Technical Expert Meetings on Mitigation – 2020
Building (back) better: Mobilising the value chain towards circular economy
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Indian Perspective for Sustainable Development of Built Environment

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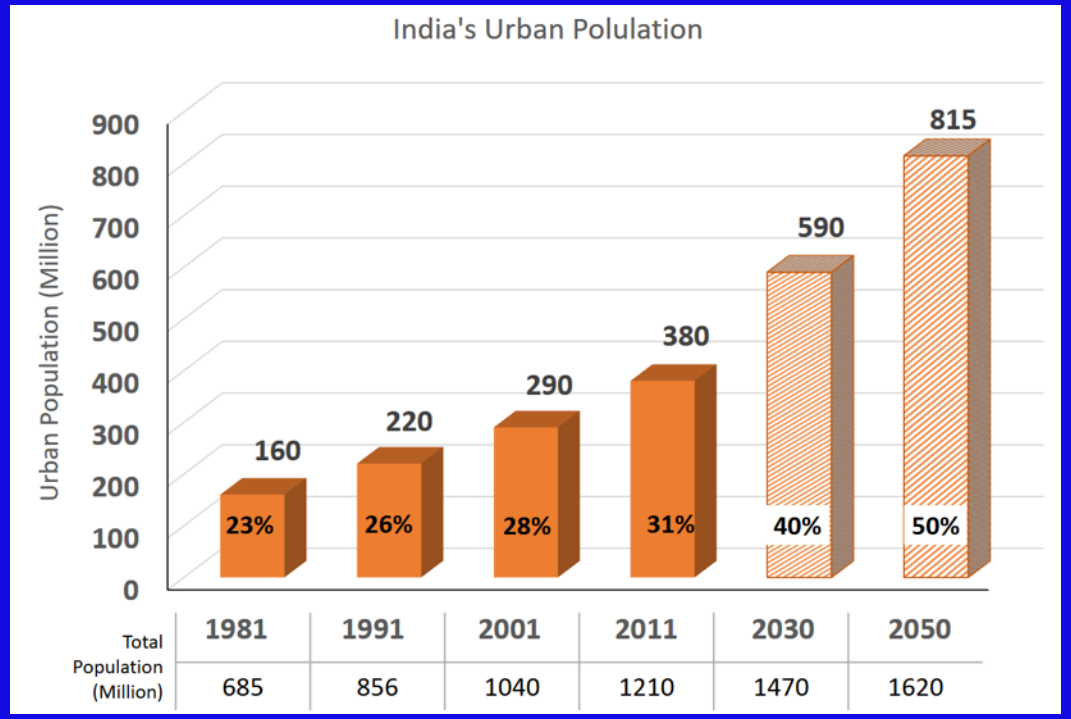
Growing Opportunities with Rapid Urbanization



Source: *UN report on World Urbanisation Prospects (2014 revision)*

To cater to this growing population, India has to build 600-800 million m² urban space every year till 2030 i.e. a new Chicago every year.

- With US $3 trillion GDP, India is one of the largest and fastest growing economies in the world. It is witnessing massive public investment, robust private consumption, and structural reforms leading to rapid growth (> 7%).
- India is poised to become $5 trillion economy by 2022 & aspiring to become a $10 trillion economy by 2030.
- Construction in India is emerging as the third largest sector globally; it may reach US $750 billion in value by 2022.
- Cities, which will contribute over 80% to GDP by 2050, need to be Receptive, Innovative and Productive to foster sustainable growth and ensure better quality of living.
- Hence, a comprehensive strategy of **3-S Mantra** has been adopted: **Skill**, **Scale** and **Speed**.

