



# Advancing Sustainability: The Current Green Building Scenario in Pakistan

# PROJECT OVERVIEW



# OBJECTIVE & ACTIVITIES



Implement a comprehensive initiative to introduce green building standards in Pakistan, encompassing a clear methodology, Monitoring, Verification, and Enhancement (MV&E) mechanisms, and financing options aiming to address the lack of awareness and limited financing options hindering the adoption of green building practices.



Conduct a baseline assessment of existing infrastructure, including commercial, office, and residential buildings



Develop standards for new green building construction and the conversion of existing structures into net-zero buildings



Formulate policies and economic measures to incentivize eco-friendly construction



Promote energy efficiency, resulting in substantial energy savings and financial benefits for both individuals and businesses.

Activity



# OPPORTUNITIES



# GREEN BUILDINGS VS. ENERGY-EFFICIENT VS. TRADITIONAL



GHG Emissions Reduction

**Traditional Buildings**

**Energy efficient Buildings**

**Green Buildings**

**Approach**

Conventional materials & methods

**Approach**

Technological solutions

**Approach**

Broad framework of eco-friendly practices

**Impact**

Minimal resource conservation & environmental consideration

**Impact**

Significant reduction in energy usage

**Impact**

Widest & most proactive environmental impact



# Existing Situation

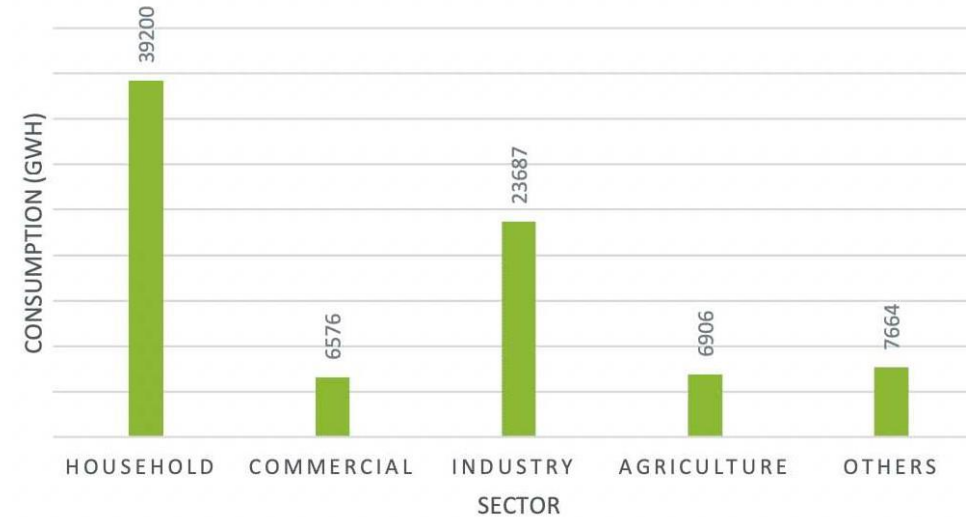
## *Building Design and Construction Material*

### The Current State

- Buildings consume most energy in Pakistan, with residential (49.2%) and commercial (7%) leading the charge
- Rapid population growth and urbanization will further strain energy resources
- Limited use of sustainable materials: High costs, lack of awareness, and weak supply chain hinder adoption
- Only 74 LEED-certified buildings compared to regional peers (India: 323, Turkey: 518)



ELECTRICITY CONSUMPTION FY2023 (JULY-MARCH)



**Green Building Design is the solution to saving cost and energy**



# ENERGY/COST SAVING DUE TO GREEN BUILDING DESIGN

Building insulation plays a pivotal role in enhancing the energy efficiency and overall sustainability of structures

## Cost Benefit Analysis of Building Insulation on energy and cost savings

Alternative insulation strategies	No insulation (BC)	Insulated roof only	Insulated walls only	Insulated roof and walls
Percentage of conserved energy (%)	0	19.14	7.51	29.77
Cost saving (%)	0	16.8	4.5	23.4

**\$101 billion** needed for clean energy shift  
**\$7-14 billion** annually for adaptation

Green growth can unlock **\$1971 billion investment potential** across sectors

Up to **20% GHG reduction** by 2030.

