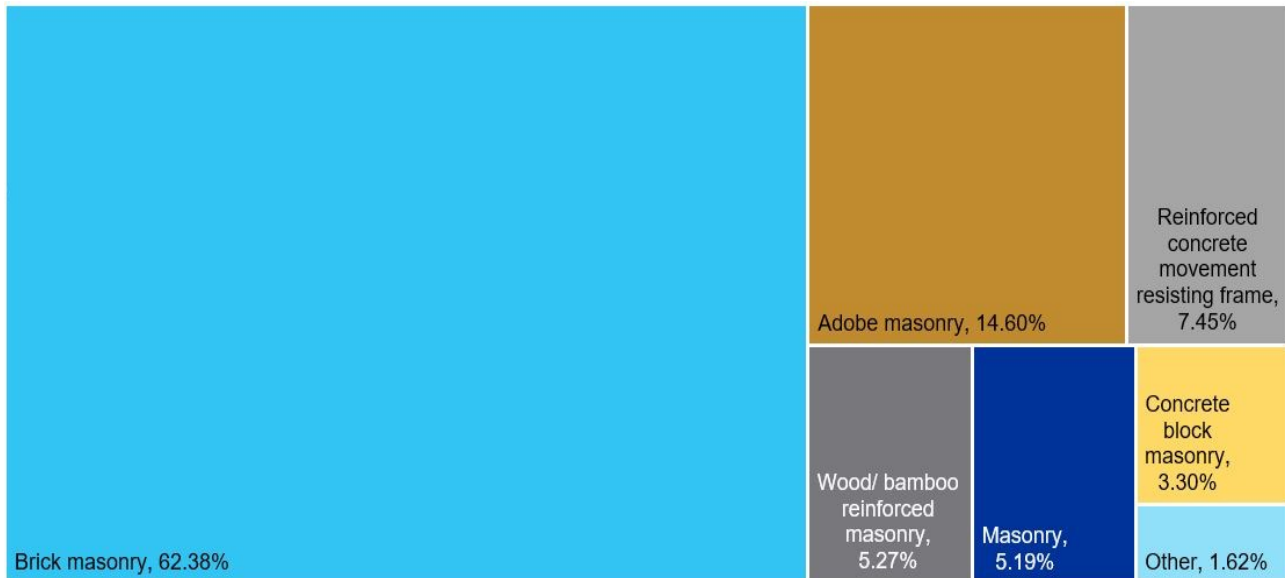
### 3.1.2 Selection of a base document

The scope of the International Building Code® (IBC®) includes all buildings except detached one- and two-family dwellings, and townhouses up to three stories. It comprises a set of rules that specify the standards for constructed buildings and non-building structures, and has been adopted by most jurisdictions in the USA as a base document on which many kinds of building codes are built. Building plans must conform to the code to obtain permission, usually from a local council. The International Code Council's (ICC) 2021 International Green Construction Code® (IgCC®) can also act as a guide for the GBC as it sets out provisions for the design and construction industries to deliver high-performance buildings that consider criteria for energy efficiency, resource conservation, water safety, land use, site development, Indoor Environmental Quality (IEQ), and building performance. The broad scope can be applied to a wide range of buildings. By using these as a basis for the GBC, the government can reduce costs of developing the code from scratch.

## 3.2 Analysis of current building stock

Around 90 per cent of buildings in Pakistan are non-engineered; the remaining could be considered built with specialised engineering. There exists a huge stock of old and dilapidated buildings, including numerous dangerous buildings. Currently, the building stock in Pakistan is predominantly brick masonry as seen in Figure 4 (World Conference on Earthquake Engineering, 2012). More than 50 per cent of the buildings are more than 10 years old (Maqsood, 2011). At the time of publication, the country had less than 50 green buildings certified by one of the following: Leadership in Energy and Environmental Design [LEED], Energy Star Challenge for Industry, Association for the Advancement of Sustainability in Higher Education [AASHE], Sustainability Tracking, Assessment & Rating System™ [STARS®], and Excellence in Design for Greater Efficiencies [EDGE] (Green Building Information Gateway [GBIG], 2021; EDGE, 2021).

