

“Waste to Resource”



Construction and demolition waste problem in Indian cities

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Fellowship Media Briefing

URBANSAPES: how
sustainable are our
buildings and cities?

New Delhi, May 1, 2014



“Malba”: Cost of development



"construction and demolition (C&D) waste" -- building materials, debris and rubble from construction,. re-modelling, repair and demolition operation and disaster.....



Debris from disaster.....



Bhuj earthquake



Obstructs Mobility



Lodi estate, New Delhi

1. Pattinapakkam Beach



Severing our water bodies



2. Yamuna, Delhi



6. Keelkattalai Lake, Chennai



3. Ram Nadi, Pune



4. Mangroves, Navi Mumbai



7. Coimbatore



5. NRI Complex, Mumbai



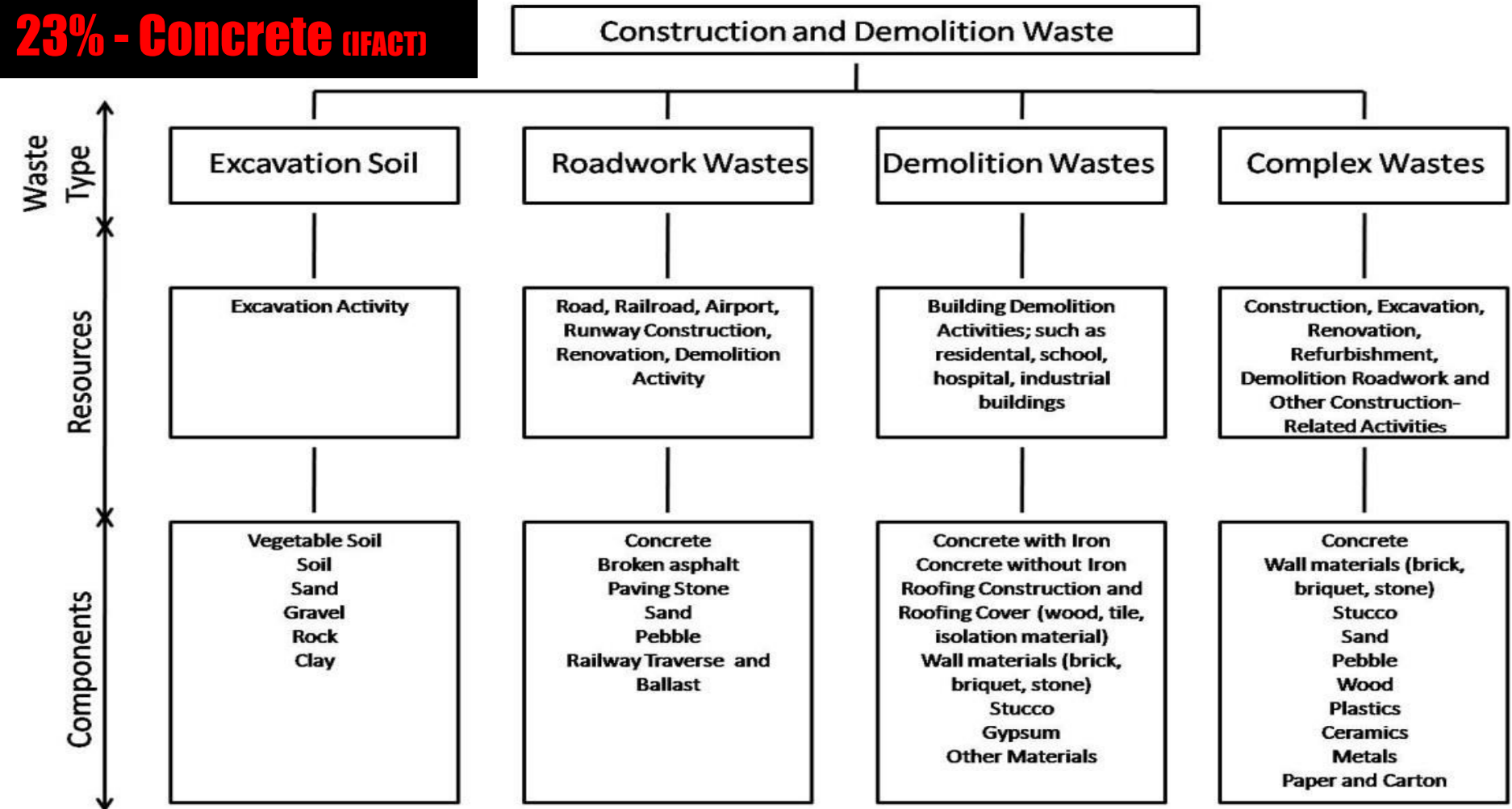
Indian C&D Waste

36% - Sand/gravel

31% - Bricks

23% - Concrete (IFACT)

