

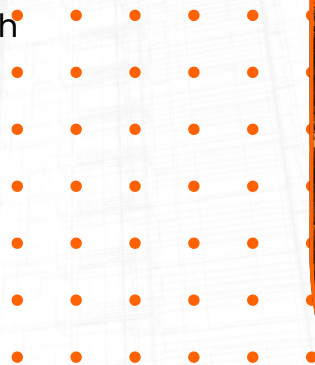


Association of
Infrastructure
Industry(India)

BUILDING A CIRCULAR ECONOMY IN CONSTRUCTION

and Infrastructure in India

Transitioning from Linear Growth
to Sustainable Regeneration



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INTRODUCTION: THE URGENCY FOR A *CIRCULAR* TRANSITION



India is on the cusp of a massive infrastructure transformation. With over **\$1.4 trillion investment** planned under the National Infrastructure Pipeline (NIP) and **smart city missions** expanding across the nation, the demand for cement, steel, sand, and other materials is surging.

However, the construction sector — which contributes nearly 9% of India's GDP — is also responsible for 30% of total solid waste generation, 22% of CO₂ emissions, and extensive natural resource depletion.

A Circular Economy (CE) approach offers a transformative alternative to the traditional “take-make-dispose” model by emphasizing resource efficiency, reuse, recycling, and regeneration — making the construction ecosystem not only economically productive but also environmentally restorative.

2. THE CASE FOR **CIRCULAR CONSTRUCTION**



Aspect	Linear Model (Current)	Circular Model (Future)
Resource Flow	Extract → Use → Dispose	Reuse → Recycle → Regenerate
Waste Management	Landfill and dumping	Closed-loop recovery systems
Material Life	Single use	Extended lifecycle via reuse/remanufacture
Carbon Impact	High embodied carbon	Low-carbon circular materials
Value Chain	Fragmented	Integrated and regenerative

According to a NITI Aayog (2023) report, implementing circular economy principles could reduce India’s construction waste by 80% and save nearly ₹2 lakh crore annually by 2030.

3. CIRCULAR ECONOMY

PRINCIPLES FOR CONSTRUCTION



Design for Longevity & Adaptability

01. Adopt modular and prefabricated designs to extend the lifespan of buildings and infrastructure.
02. Encourage Building Information Modelling (BIM) for efficient material management and deconstruction planning.

Material Reuse and Resource Recovery

- Reuse structural steel, doors, bricks, and flooring from demolition projects.
- Deploy construction and demolition (C&D) waste recycling plants — currently only 53 cities have functional ones, but the potential exceeds 150 million tonnes/year.

Use of Secondary Raw Materials

- Promote use of fly ash, slag, recycled aggregates, and geopolymer concrete in public works.
- Example: The Delhi Metro Rail Corporation (DMRC) uses 98% recycled construction waste for its stations.



Circular Procurement and Public Policy

- Mandate circularity criteria in government tenders and procurement under GFR 2017 revisions.
- Incentivize “green procurement” via tax rebates or performance-linked sustainability credits

Digital Tools and Data Governance

- Implement Material Passports and Digital Twins for tracking resources throughout the infrastructure lifecycle.
- Use IoT and AI for predictive maintenance, reducing waste and extending asset life.



4. POLICY AND INSTITUTIONAL ENABLERS



Government Frameworks

- NITI Aayog's Circular Economy Action Plan (2022) lists construction as a priority sector.
- Construction and Demolition Waste Management Rules (2016) mandate 100% segregation and recycling of waste.
- Bureau of Indian Standards (BIS) has released codes for recycled aggregates and alternate materials.



Financing and Incentives

- Introduce Green Infrastructure Bonds and Circular Construction Credit Schemes.
- Enable Extended Producer Responsibility (EPR) for large construction firms.



Skill Development

- Integrate Circular Design Thinking into architecture, civil engineering, and urban planning curricula.
- Upskill municipal engineers and contractors in waste segregation and reuse technologies.

5. CASE STUDIES FROM INDIA AND BEYOND

Location	Circular Practice	Impact
DMRC, Delhi	Recycled 98% C&D waste	Reduced 200,000 tonnes landfill burden
Mumbai Coastal Road Project	Use of fly ash & dredged material	Reduced virgin material use by 30%
Amsterdam (Netherlands)	Citywide Circular Strategy 2050	Targeting 100% reuse of materials
Singapore	Smart Materials Exchange Platform	Reuse rate >90% in public infrastructure

6. PATHWAY TO A *CIRCULAR FUTURE*

Phase	Key Actions
Short-term (2025)	Enforce C&D waste recycling norms; incentivize circular startups.
Medium-term (2030)	Integrate circularity in Smart City and AMRUT 2.0 projects.
Long-term (2047)	Achieve zero-waste, net-zero carbon infrastructure ecosystem.



7. CONCLUSION: BUILDING A *REGENERATIVE BHARAT*

The journey toward a Circular Economy in Construction and Infrastructure is not just an environmental imperative — **it is an economic and social opportunity.**

By designing out waste, rethinking resource flows, and aligning industry, academia, and policy, India can become a **global leader in circular construction innovation.**

A Circular Bharat is one where every demolished building becomes a resource, every project a node in a regenerative network, and every engineer a steward of sustainability.