# ENERGY USE BENCHMARKS

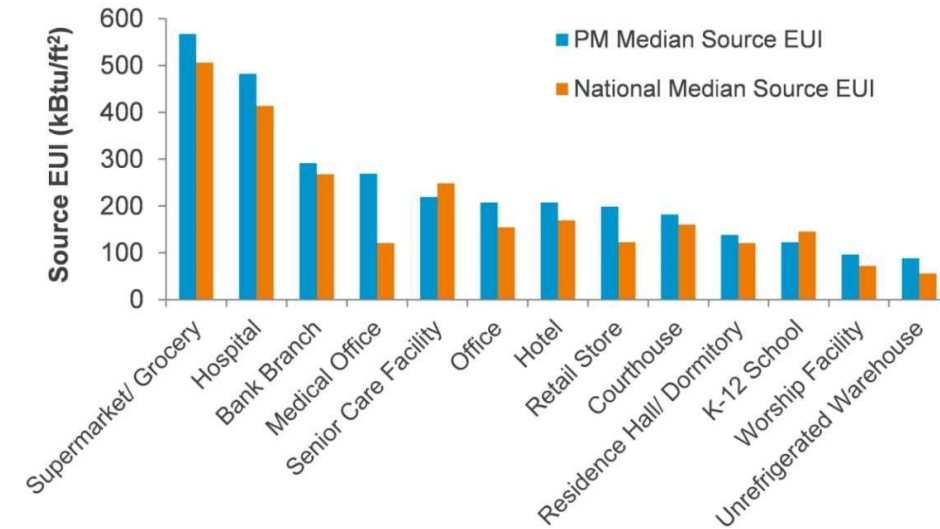


## Why Benchmarks Matter...

- Measure and compare building energy performance. Identify opportunities for improvement and quantify savings.
- Serve as a baseline for assessing energy efficiency. Enable establishing a performance-based energy efficiency rating system

## Benefits of a Rating System

- Robust evaluation of energy performance, considering various factors
- More accurate and comprehensive assessment for stakeholders
- Incentive for investments in green technologies and practices
- Promotes adoption of energy-efficient building solutions nationwide



Typical EUI for selected buildings. This graph is based on research EPA conducted on more than 100,000 buildings





# CASE 1- COST-BENEFIT ANALYSIS FOR SOLAR PV INSTALLATION ON A COMMERCIAL BUILDING IN PAKISTAN

Integrating solar PV systems into green buildings presents a cost-effective solution for energy savings in Pakistan



**Investment**

## Initial Investment

\$50,000 for a 50-kW solar PV system (\$1,000 per kW)



**Annual Savings**

- Electricity Production:** 107,310 kWh/year
- Cost of Grid Electricity:** \$0.15/kWh (PKR 45/kWh)
- Annual Savings:** \$16,096.50 (PKR 4,819,950)



**Payback period**

**3.1 years** (Initial Investment / Annual Savings)

$\$50,000 / \$16,096.50 \approx 3.10$  years



# CASE 2- COST SAVING DUE TO GREEN BUILDING DESIGN FEATURES

Cost Savings due to building orientation in an Average household in Pakistan

Season	Average Household Electricity Cost (PKR)	Percentage Savings (%)	Cost after Orientation Correction (PKR)	Cost Savings (PKR)
Winter	3000	15	2550	450
Summers	7000	30	4900	2100

Cost Savings due to WWR in an Average household in Pakistan

Season	Average Household Electricity Cost (PKR)	Percentage Cost Savings (%)	Cost after optimizing WWR (PKR)	Cost Savings (PKR)
Winter	3,000	11.5	2,655	345
Summer	7,000	39.5	4,250	2750

Cost Savings due to green roofing system in an Average household in Pakistan

Season	Average Household Electricity Cost (PKR)	Percentage Saving (%)	Cost after Green Roofing System (PKR)	Cost Savings (PKR)
Winter	3000	35	1950	1050
Summer	7000	35	4550	2450



