The Global Impact of Buildings

Economic

- Building sector represents 10% of global GDP - higher in some rapidly developing countries
- Employs more than 111 million people, including within the sector’s supply chain
- More than $7 trillion in annual expenditures in the sector - expected to increase to $12 trillion by 2020
- Nearly $100 trillion will be spent in construction sector over the next 10 years
Resource Efficiency in the Building Sector

“The building sector can be called the industry of “thirds”: over a third of all CO2 emissions come from building construction and operations, over a third of all energy and material resources is used to build and operate buildings, and over a third of total waste results from construction and demolition activities.”

UNEP - “Green Economy Report”, 2011

From 1900 to 2005:
“Total material extraction increased over that period by a factor of 8. The strongest increase can be observed for construction minerals, which grew by a factor 34…”

UNEP - “Decoupling Natural Resource Use and Environmental Impacts from Economic Growth, 2011”
The social challenges ahead.....

• By 2030, 80% of the world’s population will be living in cities in Africa, Asia, and Latin America

• By 2030, 40% of the population (3 billion people) will need access to housing - existing housing deficit

• How to meet this demand in a resource efficient way? – to minimize waste and water consumption

• Growing demand for urban services - housing, commerce, schools, hospital.....
# Environmental Impact of Cities and Buildings

<table>
<thead>
<tr>
<th>Environment Impact (global)</th>
<th>Cities (%)</th>
<th>Buildings (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GHGs</td>
<td>75</td>
<td>30</td>
</tr>
<tr>
<td>Energy Consumption</td>
<td>70</td>
<td>40</td>
</tr>
<tr>
<td>Resources (natural)</td>
<td>75%</td>
<td>30 (80% increase '92)</td>
</tr>
<tr>
<td>Waste</td>
<td>75%, rate &gt; pop. growth</td>
<td>40</td>
</tr>
<tr>
<td>Water</td>
<td>50% (losses)</td>
<td>25</td>
</tr>
<tr>
<td>Electricity (included in Energy)</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>Land</td>
<td>~50% increase by 2050</td>
<td></td>
</tr>
</tbody>
</table>

*Growth regions: Africa, Asia, Middle East, and Latin America*
The global use of natural resource materials increased by over 40% between 1992 and 2005, from about 42 to nearly 60 thousand million tonnes. On a per capita basis, the increase was 27%. Among the four major material groups (biomass, fossil fuels, ores and industrial minerals, and construction minerals) there has been a major increase in extraction of construction minerals of almost 80%, followed by ores and industrial minerals (close to 60%). This growth is strongly linked to increasing population numbers and the need for shelter, food and an improved standard of living (UNEP 2011).
A genuine attempt at moving towards a circular urban metabolism: Hammarby Sjostad, Stockholm.
# Greening the Building Sector Supply Chain

## Key Actors

**Who is involved?**

- Owners/Developers
- Regulators
- Designers
- Contractors
- Product Providers
- Material Extractors
- Transporters
- Operators/Users
- GBCs
- Financial Institutions
- Schools/Universities

## Barriers

**What prevents progress?**

- Policy Frameworks (info/awareness, knowledge about benefits)
- Undefined responsibilities (owner, designer, contractor, etc.)
- Procurement requirements
- Fragmentation (trade separation)
- Risk distribution
- Lack of incentives
- Costs, Margins, Time
- Resource availability
- Hard and soft barriers
- Different benefits and measures of success throughout chain
Greening the Building Sector Supply Chain

Key focus of UNEP’s Sustainable Buildings and Climate Initiative (SBCI), includes application of green principles and assessment at each link (intervention point) of the supply chain:

**ENERGY-----CARBON-----WASTE-----WATER-----MATERIALS**

- Identify institutional barriers and opportunities
- Identify and share best practices using comparative international case studies
- Identify reduction potential in resource consumption and broad goals for materials and waste, energy and carbon, water, transport
- Identify co-benefits of greening the supply chain
- Engage with sub-sectors to identify unique opportunities in supply chain links
- Identify areas for further study/research
Resource Efficiency in the Building Sector

Develop Practices, Policies and Tools for Supply Chain

• Broader application of Life Cycle principles in Building Design
  • Design for EE and resource efficiency
    • Local Sourcing of Materials
    • Consider Site Resources (Solar, Wind, Geo-thermal, Water, Biodiversity)
    • Vernacular and passive designs
  • Construction
    • Green practices (e.g. recycling and waste reduction, site management)
    • Green Procurement requirements to suppliers and upstream
  • Operations
    • Apply Resource Management principles to operations
  • Suppliers
    • Reduce material use (including packaging), waste, energy consumption in own and sub-supplier practices
  • Governments
    • Regulatory instruments (labeling, EPDs, codes)
    • Buildings in national climate plans, Sustainable Consumption and Production strategies, Solid Waste Management Plans
<table>
<thead>
<tr>
<th>Program Objective</th>
<th>Geographic Focus</th>
<th>Expected Outputs</th>
</tr>
</thead>
</table>
| Resilient, Resource-Efficient Cities:                 | Global: city level ecosystem based adaptation, integrated resource flows, urban sprawl and planned city extensions | • Baselines of resource flows  
• City legislative/planning frameworks reviewed  
• Demonstration projects to improve resilience/resource efficiency through infill, densification, brownfield redevelopment, revising city-region plans |
| Sustainable Transport and Mobility:                   | Africa, Kenya                                         | • Sustainable transport and urban mobility policy/plans adopted by African countries |
| Waste and Waste Water:                                 | Global: different city types                          | • Integrated city waste management (IWM) strategies; focus in part on building/construction waste;  
• Pilot projects to demonstrate and test feasibility and tools |
Defining the Benefits of Sustainable Buildings and Cities

Energy
- Reduced demand, operational cost
- Management of long-term supply
- Creating renewable energy markets

Infrastructure
- Sustainable building reduces infrastructure needs, costs, promotes resource efficiency
- Smart urban planning linked to sustainable building policies

Water
- Efficiency in green buildings = cost savings for supply of water
- Helps address water scarcity issues

Waste and Material
- Efficient use of land and materials
- Limit construction waste
- Reduce environmental impacts globally and locally

Low Net Cost
- Strong Investment case; generating significant savings
Focus on the Building Sector in the ‘urban context’ will provide significant potential for achieving high levels of resource efficiency, including for ENERGY--CARBON--WASTE--WATER---MATERIALS---LAND

• More sustainable patterns of consumption and production need to be developed national levels, municipal and sector levels

• A more resource efficient city and local building sector can reduce the demand and cost of infrastructure and improve delivery of city services, such as waste management, transportation, energy and water supply

• Links and integration among sectors can advance resource efficiency in cities and at a national and global scale

• A focus on building supply chains will reveal opportunities for also transforming energy, water, waste and transport sectors, material consumption, and waste generation, and will support transitions to greener, more sustainable economies
Thank you

www.unep.org