Figure 4: Existing buildings in Pakistan by construction type



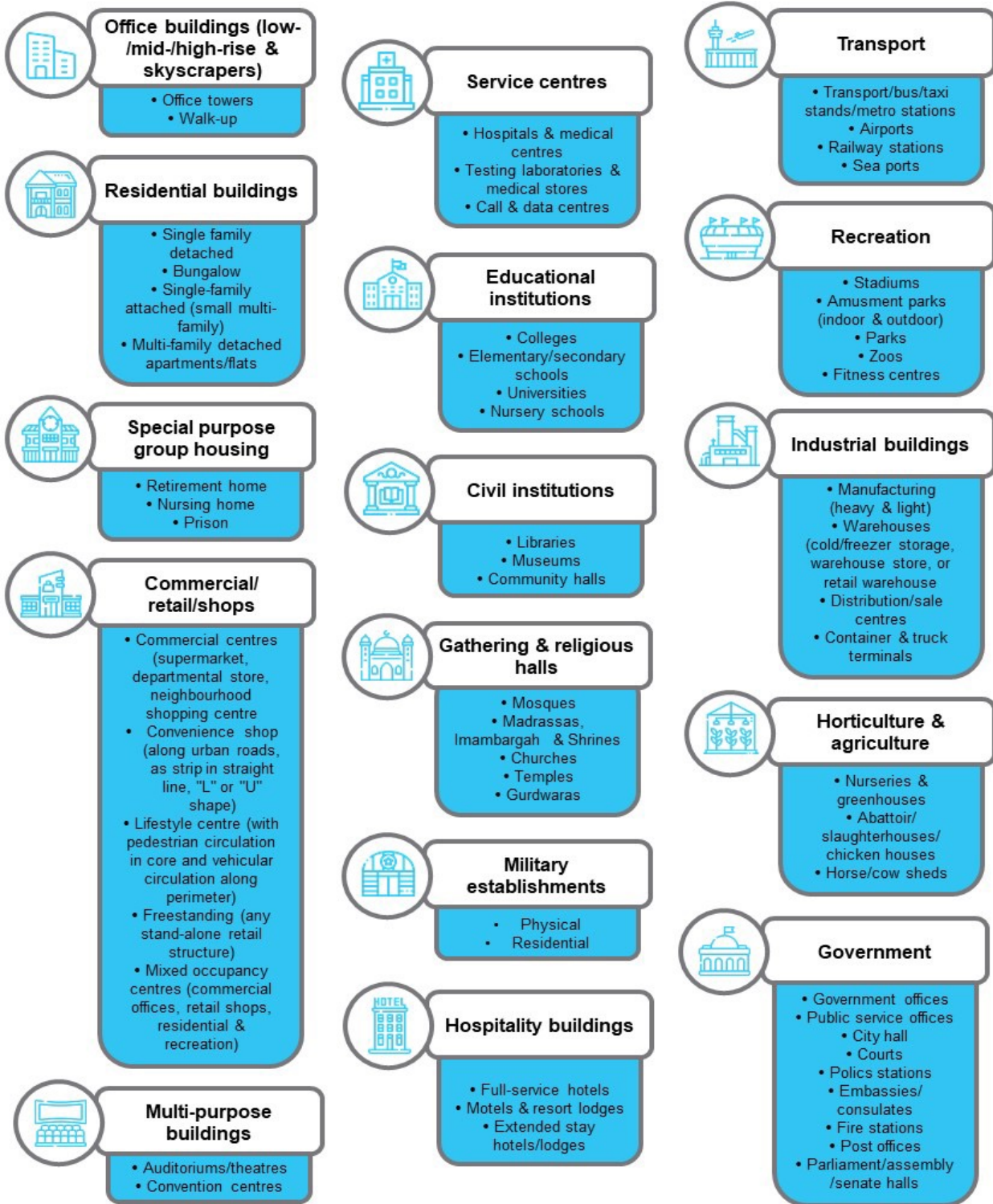
### 3.3 Definition of building types to be covered by the GBC

Considering the buildings and houses under construction as well as existing buildings, it is suggested that after a cut-off date, the buildings mandated to follow the GBC should be classified by 1) building types by use; 2) building types by construction; and 3) categories of green buildings.

#### 3.3.1 Building types by use

Each type of the buildings in Figure 5 should be placed in two sub-groups: 1) For which the application of GBC will be **Mandatory**; and 2) Buildings or houses for which following the GBC would be **Voluntary** or **Provisional**.

Figure 5: Types of buildings by use to be covered by the GBC



### 3.3.2 Building types by construction

When it comes to designing a structure, the construction type chosen is based on a number of considerations, such as

- Purpose of the structure
- Size of the structure
- Load-bearing constraints

- Environmental factors and natural hazards
- Pace of construction – construction types/methods (on-site, modular, pre-engineered)
- Cost of materials

For the purpose of the GBC, construction types in Pakistan can be categorised into the following groups:

- **Conventional mud/adobe walls and thatched roof houses** where building elements are of any material allowed by GBC.
- **Load-bearing masonry** (bricks laid in compressive strength [CS] mortar, or solid/hollow CS blocks) and **reinforced brick concrete (RBC)** or **reinforced cement concrete (RCC) roof**, where building elements are of noncombustible material.
- **Concrete/RCC frame structure**, where exterior walls are of noncombustible materials and the interior walls and building elements are of any material allowed by GBC.
- **Steel frame and light weight panels** (joisted or load bearing), made of fire resistant and non-combustible materials (for high-rise buildings),
- **Pre-engineered** (modular, prefabricated, columns and beams on foundations).

### 3.3.3 Categories of GBs

The following categories can assist GB designers and builders to select sustainable features for inclusion in their project, and hence promote the application of GBC. These categories generally classify the different technologies available for GB and help in defining the broader GB concept.

1. **Site Selection** includes elements such as type of infrastructure available, proximity to public transportation, storm-water management, and roofing.
2. **Water Efficiency** limits the use of water inside and outside the building by considering water demand reduction by using low-flow restroom fixtures, and high-efficiency systems and supply that, for example, recycle storm-water or grey-water (used from showers, wash basins, and laundry).
3. **Energy Efficiency** focuses on ways to reduce demand by incorporating features such as passive design like natural shading and lighting, high efficiency lighting, building controls (for example, automated lighting or air conditioning using sensor technology), and effective HVACR management. It also includes supplying renewable energy by using technologies like solar photovoltaic panels and solar hot water heaters.
4. **Materials and Resources** include reduction of waste in construction and operation, the way the construction materials are disposed of, and using materials in building finishes that reduce the waste to be disposed of in landfills.
5. **Indoor Environmental Quality (IEQ)** focuses on keeping the building healthy for its occupants by regulating thermal comfort, increasing natural lighting, improving indoor air quality, and minimizing noise levels, thereby reducing absenteeism at work and increasing occupant productivity.

These categories are interrelated; for example, improved natural lighting provides better indoor environmental quality while reducing electricity demand and cost for artificial lighting. The GB developer/investors can decide the priority areas in which to invest, based on the payback calculations and cost-benefit analysis; for example, if the aim is to save money on energy in a project, then the focus should be on energy efficiency measures.

## 4 Writing process

Code development is a complex process that involves technical expertise of various expert groups. Similar to other globally recognised standards and best practices, the GBC for Pakistan should be developed following a thorough methodology. First, a stakeholder analysis should take place to identify key players in the realm of GB in Pakistan. Next, the Task Force described in the roadmap should guide the writing of the GBC and take responsibility for its content. Next, the methodology for the writing of the GBC should be developed. When that is in place, the institutional set-up can be decided. This section proposes the course of action for the writing process for Pakistan's GBC.