# CASE 3- COST SAVINGS FROM GREEN BUILDING CONSTRUCTION MATERIALS IN PAKISTAN

Green Building construction is a cost-effective solution for energy savings in Pakistan



**Investment**

## Initial Investment

\$305,457.773 for green building material only per kg per unit



**Annual Savings**

1 kWh = Assumed \$ 0.15 for commercial electricity unit  
Saving/ year = \$ **113,710 / year**



**Payback period**

Payback Period  
**Approximately 2 Years**

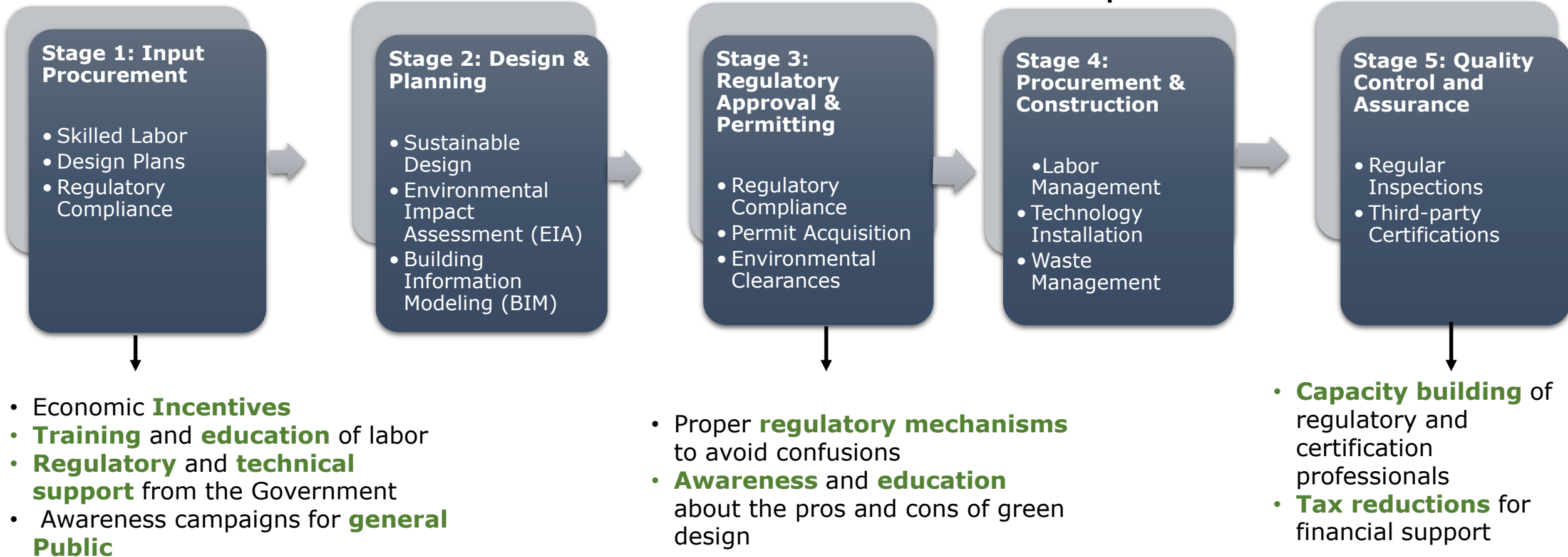
# Opportunities in the Design Stages of green buildings in Pakistan

## Value chain



- **Incentives** for relieving economic stress
- Use of **Simulation Tools** for Design, Research and Development

- **Training** and **Capacity building Workshops** for workers about green systems & responsible disposal methods

