Circular Economy and the Construction Industry

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ARUP
Renewables and finite materials

- **Biological Cycles**:
  - **Regenerate** and capture value at each stage of decomposition

- **Technical Cycles**:
  - **Take**
  - **Make**
  - **Use**
  - **Dispose**
  - **Restore** repair, reuse, refurbish, re-manufacture, recycle

Minimise systemic leakage & negative externalities
The construction industry is the largest consumer of raw materials globally and yet less than one third of construction and demolition waste is recycled or re-used.

- 70% of the world population lives in cities by 2050.
- 40% of global waste is generated by the construction industry.
- 56% of all steel and aluminium goes into construction. Cement accounts for 11-23%.
- $8 trillion Global Construction industry.
- 57% Represented by China, India and US.
Carbon Emissions in the UK Built Environment Driver for change Achieving 80% Reduction*

*Development of the Routemap was managed by WRAP, working in collaboration with Arup and the Climate Centre; adapted from greenconstructionboard.org

**Mid-term compounded annual growth rate (CAGR) source: Columbia University, FAO, Transparency Research, CW Advisory

Annual volumes in global construction industry

<table>
<thead>
<tr>
<th>Material</th>
<th>Volume</th>
<th>Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cement</td>
<td>4.5bn tons</td>
<td>1%**</td>
</tr>
<tr>
<td>Concrete</td>
<td>10 bn tons</td>
<td>5%**</td>
</tr>
<tr>
<td>Brick</td>
<td>1.5 bn bricks</td>
<td>4%**</td>
</tr>
<tr>
<td>Glass</td>
<td>8 bn m²</td>
<td>6%**</td>
</tr>
<tr>
<td>Lumber²</td>
<td>500 mm³</td>
<td>2%**</td>
</tr>
<tr>
<td>Construction waste¹</td>
<td>1.3bn tons</td>
<td>15%**</td>
</tr>
</tbody>
</table>

700-900 thousand sqm new commercial and residential per annum in India only.
Systemic rethink of construction

Regulators & influencers:
- NGOs, PPEs and official authorities dictating, incentivizing or limiting parameters within value chain
- Standards setting bodies and agencies Examples: National and local government institutions, NGOs, regulators, global and regional standards and code setting bodies (LEED, BREEAM, etc.)
High Speed 2 Circular Depot – interventions

- Design the railhead to minimise conversion into the infrastructure depot
- Design for deconstruction
- Circular material selection
- Renewable energy generation
- Circular use of water resources

90,000 tn
Reduction material consumption

<10 year
Payback time water treatment and energy systems

8%
Reduction of upfront Capex
Where is value lost?

- Underutilised space
- Buildings demolished prematurely
- Vacant land
- Depreciated building materials
- Underperforming components

- European offices under-occupied by 35-40% during working hours
- 46% of UK residential buildings demolished age 11-32
- UK residential developers are sitting on 600,000 plots with planning permission
- Residual value of materials less than 5% of the value of new manufactured products
- 20-40% of building energy use could be profitably conserved
Realising the value of circular economy in Property industry

- **Flexible spaces**: 18% reduction in NPC over 12y
- **Adaptable assets**: 3% increase in IRR over 15y
- **Relocatable buildings**: 26% increase in IRR over 11y
- **Residual value**: 5% reduction in NPC over 10y
- **Performance procurement**: 3% increase in IRR over 30y
Market demand and trend for circular economy
Challenging the status quo

Upscale CE to default position

Creating a competitive edge for CE

CE as a better investments

What do we need to upscale the circular economy to the standard approach in a constructed world?

What role do the governments play?

What is the competitive advantage of a circular economy that is needed to compete with the predominantly unsustainable forms of construction material manufacturing, design, construction, operation and demolition of today?

Recognising that the financial sector is an important driver for the constructed world; what does it take to turn circular solutions into attractive investments?

What is the role of the World Bank?
Thank you

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