### 4.1 Stakeholder analysis

The writing of the GBC involves the primary process of stakeholders' consultation and the secondary process of indigenisation for local conditions by harmonising of local laws and regulations. Keeping in view the precedent followed in the case of the Building Code of Pakistan 1986, and to expedite the implementation of GBC, it is recommended that the MoCC should take the responsibility of developing the Pakistan GBC. In addition, the GBC-concerned officials, fire and inspection staff in the Urban Development Authorities or Metropolitan Corporations, Municipal or Town Committees, Rural or Village Development Councils, and also the Cantonment Boards or Defence Housing Authorities should be immediately notified, consulted on the GBC and effectively trained to manage the enforcement and monitoring of relevant provisions of the new GBC in their respective jurisdictions, including the on-site inspection during all stages of construction and GB permit issuance. Table 5 outlines the key stakeholders at the national level who should additionally be involved in some form, for example through consultations in the GBC writing process. A full list of stakeholders, both at the national level and state/provincial levels, is provided in the Annex.

As previously mentioned, a national level, high profile Task Force should be constituted. This group would work on their dedicated disciplines while developing the GBC. A list of eight sub-committees of experts is suggested below, which can also form the basis of the aforementioned Technical Committees in the roadmap.

1. Committee on Structural and Allied Engineering Aspects of GBC
2. Committee on Green Architectural Design and Innovation
3. Committee on International Resource Material, Copyrights, Memorandum of Understanding (MoU), etc.
4. Committee on Website Development, Management and Regular Maintenance
5. Committee on Evaluation of New Technology and Systems
6. Committee on GBC Compliance Rating System
7. Committee on Incentives for Market Development
8. Committee on Green Building Design and Materials

Table 5: Key stakeholders in the development of a GBC for Pakistan

	STATE	PRIVATE SECTOR	CIVIL SOCIETY
<b>Key stakeholders</b>	Ministry of Climate Change (MoCC) Ministry of Housing and Works (MoHW) National Energy Efficiency & Conservation Authority (NEECA) Pakistan Public Works Department (Pak. PWD) Naya Pakistan Housing & Development Authority (NPHDA) Federal Government Employees Housing Authority (FGEHA) National Officers Academy (NOA)	Pakistan Council of Architects and Town Planners Pakistan Engineering Council (PEC) Capital Development Authority Islamabad Capital Territory Administration Energy Efficiency Associations and Corporate Institutions Green Building Councils	UN-Habitat Pakistan Green Building Council (PGBC)
<b>Primary</b>	National Disaster Management Authority (NDMA) National Engineering Services Pakistan (NESPAK) Military Lands and Cantonments Department (ML&CD) National Vocational and Technical Training Commission (NaVTTC) Technical Education & Vocational Training Authority (TEVTA) Pakistan Standards & Quality Control Authority (PSQCA)	Banks (Government and Private) Housing Finance Institutions (Corporate and Limited) Association Of Builders and Developers of Pakistan (ABAD)	Environmental NGOs International Union for the Conservation of Nature (IUCN) Global Biodiversity Information Facility (GBIF) Aga Khan Housing Foundation (AKHF)
<b>Secondary</b>	State Universities	Engineering and Architecture Universities and Colleges Building Research & Development (R&D) Institutions	



## 4.2 Methodology to prepare the GBC

The GBC should be developed separate from the GB regulations/reference standards/byelaws to be framed by provincial or local governments. At the same time, some degree of freedom should be provided to provincial and local governments for modifying, adopting and enforcing respective building regulations as per ground realities. It is suggested that the national GBC should therefore serve as a model code providing guidelines for regulating green construction activity, and allowing their equivalents to be developed and enforced at provincial or local levels. This way, each local government/municipality/development authority will have its own version of the GBC, tailored to the construction within their jurisdiction. It is also recommended that the GBC and its consequent building regulations/reference standards/ byelaws be reviewed and updated, or revised, amended or deleted (where necessary) every five years. This will allow for new construction methods and technologies to be incorporated into the code, inclusive of residential and non-residential occupancies both in urban and rural buildings. During its first five years after promulgation, the GBC shall be applicable to buildings of all occupancies, other than one- and two-family houses, and residential occupancies/apartments that are three stories or less in height. In general, the GBC should be prepared as per the following sequential steps:

**Step One:** The MoCC will notify the Task Force under the chairmanship of Federal Secretary (for Climate Change), additionally comprising the Secretaries of all provincial governments; and of the governments of Gilgit-Baltistan (G-B) and Azad Jammu and Kashmir (AJ&K). The Task Force, in its first meeting, will notify the Technical Committees previously outlined to begin work on the GBC within their respective disciplines. The scope of work of each committee will include conducting a comprehensive evaluation of existing zoning policies, building codes, regulations, byelaws and statutory orders pertaining to their respective disciplines. They will also indicate the barriers and deficiencies which may affect the timely implementation and effectiveness of the GBC. In addition, the environmental hot spots affecting the life-cycle analysis of GBs, or directly affecting the GBC objectives, will be analysed. The potential trade-offs in using various resources/materials and techniques, as well as their effect on the functional performance of green buildings will be identified. The performance objectives and codes for application in the respective construction stages of green buildings will be collated, with a continuing emphasis on resource efficiency and SCP throughout the buildings' life cycle. A bottom-up approach will be followed, responding to each development stage -- planning, design, construction, completion and commissioning, and post-occupation O&M.

**Step Two:** The MoCC, upon receipt of the preliminary reports from all Technical Committees, will mobilize a group or engage a consultant to collect, compile, collate and draft the criteria separately for each of the proposed topics and sub-topics in Table 6. Where possible, the proposed criteria should be expressed both in quantitative and qualitative terms to ease the evaluation of and compliance with the GBC.