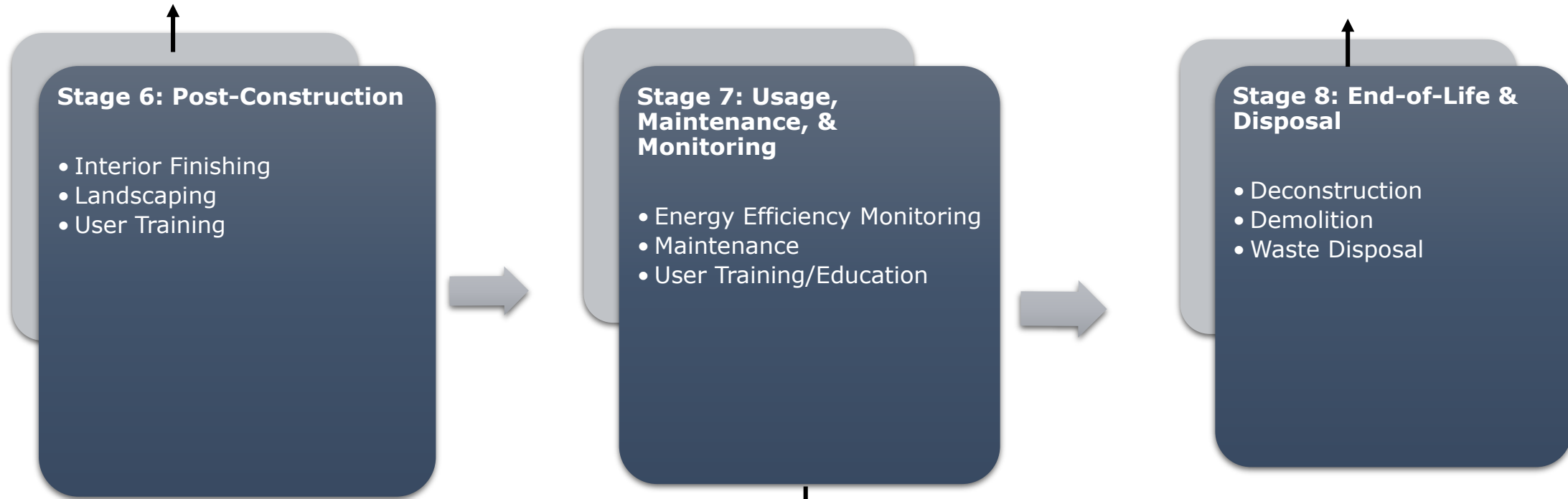


# Opportunities in the post-construction stages of green buildings in Pakistan Value chain



- **Import** of technology
- **Awareness** and **education** programs on water scarcity issues

- **Training** on waste management
- Promoting **recycling practices**



## Stage 6: Post-Construction

- Interior Finishing
- Landscaping
- User Training

## Stage 7: Usage, Maintenance, & Monitoring

- Energy Efficiency Monitoring
- Maintenance
- User Training/Education

## Stage 8: End-of-Life & Disposal

- Deconstruction
- Demolition
- Waste Disposal

- Ensuring proper **resource management**
- **Training** of workers on green technology
- **Public-private partnerships**
- Implementing **National green buildings rating system**

# ROI FOR GREEN BUILDING MATERIALS ACROSS DIFFERENT SECTORS



## 1. Residential:

Highest ROI: Cellulose insulation effectively reduces heat transfer, leading to substantial energy savings in single- family homes.

Reason: Energy consumption primarily driven by space conditioning.

## 2. Commercial:

Highest ROI: Combining fly ash bricks and cellulose insulation offers a synergistic effect for improved thermal performance.

Reasons: Complex energy profiles require both insulation and thermal mass. Fly ash bricks are cost-effective and enhance stability and acoustics.

## 3. Industrial:

Highest ROI: Fly ash bricks offer superior strength, fire resistance, and cost-effectiveness, making them ideal for large-scale projects with specific structural needs.

## 4. Additional Factors:

Initial cost of materials, energy consumption patterns, building size/complexity, local climate, government incentives, all influence ROI.