Waste as Resource for Producing Value Added Building Materials & Components

Inorganic Industrial Wastes

S. No.	Waste	Potential Uses
1	Blast furnace slag	PSC, SSC, oil well cement, aggregate, ceramics
2	Ferro-alloys slag	Masonry cement, blended, cement, ceramics, aggregate
3	Flyash	Cement, PPC, concrete, cellular concrete, lightweight aggregate, calcium silicate brick, clay flyash brick
4	By-product gypsum	Cement additive, plaster, building blocks and fibrous gypsum board, special cement
5	Red Mud	Cement raw material, brick and tiles, sintered aggregate
6	Mine tailings (zinc, copper, gold)	Filler in concrete, calcium silicate brick, cellular concrete, clay brick and cement
7	Iron tailing	For making stabilized and burnt clay building bricks, high strength bricks
8	Waste Glass	In the manufacture of mosaic and glazed tiles and light weight aggregate, brick making
9	Water works silts	For manufacture of structural clay product, light weight bloated clay aggregate, high strength bricks
10	Marble dust	Walling and flooring tiles, bricks and blocks
11	Coal mine and washery waste	Manufacture of bricks, tiles, lightweight aggregates, fuel substitute in the burning of bricks
12	Gypsum mine waste	Gypsum building plaster, ready made plaster with lime
13	Kiln dust	In the cement industry, as a hydraulic binder
14	Lime stone waste	For production of masonry cement and activated lime pozzolana mixture
15	Lime sludge	For the manufacture of Portland cement, masonry cement, sand lime bricks, building lime pozzolana mixture
16	Paper waste	For the manufacture of pitch fibre pipes, asphaltic corrugated roofing sheets, egg/apple/fruit pack trays, pulp moulded packaging materials
17	Cinder	Manufacture of lime cinder mortar, production of concrete building blocks, production of bricks from black cotton soil

Waste as Resource for Producing Value Added Building Materials & Components

Agricultural Wastes

S. No	Item	Application in Building Materials
1	Rice Husk	As fuel, for manufacturing building materials and products for production of rice husk binder, fibrous building panels, bricks
2	Banana Leaves/Stalk	In the manufacture of building boards, fire resistance fibre board
3	Coconut Husk	In the manufacture of building boards, roofing sheets, insulation boards, building panels, as a lightweight aggregate, coir fibre reinforced composite, cement board, geo-textile, rubberised coir
4	Groundnut Shell	In the manufacture of buildings panels, building blocks, for making chip boards, roofing sheets, particle boards
5	Jute Fibre	For making chip boards, roofing sheets, door shutters
6	Rice/Wheat Straw	Manufacture of roofing unit and walls panel/boards
7	Bagasse	For manufacture of insulation boards, wall panels, etc.
8	Saw Mill Waste	Manufacture of cement bonded wood chips, blocks, boards, particle boards, insulation boards, briquettes
9	Sisal Fibres	For plastering of walls and for making roofing sheets, composite board with rice husk, cement roofing sheet, roofing tiles, manufacturing of paper and pulp
10	Cotton Stalk	Fibre boards, panel, door shutters, roofing sheets, autoclaved cement composite, paper, plastering of walls

C&D Waste Management - Regulatory and Enabling Framework

- C&D Waste Management Rules, 2016
- Guideline by Central Pollution Control Board for Environmental Management of C&D Wastes, 2017
- Initiative by Standardization Agencies (Bureau of Indian Standards, 2016 & Indian Road Congress, 2017)
- Guideline on Utilization of C&D Wastes by Govt. agencies BMTPC (2017, 2018), CPWD (2014)

Reuse and Recycling of C&D Waste

- Recycled C&D waste can be used to produce products such as :
  - Sand for use in concrete and masonry
  - Coarse aggregate for use in concrete
  - Bricks, blocks, tiles
  - Paver blocks and kerb stones
  - Precast items such as drain covers, manholes, slabs, door & window frames

Pradhan Mantri Awas Yojana (Urban) – Housing for All (Urban)
- Technology Sub Mission

Sustainable Interventions being adopted

- Use of renewal energy sources including solar energy
- Rain water harvesting
- Waste water treatment and reuse
- Use of fly ash based building materials, C&D Waste and other energy efficient building blocks such as Aerated Autoclaved Concrete blocks (AAC), Cellular Lightweight Concrete (CLC) etc.
- Use of local skills and local materials under BLC
- Bamboo based technologies
- Zero net energy buildings

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