Different types of C&D Wastes



As waste lies waste nature is devastated to support urban boom



•Sand mining triggers debate

- 2012:Supreme Court order on stronger regulations for minor minerals

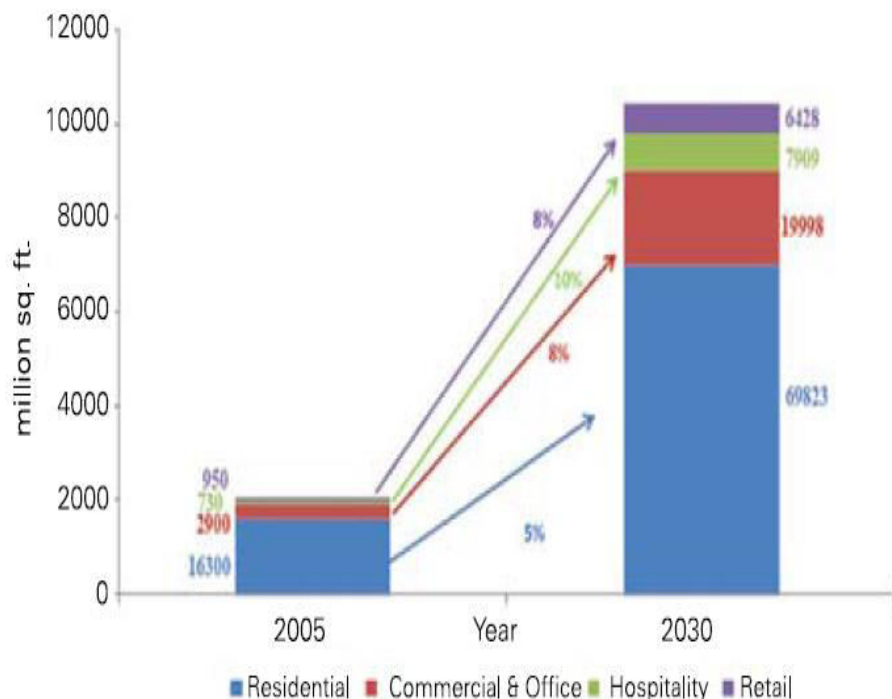
- 2013: National Green Tribunal declared sand mining with environmental clearance illegal.

- Union Ministry of Housing and Urban poverty alleviation alerted Rajaya Sabha in 2012 about the shortage of building material especially aggregates. Holding up housing and civic infrastructure projects.....

- Need substitutes and strategies to reduce demand for naturally sourced material



Building sector: Explosive growth



India's challenge: The ECO-III forecasts - 70% of building stock that will be there in 2030 is yet to come up in the country.

What is the implication for C&D waste?

According to TIFAC estimates:

- **New construction** generates about 40-60 kg per sq meter of build up area
- **Repair and renovation** of existing buildings generates 40-50 kg per sqmeter
- **Demolition of buildings** generate 300-500 kg per sq meter

Additionally astounding amount of waste is generated from infrastructure projects – roads, flyovers, bridges etc

C&D waste is grossly underestimated in India: No one really knows, how much?



“No estimates or even guesstimates exist for construction and demolition waste” in the country - Comptroller and Auditor General of India 2008