Table 6: Proposed topics for the Pakistan GBC

<b>A – SITE PLANNING &amp; DEVELOPMENT</b>	
<b>Area Development and Land use</b>	<ul style="list-style-type: none"> <li>• Plan for energy-conserving layout, with easy access to schools, work, public transportation</li> <li>• Cluster buildings around green lots. Plant trees in paved areas to reduce Heat Island Effect.</li> <li>• Use recycled materials/aggregates and wastes from agriculture and industries for paved areas such as streets, sidewalks and parking lots, and for open green spaces</li> <li>• Protect and preserve maximum natural site features/resources, including water bodies</li> <li>• Create well-connected green/quality living places, resilient to climate change and natural disasters</li> </ul>
<b>Building Energy Efficiency</b>	<ul style="list-style-type: none"> <li>• Site configuration, Orientation of buildings, Shading features, Plantation, etc.</li> <li>• Glazing and windows (fenestration), Lighting (day lighting and comfortable indoor lighting), Walls (non-glazed facades, external paints), and Roofs (shape, green roof and skylights)</li> <li>• Glare control, Moveable louvers, Tinted glass, Fenestration surface area limits</li> </ul>
<b>B - GREEN BUILDING CONSTRUCTION</b>	
<b>General</b>	<ul style="list-style-type: none"> <li>• Green building materials and products procurement, including transparency and optimal use</li> <li>• Collection, storage and reuse of recyclable materials</li> </ul>
<b>Green Building Safety</b>	<ul style="list-style-type: none"> <li>• Seismic-zone-wise site soil-foundation interface (Piles, Caissons)</li> <li>• Foundation-to-superstructure connection, Retaining walls</li> <li>• Structural framing and pre-fabricated construction as per seismic and wind design</li> <li>• Dead- and Live-loads distribution, Seismic load combination</li> <li>• Flood-resistant construction, Non-building structures – Rigid, Supported</li> <li>• Non-destructive testing (structural steel, concrete, masonry, electro-mechanical, etc.)</li> </ul>
<b>Fire Safety</b>	<ul style="list-style-type: none"> <li>• Fire protection zones and boundaries in green buildings, Emergency egress</li> <li>• Asbestos use (as per specified safety considerations, especially in refurbishment)</li> <li>• Interior finishes and paints, use of non-combustible partitions and furnishings</li> <li>• Fire/smoke alarms, Safety equipment such as fire extinguishers, sprinklers, pumps, fire hydrants</li> <li>• Fire smoke control, partitions/barriers, building evacuation and fire assembly spots</li> <li>• Electrical and gas fire safety, Communication system</li> </ul>

## C – RESOURCE EFFICIENCY

<b>Water Efficiency &amp; Grey Water Disposal</b>	<ul style="list-style-type: none"><li>• Water tanks and fixtures, Bulk water storage, Rainwater harvesting &amp; collection</li><li>• Indoor water use reduction &amp; metering</li><li>• Water-efficient landscaping, Outdoor water-use reduction</li><li>• Wastewater collection &amp; treatment plants, Recycled water, Non-desalinated water for air-conditioning</li></ul>
<b>Energy Efficiency</b>	<ul style="list-style-type: none"><li>• Building envelope trade-off options via necessary interventions</li><li>• Outdoor lighting, HVACR-equipment efficiency, CFC-free refrigerants</li><li>• Cooling systems (internal cooling, radiant cooling, local &amp; solar-absorption cooling)</li><li>• Water heating, Reverse metering, Thermal comfort, Renewable energy production</li><li>• Indoor lighting fixtures, systems &amp; smart control devices, Monitoring of efficiency, Solar</li></ul>
<b>Gas Supply</b>	<ul style="list-style-type: none"><li>• *To be framed as advised by concerned Agency</li></ul>
<b>Indoor Air Quality &amp; Comfort</b>	<ul style="list-style-type: none"><li>• Minimum and enhanced indoor air quality</li><li>• Environmental smoke control, Operable windows, and Daylight</li><li>• Interior lighting and ceiling fans</li><li>• Chemical Pollution and use of Low-emitting Materials</li><li>• Air-borne sound insulation/Acoustic control</li><li>• Efficient and passive ventilation, Indoor air quality</li></ul>
<b>Material Resource Conservation &amp; Waste</b>	<ul style="list-style-type: none"><li>• Proper disposal of Asbestos-mix material (as per waste treatment &amp; disposal/recycling criteria)</li><li>• Acoustic and Thermal materials</li><li>• Proper handling of materials containing Lead and Heavy Metals</li><li>• Management of materials with Ozone depleting potential</li><li>• Construction and demolition waste disposal and management</li><li>• Management of recycled waste content</li></ul>

## D – POST-COMPLETION GREEN BUILDING ACTIONS

<b>General</b>	<ul style="list-style-type: none"><li>• Commissioning and inspection after completion of Green Building</li><li>• Optimizing O&amp;M of Green Building – Eco-friendly land-use development</li></ul>
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## E – GREEN BUILDING CODE COMPLIANCE & INFORMATIVE REFERENCES

<b>General</b>	<ul style="list-style-type: none"><li>• Green Building commissioning pre-requisites and compliance paths</li><li>• Optimal O&amp;M of Green Building checklists</li><li>• Code Compliance forms, worksheets, Reference manuals</li></ul>
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**Step Three:** The MoCC will circulate among all major GBC stakeholders (see Table 5 & Annex) the Draft GBC as per the above format, to seek their concurrence on the proposed sections, provisions, criteria, content and text.

**Step Four:** The consensus, comments and observations on the Draft GBC will be submitted to the MoCC, and the Task Force will be notified for final review and formal vetting.

**Step Five:** The MoCC will accordingly finalise the Green Building Code for Pakistan document, and process its formal approval by the Competent Authority, along with seeking its vetting by the Ministry of Law and Justice Affairs for enactment at the national level. It is to be noted that the new GBC will neither supersede nor replace Building Codes of Seismic Provisions, Building Energy and Fire Safety Provisions. Finally, the GBC will be printed for wide circulation on social-media platforms to create mass-awareness. In order to facilitate the implementation of Pakistan GBC by the concerned stakeholders, as well the private developers of green buildings and residences, the MoCC could arrange the compilation and printing of the following brochures or leaflets:

- GBC Implementation Guidance Manual
- Performance Indicators for GBC Compliance
- Green Materials Production & Procurement Guidelines

## 4.3 Components of the GBC

It is suggested that the new GBC consider following the content framework described in Table 7.