# SOCIO-ECONOMIC & ENVIRONMENTAL BENEFITS OF GREEN BUILDINGS



## Social

- Improve quality of life & living environment
- Healthy, comfortable conditions for occupants
- Minimize health risks from hazardous materials

## Economic

- Long-term value: Consider "whole life value" - initial cost + design/procurement + operation/maintenance + dismantling + residual value. Sustainable materials can be profitable in the long run

## Environmental

- Minimize waste & resource use - protect environment
- Local & recycled materials reduce CO2 emissions
- Improve health
- Energy efficiency in construction & operation leads to cost savings
- Growing demand for eco-friendly properties in Pakistan



# CHALLENGES



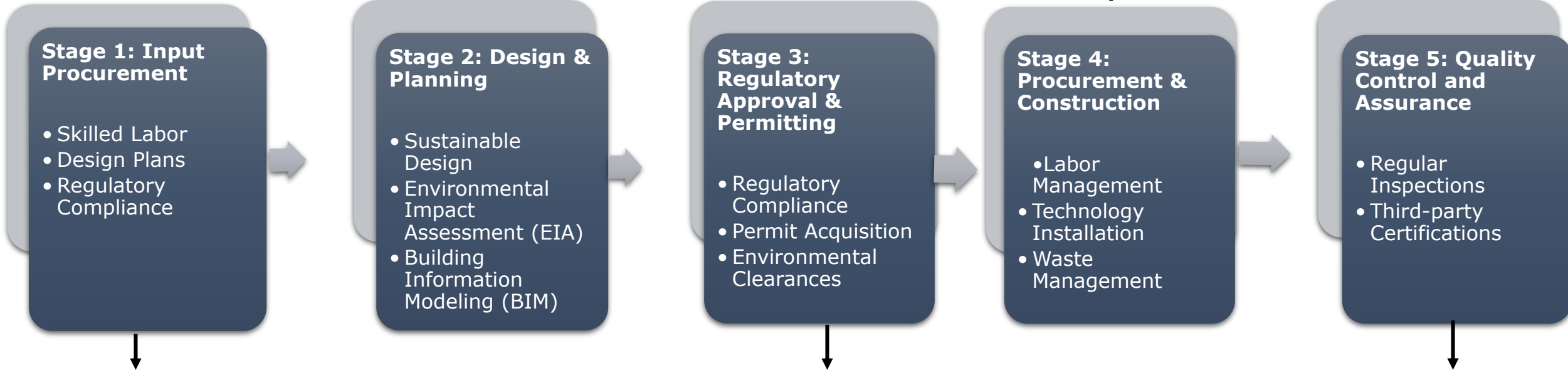
# Challenges in Design Stages of green buildings in Pakistan

## Value chain



- **Resistance** due to perceived **higher costs**
- **lack** of **accurate data** for comprehensive assessments
- **limited expertise** in creating detailed **green BIM models**

- **Lack** of **skilled technicians** for installing advanced green systems
- Inadequate **recycling infrastructure**
- Lack of **awareness** about responsible disposal methods



- High costs
- **Lack** of **skilled workers** trained in green technologies
- **Lack** of **professionals** skilled in using eco-friendly materials and techniques
- **Resistance** to change from traditional designs, & Complex and evolving regulations

- **Conflicting regulations** from different governing bodies leading to confusion and delays
- **lack** of specialized green building permit categories
- **Resistance** from **local communities**