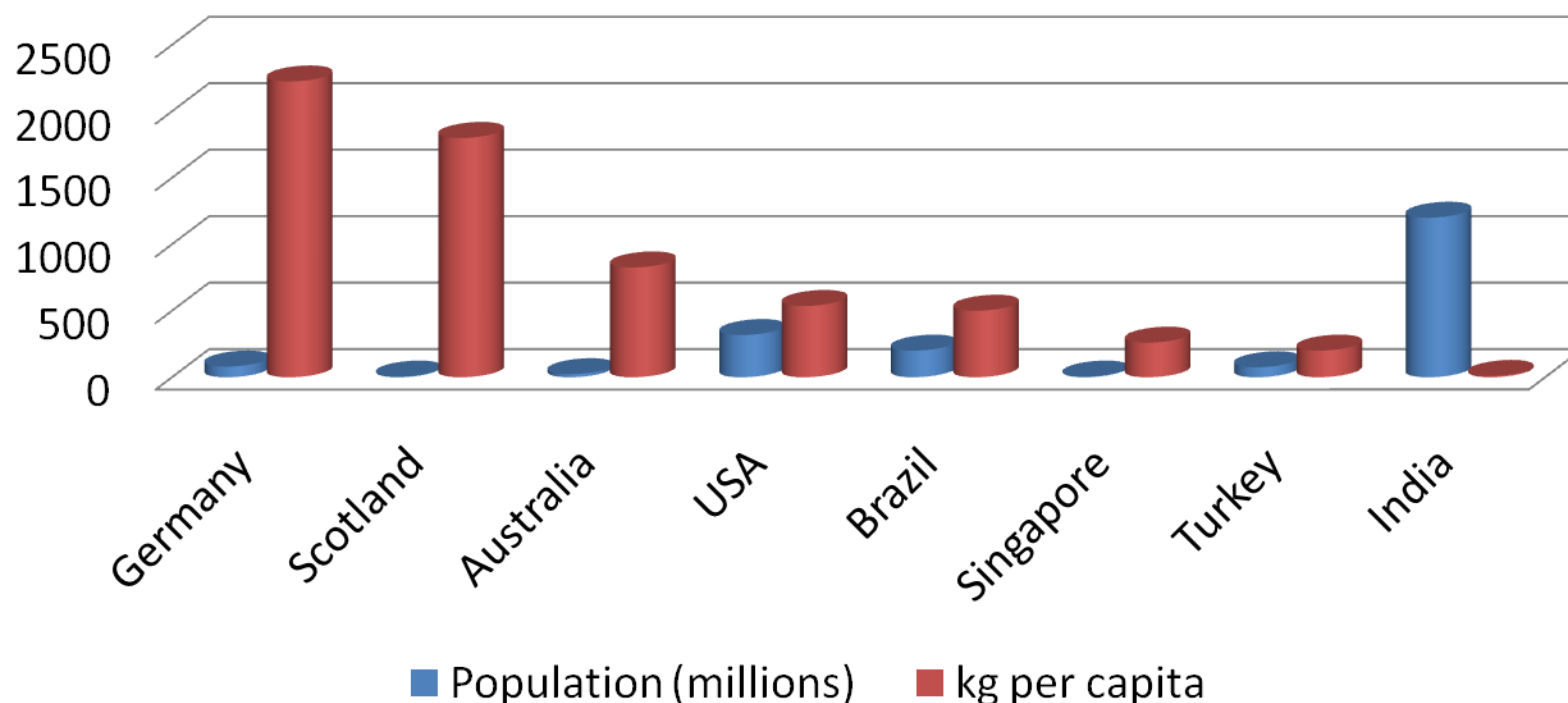
Even though built up area has increased dramatically official estimate of C&D Waste in India has not changed for over a decade

Year	Authority	Estimate (million tonnes)
2000	Ministry of Urban Development	10-12
2001	Technology Information, Forecasting and Assessment Council (TIFAC), Department of Science and Technology	12-15
2010	Ministry of Environment and Forest	10-12
2014	Ministry of Urban Development	No estimates exists



Brazil: 500kg per capita
India: 10kg per capita

Population vs Per capita C&D waste generation



C&D waste accounts for **13-67% of MSW**, and the generation in the world ranges from **130 to 3000 kg per capita per year**.

GUESS the ESTIMATES?



CSE has estimated the C&D waste based on TIFAC factors for C&D waste and Mckinsey estimates for trend in built up area in India. It finds:

- Indian buildings in 2013 must have generated more than **530 million tonnes – 44 times more than official estimates**. More than all the other solid wastes

- If C&D waste from infrastructure projects like road, dams, flyovers, bridges is also added India is already drowning.

A great part of this waste is also being used to illegally fill up urban water bodies and wet lands to reclaim land for more building construction.....

Weak laws on C&D waste..... weaker today....



Year	Authority	Document	Take
2000	Ministry of Urban Development	“Manual on Municipal Solid Waste Management”	includes a chapter on construction and demolition waste, with basic guideline on its handling
2000	Ministry of Environment and Forest	Municipal Solid Waste (Management and Handling) Rules	Directs civic bodies to follow them management procedure
2005	Ministry of Urban Development	Status of Water Supply, Sanitation and Solid Waste Management in Urban Areas	Notes problem with transport of C&D waste
2010	Ministry of Environment and Forest	Report of the Committee to Evolve Road Map on Management of Wastes in India	Recommends amendment to MSWM Rules 2000 to address the C&D waste for its collection, utilization and safe disposal
2013	Ministry of Environment and Forest	Draft Municipal Solid Waste (Management and Handling) Rules 2013	Ignores the 2010 Committee's recommendations

Small steps to make resource from waste.....



- C&D waste can be recycled and reused in construction and minimize environmental degradation and pressure on land. Matured technologies are available.

- Small steps in Delhi and Mumbai:

- MCD-ILFS-IEISL initiative in Delhi: C&D waste is being recycled into aggregates which are converted to Ready Mix Concrete, pavement blocks, kerb stones and concrete bricks.

