Scaling up low carbon technology in construction & infrastructure Sector

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Urbanisation in South Asia

growth and demands on built space

- In India the total urban housing shortage was estimated to be **18.78 million** (2012)
- In Pakistan housing shortage was estimated at **7.57 million** (2009)
- In Nepal an additional **1 million** urban houses will be required from 2011-21

*Predicted Growth in Indian Middle Class (Sankhe et al. 2010)*
Urbanisation

**pressure for more and new materials**

- Worldwide buildings account for up to **30%** raw materials use
- In 2011, gross built up urban area grew by 10% (CII)
- A major share, almost **80% of the GHG burden** of the building sector, is borne by the building materials alone.
- Cement, steel, lime and bricks are the **largest bulk consumption items** in the Indian construction industry and also the most energy-guzzling.

*Projected Growth in Building Sector of India (Parikh, 2011)*

![Graph showing projected growth in building sector of India from 2005 to 2030 for residential, commercial, hospitality, and retail sectors.](image)
Construction Materials
growth trends in India

- 85% of Paint Production
- 40-45% of India’s Steel
- 65-70% of Glass
- Cost of construction materials - 40-60% of project cost
- Construction sector accounts of 45% of total steel demand
- Cement consumes 303 MT of limestone and 30 MT of coal
- Cement production increased by 56% in the last decade
- Annual material production growth rate of 9.8%
- 350 MT of top soil lost to brick making every year
- 2nd largest brick producer, 200 million bricks annually
- 300% increase in production in steel from 1994-95 to 2008-09.

Annual material production growth rate of 9.8%

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What are Green Materials

- Low in **embodied energy**
- Low in **resource footprints**
- **Cleaner production** processes
- Contribute to **thermal comfort**
- **Low or nil conflicts** with other uses of greater ecological and economic value
- **Recyclable/Reusable** – low life cycle costs

...low environmental impacts, small ecological footprints
Case example: Fly ash brick production in India
Case example: Vertical Shaft Brick Kiln in Pakistan

- 30% to 50% lower CO2 emissions,
- 80% reduction in suspended particulate matter
- 35-40% fuel reduction, resulting in 30% increase in profit.

Lessons learnt:
- Environmental hazards and threat to human health due to emissions by brick kilns have been given less consideration
- Involvement and support from Pakistan Environment Protection Agency was critical
- Cost effectiveness of the technology as well as collaborations with local investors (Small & Medium Enterprise Development Authority)
- Greater public awareness among all stakeholders
Case example: Hollow Concrete Blocks, Nepal

- Precast concrete blocks produced from an appropriate mixture of cement, sand and aggregates with manual or mechanical compressions that have hollow cavities in between the cells.
- Less embodied energy that fire bricks
- HCB houses are **30-40% cheaper** compared to RCC buildings and more energy efficient

**Lessons learnt:**
- Low carbon construction materials are **not included in the Building Codes and Standards**, thus no compliance for use of sustainable building materials
- Lack of awareness for use of alternative sustainable materials in the construction sector.
- With **no existing norm and guidelines** for manufacturing these alternative materials, there is no assurance of strength and quality.
- Lower cost of these materials is often thought of as being of lower quality by end-users. *(perception)*
Imperatives for upscaling low carbon technologies

- Research
  - New Knowledge
  - Materials
- Capacity
  - Existing Knowledge
  - Models
  - Curricular Revision
- Information
  - Vocational Skills
  - Public Disclosure
  - Decision Support

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## Imperatives for upscaling low carbon technologies

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Thank you

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