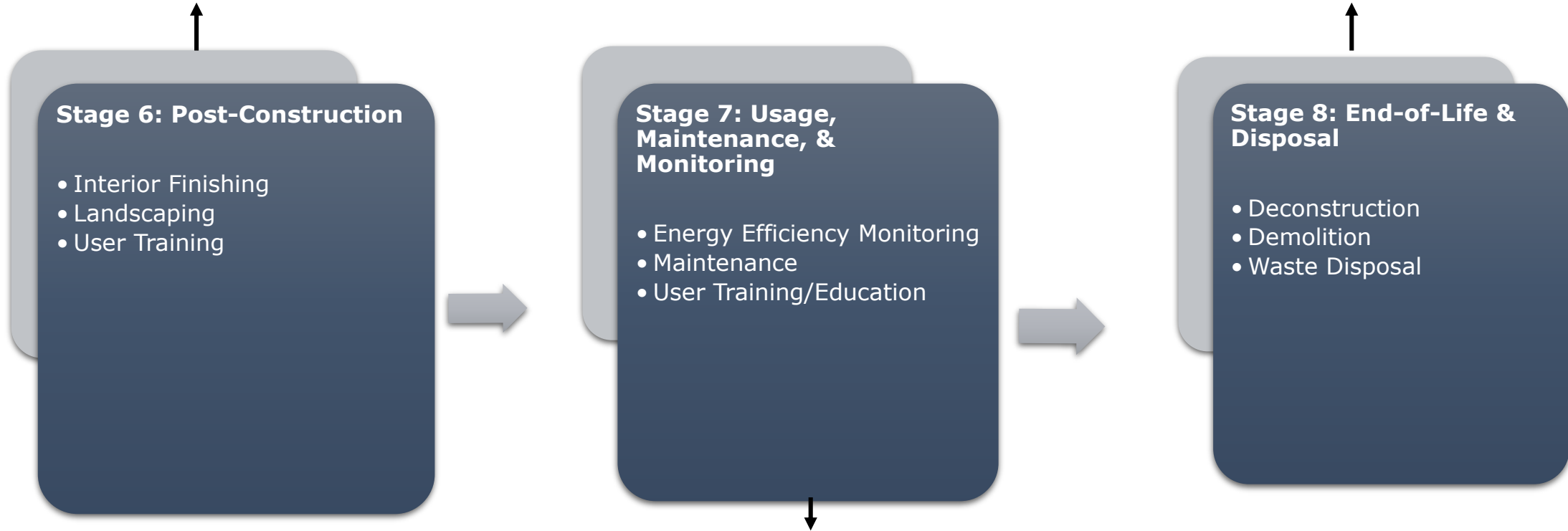
- **Limited expertise** of **inspectors** in assessing green features
- **High costs** associated with **certifications**
- **Shortage** of **professionals** trained in **LEED**



# Challenges in Post-Construction stages of green buildings in Pakistan Value chain

- Limited availability of certified eco-friendly finishes
- Water scarcity issues impacting the maintenance of green landscapes
- Lack of ongoing awareness programs

- Lack of awareness about eco-friendly deconstruction methods
- Inadequate facilities for proper disposal of non-recyclable green construction waste



- Limited access to advanced energy monitoring systems
- Lack of trained personnel for maintaining specialized green technologies
- Limited resources allocated for continuous occupant education



# ENABLERS



# Building Codes and Framework in Pakistan



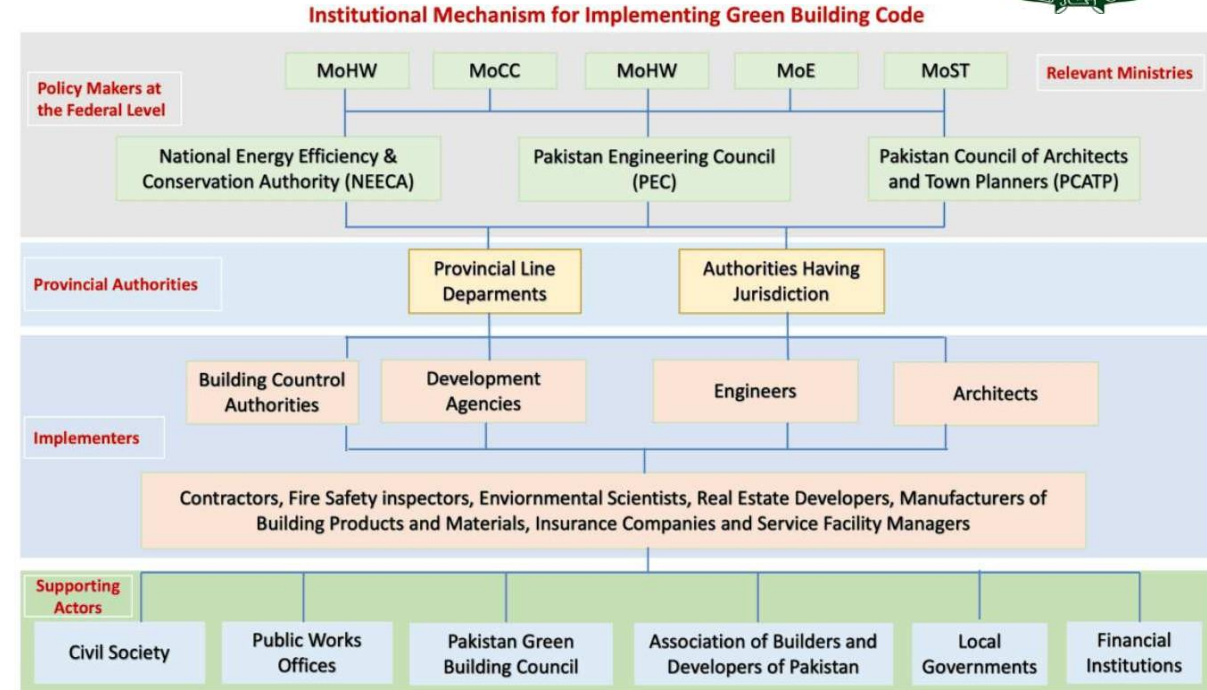
## 1. Pakistan Green Building Council (PGBC):