- YUVA and CIDCO initiative in Navi Mumbai: This has recycled 1500 tonnes of C&D waste between 2002-06. But operations shut down as no policy and market support

- No takers

IL&FS Plant Burari Delhi



Recycled Products from IL&FS Plant



What is coming in the way?

Indian laws permit only 'naturally sourced' material



- **No legal framework:** Municipal Solid Waste (Management and Handling) Rules 2000 only made a brief mention of C&D waste without laying down any guidelines for its management. **And Draft rules 2013 have not added anything more. Why?**

- **No standards for recycled products:** The BIS allows use of non-natural materials to be used for construction but doesn't have any specific standard for recycled material, leading to major confusion among various agencies and developers. Most are abstaining from using recycled waste citing Indian standard specification related to aggregates for concrete state that these should be '**naturally sourced**'.

- Only virgin materials (sand, aggregate) mined directly from nature can be used. This does not allow recycled or reused components.
- Any use of recycled aggregate become 'illegal'.

- **State construction agencies cannot include these material in their Schedule of Rates**

Technical studies for standard development exist. Speed up process



- **BIS requires designated agencies to carry out research according to their criteria to assess suitability of material.** – CBRI, CRRI, NCCBM etc are involved in such research.
- **Studies exist. Need policy action.** Eg. NCCBM and CBRI research has advanced to establish compliance with the IS codes. Other premium institutions like IITs have also carried out research and found recycled material fall within the range of IS norms.
- **CRRI research and pilot projects demonstrates suitability of recycled material including curb stones for road building**
- **Leverage research findings to expedite certification of recycled material**

Are interim measures possible?



- Explore other avenues to absorb alternative products until standards are notified
- Building material and technology Promotion Council under MUHPA promote innovative building material and technologies under “performance Appraisal Certification Scheme”. Innovative and alternative material that are not covered by BIS can be certified after detailed evaluation. This has been done for products of bamboo for buildings.
- Revision of schedule of rates (SOR) by state construction agencies like CPWD: Using publicly available scientific study by premium institutes CPWD can revise its SOR to allow use of paver blocks and flooring tiles from recycled C&D waste. This will develop market for recyclers and reduce subsidy burden on civic bodies.
- Build on the precedence of fly ash but shorten the time frame

Need proactive municipal action...



- **Municipalities have powers to act proactively**
- **Solid Waste management Cell of Government of Maharashtra has included C&D waste in its action plan.** Each city required to have collection and disposal of waste from bulk waste producers and construction debris

Municipal Corporation of Greater Mumbai has notified Construction & Demolition & Desilting Waste (Management & Disposal) Rules 2006

Implementation remains a challenge....

Global best practice shows the way



Hong Kong: C&D waste tax on developers lowers C&D waste at landfill by 60%. 100% waste utilisation is charged at \$27 per tonne. More than 50% waste needing landfill disposal is charged at \$125 per tonne. Revenue is used to subsidise recycling centres. Promoted efficient construction practices.

Singapore recycles 98 per cent of its C&D waste.

South Korea: C&D waste management part of Low Carbon Green Growth strategies. Have separate building codes for recycled asphalt concrete aggregates , recycled concrete aggregates, and road pavements. Effective recycling rate is 36% with a target of 45% by 2016.

European Union: EU 2004 regulations for Aggregates provides for “*aggregates from natural, recycled, and manufactured material*”. Some member countries report over 20% recycled material use.

United Kingdom: The Northern Ireland Environment Agency aggregates and waste rules of 2004. Recycled aggregates are 28% of the C&D waste.

New York City Its disposal practices are more efficient than the rest of the US. It forces the developers to segregate waste at site, dismantle and not demolish in addition to other measures. .

Recycled concrete was used in the construction of the South Seas apartment building in Greenpoint, Cape Town



London Olympic 2012 Stadium used 30% Recycled concrete in its construction.



International Best Practice



The Nalawala Hall, Fairfield City Council's Sustainability Hub, incorporates the world's first concrete load-bearing foundation slab which is 95 per cent recycled.



Way forward.....



- **Fast track BIS code formation specifically for recycled material**
- **Explore other legal avenues in the interim to use alternative and recycled building material.** Eg... BMTPC's Performance Appraisal Certification Scheme' --- as was used for products of bamboo for buildings
- **Revise schedule of rates (SOR) :** Using publicly available scientific study by premium institutes CPWD can revise its SOR to allow use of paver blocks and flooring tiles from recycled C&D waste.
- **Include detailed and stringent provisions on collection, disposal, recycling of C&D wastes in Draft Municipal Solid Waste and Management Rules 2013**
- **Need tax policies for developers linked to waste generation and promote reduction in generation of C&D waste**
- **Need accountability in reporting of C&D waste. Develop data bases for each city**