*Table 7: Proposed sections for the GBC*

SECTION #	TOPIC
1	<b>Executive Summary</b>
2	<b>General Provisions</b>
3	<b>Green Building Strategies</b>
<b>A - SITE PLANNING &amp; DEVELOPMENT</b>	
4	<b>Site Sustainability</b> Land Use Rules & Zoning Regulations
5	<b>Building Orientation</b>
6	<b>Heat Island Mitigation</b>
7	<b>Green Planning and Design</b> Building Design Criteria and Construction Standards
8	<b>Effective Land and Space Use</b> Integrated Design and Green Buildings Concentration Landscaping and Stormwater Drainage Requirements
<b>B - GREEN BUILDING CONSTRUCTION</b>	
9	<b>Building Materials Sustainability</b>

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**10 Building Envelope and Openings**  
Climate Zones and Prescriptive Building Envelope

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**11 Natural and Controlled Ventilation**

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**12 Fire Safety**

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**13 Roof Insulation**

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#### C - RESOURCE EFFICIENCY

**14 Water Efficiency**

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**15 Rainwater Harvesting**

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**16 Energy Efficiency**  
Performance Option for Energy Efficiency and Insulation  
Prescriptive Equipment Efficiency Tables for Alternate and Increased Efficiency

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**17 Solid and Liquid Wastes Management**  
Deconstruction and Construction Debris (voluntary and regulatory)  
Waste Recovery and Recycling

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#### D - POST-COMPLETION GREEN BUILDING ACTIONS

**18 Environmental Pre-requisites and Assessment**  
Minimum Green Building Requirements

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**19 Building Inspection & Commissioning**  
Guidance for GB Functional Performance Testing and Commissioning Process

---

**20 Green Building Code Compliance Rating**  
Green Buildings Efficiency and Sustainability Measures

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**21 Post-Occupation O&M Considerations**

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#### E - GREEN BUILDING CODE COMPLIANCE & INFORMATIVE REFERENCES

**22 References (to be Annexed or Quoted)**  
Existing Codes, Standards, Regulations and Byelaws of Building/ Energy/ Seismic/  
Parking/ Connectivity to Public Transport, etc. already enacted by the Federal, Pro-  
vincial, Municipal, or Local Governments

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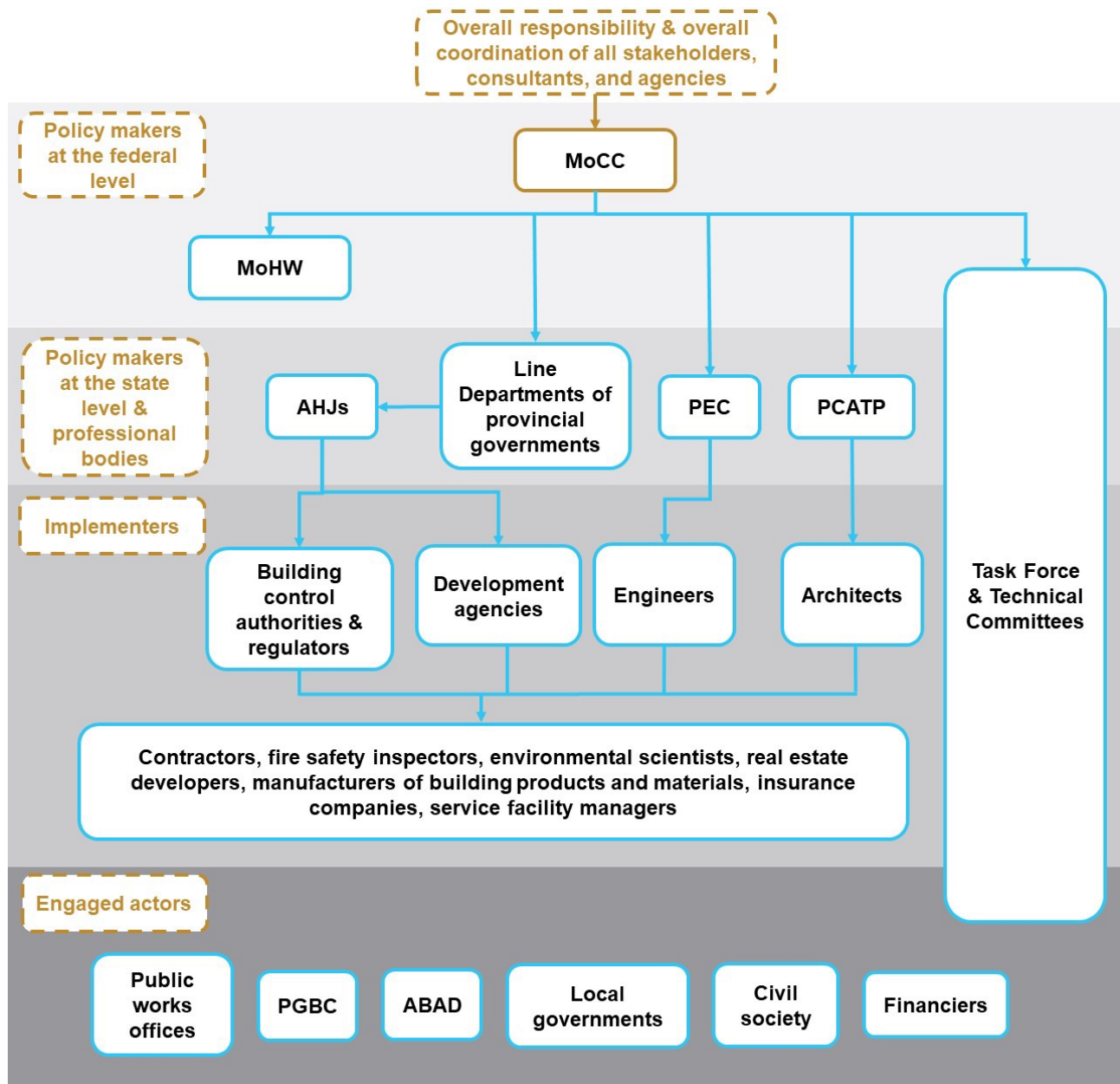
## 4.4 Institutional set-up

To accomplish the tasks of preparing and promulgating the Pakistan GBC, as explained in the preceding section, the major role of coordination among all stakeholders, consultants and Federal Ministries/Agencies and Provincial/G-B/AJ&K counterparts rests with the MoCC.