Established in 2012, promotes sustainable construction practices

## 2. Building Codes:

- *PEC 2021 Building Code*: Emphasizes natural ventilation, lighting, and roof drainage
- *NEECA National Energy Conservation Code 2023*: Promotes green design features like green roofs and renewable energy integration
- *Green Building Code of Pakistan-2023 (draft)*: Based on international standards, recommends sustainable materials, yet to be published.

## 3. Energy Provisions 2011: Outdated, replaced by ECBC-2023.



# Building Codes and Framework Challenges in Pakistan



**Limited Implementation:** Lack of awareness, workforce training, technology access, and financial constraints hinder progress

**Lack of Coordination:** Clear roles and responsibilities for various stakeholders are required

**Lack of comprehensive guidelines:** For sustainable materials in building codes

**Need for legal framework:** To promote widespread adoption

**Outdated energy codes:** Existing energy codes haven't been updated regularly

National Energy Efficient Building Code not enforced outside NEECA framework



# Green Building Incentives in Pakistan

## Tax Incentives

Currently, few tax benefits exist for green construction.

## Naya Pakistan Housing Program

Offers subsidies for developers using green features  
Residents benefit from lower utility bills and improved living conditions.

## Green Climate Fund (GCF) Projects

Provide grants and loans for green building initiatives. Offer technical assistance and capacity building.

Showcase best practices for wider adoption



# RECOMMENDATIONS



# RECOMMENDATIONS

## Establishment of National Qualified Evaluator System

- Ensuring quality and consistency
- Building expertise and capacity
- Addressing market demand
- Boosting job creation
- Enhancing international recognition
- Promoting continuous learning
- Encouraging innovation

## Human Resource Capacity Building

- Human resource capacity building
- Green building workshops, seminars, and training initiatives
- Public awareness
- Training for professionals
- Training for labor

## Strengthening Compliance and Enforcement

- Enhance local capacity
- Technology and data management- develop digital platforms & remote monitoring technologies
- Review and continuous improvement

# RECOMMENDATIONS

## Implementation of Green Building Codes and Certification

- Establish a Green Office coordinator
- Indicators for assessment, numeric objectives and benchmarks
- Green issues in procurements
- Annual reports for audit purposes
- Training and certification for development officers
- Quick and efficient e-approval process

## Green Bonds and Funds

- Issue green bonds for green buildings
- Develop a green taxonomy to clearly define eligible projects
- Offer credit guarantees or green bond funds to mitigate risk
- Green equity, mutual funds, and REITs focused on sustainability

## Implementation of Technology

- Locally sourced raw material for smart building materials
- Tax exemption – industries involved in smart building solutions
- Reduce Import of smart building equipment
- Enforcing green building rules
- Promoting research that aligns with industry needs

# CONCLUSION



## Actions Needed

- Review and improve green building principles in codes and policies
- Collaboration, knowledge sharing, and supportive environment
- Address cost concerns, raise awareness, and promote sustainable materials
- Update building codes and enforce compliance with energy frameworks



## Future Vision

- Green buildings harmonizing with nature and enhancing well-being
- Resilience, sustainability, and overall vitality for Pakistan's built environment



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# Thanks!