It would be appropriate that the issue of GBC institutional set-up be referred to the continuing Task Force after the formal approval of Pakistan GBC. However, the Ministry, while considering the formal institutional set-up to effectively implement the GBC, needs to note the following concerns:

- The policy makers to develop the GBC include the MoCC and the MoHW at the federal level; Line Departments in provincial governments, the PEC, and the PCATP. However, the real implementers of the GBC will be the building control authorities, or offices in the local building control and development agencies; and this is where the missing link exists in the GBC implementing chain. Unless these authorities and agencies are associated with set-up and implementation of the GBC, the establishment of a proper institutional set-up for effective implementation of the GBC up to the local level may not be possible.
- Multiple actors with different roles will be engaged in green building adoption. Specified actors should have specific roles in GB. These include Public Works Offices, Urban Development Agencies, PEC, PCATP, PGBC, ABAD, etc. The lack of clear roles and responsibilities at higher policy levels, and the competition among various actors could make it hard to enforce the GBC and move forward to green construction, at provincial, municipal and local levels.
- The Pakistan GBC, when adopted as a law, will regulate the design and construction of structures. In addition to the local building control agencies and regulators, the GBC is also required to be applied by architects, engineers, contractors, fire safety inspectors, environmental scientists, real estate developers, manufacturers of building products and materials, insurance companies, service facility managers, and others. They must all, therefore, be conversant with and committed to the GBC.
- The local government bodies and works departments, including municipality and building control authorities at provincial and district level, are involved in the execution of numerous developmental work projects in urban and rural areas, both in public and private sectors. They can play a vital role in the enforcement of the GBC. These authorities would, however, require capacity building to properly implement the GBC during the different stages of construction, and inspection and monitoring of code compliance.
- The local building control AJHs have an important role to promote the adoption and proper implementation for the following additional benefits of the GBC. For example:
  - Well-planned & energy efficient urban sprawl in the future for municipal administration
  - Good town planning, efficient allocation and utilisation of resources
  - Promoting GB in private development projects
  - Cost & benefit analysis is improved with minimum cost for site preparation, long-term sustainability of green building, and lower operational costs
  - Value addition in overall market value of GBs
  - Enhanced water efficiency practices, reduction in annual water charges and municipal wastewater treatment costs, and
  - Increased local economic development opportunities.

Figure 6: Visualisation of the proposed institutional set-up



# 5 Impact assessment

## 5.1 Demonstratable quantitative impact

On the global stage, the evaluation and data collection of GB has been going on for several years. The World Green Building Council (WGBC) has created a resource of credible information for public access. While quoting the United Nations Environment Programme (UNEP) 2016 Report, it confirms that the building sector has the greatest **potential** for greenhouse gas (GHG) reduction and energy savings. The results have been confirmed with examples from Australia, India, South Africa, USA, and Canada. The WGBC has grouped the benefits of green initiatives in the building sector into three categories: 1) environmental, 2) economic, and 3) social.

### ENVIRONMENTAL

- Huge potential in the building sector to reduce GHG emissions by up to 62%, and
- Energy savings of 40-50% and water savings of 20-30% compared to conventional buildings (WGBC, 2020).

### ECONOMIC

- Reduction in utility bills for tenants or households
- GB industry can generate GDP and full-time jobs
- Approximately 7% rise in increased asset value over traditional buildings (WGBC 2020).

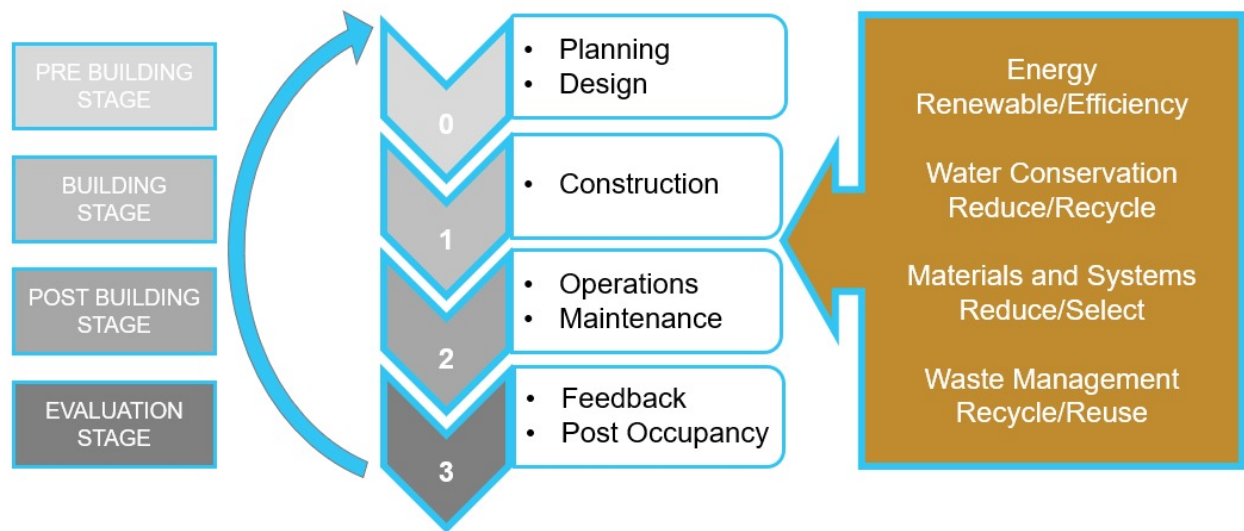
### SOCIAL

- Well-ventilated offices record increases in cognitive scores (brain function)
- Good ventilation also records improved sleep
- Improved IEQ and indoor air quality (low concentrations of CO<sub>2</sub> and pollutants, and high ventilation rates), can lead to improvement in productivity performance of up to 8% (WGBC 2020).

The Ministry of Climate Change, in collaboration with the EU SWITCH-Asia Programme, UN Habitat and the National University of Sciences and Technology (NUST) have additionally prepared the “Green Building Guidelines for Prime Minister’s Five Million Naya Pakistan Housing Programme”. This report has identified the stages of GBs visualised in Figure 7.



**Figure 7: Stages of Impact Assessment of a Green Building Code**



The Government of Pakistan, in all its recent undertakings regarding sustainability, carbon reduction and climate change, has emphasised the need for quantifying the impacts of adopting the GBC in green buildings. In the on-going Naya Pakistan Housing Programme (NPHP), a GB Guideline has recently been approved by the Prime Minister of Pakistan, wherein the targets for measurable assessments of green housing interventions and their impacts would be evaluated. The NPHP Guideline will focus on incorporating the following elements of the GBC in housing for low-income groups throughout Pakistan:

- Energy efficiency and renewable energy
- Water efficiency and recycling
- Materials
- Indoor Environmental Quality
- Thermal comfort
- Location and transport

It is recommended that for a holistic assessment of impacts, in addition to the quantitative effects of green interventions in the building sector, the qualitative aspects (e.g., social consequences) must also be included along with the techno-economic criteria. In the absence of baseline data, the process of evaluation at all stages of the GB projects must be a specific part of the GBC. In this context, suitable evaluation methods and processes, including independent third-party evaluation and vetting, should be declared an essential prerequisites to ensure effective implementation of the GBC.

To ensure effective application of the GBC in building and housing sectors, it is also necessary to develop a mechanism in the GB process that can offer verifiable, third-party-reviewed EIAs of such buildings through the use of Life Cycle Assessment. These assessments must also include the Environmental Product Declarations (EPDs) so that the GBC’s application captures a bigger picture, and serves as an additional option for compliance.

# 6 Green Building Codes in selected EU and Asian countries

Understanding the different aspects of the process of implementation, monitoring, evaluation, and methods and techniques of successful building codes at an international level can provide further insights into the institutional set-up and implementation for the Pakistani context. This section provides an overview of case studies from the international stage, focusing on the EU and Asia, and analyses their potential for replication in the Pakistan GBC.

## 6.1 Comparative analysis and categorisation of codes, institutional set-ups and processes from EU and Asia

Table 8 provides an overview of best practices from international building codes that are considered outstanding due to their successful implementation and compliance. These international scenarios can provide further guidance for the methods and techniques to be incorporated into a GBC for Pakistan.

*Table 8: Best practice case studies of building codes in the EU and Asia*

CODE	COUNTRY	KEY FEATURES	METHODS & TECHNIQUES
<b>EU</b>			
<b>Energy Saving Ordinance (EnEV)</b>	Germany	Incentivising highly efficient new construction	Private investments for energy saving are recognised and stimulated through loans and grants offered by the KfW development bank. The “efficiency house” standards for the financing programmes require certain targets to be met, with higher energy savings translating into higher subsidies (KfW, 2021).
<b>Building Regulation 10 (BR10)</b>	Denmark	Developing a dynamic process of policy design, implementation and evaluation. Encouraging developers to go beyond minimum requirements	Developed in 2006 using three performance levels (minimum requirements, building class 2015, and building class 2020). Classification levels were directed towards future minimum standards, thus encouraging builders and developers to create “future-proof” energy-efficient buildings (Klima-, Energie-, OG Byggningsministeriet, 2012).
<b>Boverket’s Building Regulations, BBR18 (BFS 2011:26)</b>	Sweden	Compliance control by measured values	Advanced enforcement regimes including control of compliance with design stage energy use values and post-occupancy energy verification focuses on actual energy consumption of buildings (Global Buildings Performance Network, 2020).

CODE	COUNTRY	KEY FEATURES	METHODS & TECHNIQUES
<b>Asia</b>			
<b>National Building Code</b>	Nepal	Awareness raising	A bottom-up approach to compliance comprised of dissemination of techniques and guidelines for stakeholders including engineers, policy and decision makers, media, contractors and builders. Capacity building and awareness raising among the general public additionally created an increased demand for code use (Kandel, Shrestha & Dixit, 2008).
<b>12th Five-Year Plan (FYP)</b>	China	Differentiation by region	Comprehensive design of the code requirements differs from non-heating energy use in the Northern regions, to the consideration of only total energy use being the standard measurement where, for example, extreme temperatures are a non-issue (Fulton, 2011; Building Efficiency Initiative, 2011).

## 6.2 Assessment of effectiveness of different codes, institutional set-ups and processes

The examples in Table 8 show different aspects of the process of implementation of the code, including financial mechanisms, compliance methods and strategies for stakeholder engagement. All of these key features have contributed greatly to their respective codes and could easily be transferred to the Pakistani context.

The German financing programme shows an interesting notion that builders can be incentivised to overachieve the minimum regulations. This was achieved through the mechanism of supporting projects with additional subsidies or grants that invest more in energy efficiency measures and reach a superior performance compared to that of the baseline. The voluntary measures additionally fostered the development of a culture surrounding energy efficient buildings. Defining different thresholds can be applied to the GBC, with higher subsidies available when a higher standard is reached.

Inclusion of future-proof enhancements could also be applied to the GBC quite easily, as has been done in Denmark. This could provide security for developers to reach future versions of the code before they become mandatory.

In the Pakistani context, post-occupancy control of compliance similar to that of Sweden would also be possible. It would ensure that buildings meet GBC requirements not just theoretically, but practically after construction.

A key challenge in Pakistan is the lack of awareness of GB methods. Therefore, applying a widespread dissemination strategy for capacity building, and GB in general, not only to key stakeholders, but also the general public, as in Nepal, would be well advised and could easily be transferred to this context.

Finally, the diversification of the GBC by climatic region, similar to China, would greatly benefit if transferred to Pakistan. Focusing on areas with high vulnerability or adjusting per requirements for cooling would be possible.

## 7 Conclusions

This report has been developed to advise policy makers and key stakeholders on the process and institutional set-up towards the development of a successful GBC in Pakistan. While reasonable knowledge exists about water and energy saving, awareness of GB methods has progressed slowly in the region. At the same time, builders in urban areas are keen to adopt and apply GB concepts. Therefore, the government is strongly urged to push for a transition to a green-built-environment, along with adequate incentives that address the market barriers.

By engaging the key stakeholders and following the roadmap (Chapter 3), as well as developing the GBC according to the scope (Chapter 3), writing process and institutional set-up (Chapter 4), impact assessment (Chapter 5) and best practices (Chapter 6), it is highly likely that successful implementation would result. Throughout the process, it would be important to use the following key guiding principles:

**Comprehensiveness:** No measure, by itself, can secure resource efficiency in the GB sector. Strategies must be comprehensive, indicating inter-sectoral simultaneous approaches. GB planning should be considered as an integrated system, and all green building goals and objectives be reflected in national programmes of GBC, even if their practical implementation will depend on local governments.

**Training and Capacity Building:** Strategies must integrate the best practices and innovative approaches from GB research and development, information exchange and demonstration, and pilot projects. Strategies must prevent over-regulation to avoid hampering of initiatives, and monopolization by industries to avoid artificial shortages and pricing of required resources for GB.

**Public-oriented Approach:** Ensure a link between green construction, energy efficiency and affordability, social welfare and reduced social inequality. A purely technocratic approach to GB efficiency, especially in the shelter sector, is unacceptable from a socio-political point of view, and must be pursued together with housing affordability.

**Geographical Context:** The GB and resource efficiency plans must be properly integrated into programmes at the federal, provincial and local levels. However, in the course of implementation of specific measures, it would be necessary to consider the local socio-economic, institutional and geographical conditions.

**Develop a Long-Term Roadmap:** Finally, to further increase the GBC's stringency, the government should lay out a long-term roadmap to further define the targets, pathways, key policies and timelines. Developing a long-term energy efficiency plan will contribute to regulating the future energy consumption in buildings. Also, a long-term view would provide signals to industry to ensure readiness at an economical cost, and to better inform the enforcement and compliance entities.

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## Annex – Major stakeholders for the GBC (full list)

### Key Public Sector Stakeholders at the Federal Level

- Ministry of Climate Change
- Ministry of Housing and Works and Pak. Public Works Department Naya Pakistan Housing Programme (NPHP), Naya Pakistan Housing & Development Authority (NPHDA), Federal Government Employees Housing Authority (FGEHA), National Energy Efficiency & Conservation Authority (NEECA), National Officers Academy (NOA)
- Pakistan Council of Architects and Town Planners
- Pakistan Engineering Council
- Capital Development Authority and Islamabad Capital Territory Administration
- UN-Habitat, National Disaster Management Authority (NDMA), National Engineering Services Pakistan (NESPAK), Military Lands and Cantonments Department (ML&CD), National Vocational and Technical Training Commission (NaVTTC) and Technical Education & Vocational Training Authority (TEVTAs), Pakistan Standards & Quality Control Authority (PSQCA)

### Key Public Sector Stakeholders at the State Level

#### Punjab Government

- Planning and Development Department
- Local Government, Housing, and Public Works Departments
- Punjab Urban Unit
- Provincial Urban Development Authorities, Metropolitan Corporations, Municipal Committees, Building Control Departments
- Provincial Disaster Management Authority (PDMA) Punjab
- Building Research Station

#### Sindh Government

- Planning & Development Department
- Housing, Local Governments and Rural Development Departments
- Sindh Building Control Authority
- Provincial Urban Development Authorities, Metropolitan and Municipal Committees, Local Building Control Departments
- Provincial Disaster Management Authority (PDMA) Sindh
- AJK Urban Development Authorities, Municipal Committees, Building Control Departments

### **Khyber Pakhtunkhwa Government**

- Planning and Development Department
- Housing, Local Governments and Public Works Departments
- Provincial Urban Development Authorities, Metropolitan Corporations, Municipal Committees, Building Control Departments
- Provincial Disaster Management Authority (PDMA) KP
- KP Technical Education & Vocational Training Authority (TEVTA)

### **Baluchistan Government**

- Planning & Development Department
- Housing, Local Government and Rural Development Departments
- Provincial Urban Development Authorities, Municipal Committees, Building Control Departments
- Provincial Disaster Management Authority (PDMA) Baluchistan

### **Gilgit & Baltistan Government**

- Office of Chief Secretary, Gilgit-Baltistan (Housing and Public Works Departments)

### **Azad Jammu & Kashmir Government**

- Central Design Office, Planning & Development Department

## **Stakeholders in Private Sector and Civil Society**

- Engineering and Architecture Universities and Colleges, and Building R&D institutions
- Energy Efficiency Associations and Corporate Institutions
- Banks (Government and Private) and Housing Finance Institutions (Corporate and Limited)
- NGOs, mainly Environmental (e.g., IUCN; Pakistan Green Building Council (PGBC)/ Global Biodiversity Information Facility (GBIF), Association of Builders and Developers of Pakistan (ABAD), Aga Khan Housing Foundation (AKHF)



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