INCREASED RESOURCE EFFICIENCY IN THE CONSTRUCTION MATERIAL LIFECYCLE – A POLICY PERSPECTIVE

UNEP SBCI
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ADDRESSING THE IMPACT OF CONSTRUCTION MATERIALS IS A PRIORITY FOR MANY COUNTRIES

- Construction materials & building sector are responsible for more than 1/3 of global resource consumption annually
- Manufacturing of building materials consumes about 10% of global energy supply.
- Construction & demolition waste contribute about 30% to solid waste streams
THE GROWTH OF CONSUMPTION OF SOME MATERIALS (SUCH AS CEMENT) IS OUTPACING THE GROWTH IN POPULATION
WITHOUT CONTROL, MATERIALS BECOME A GREATER PROPORTION OF THE CARBON FOOTPRINT OF BUILDINGS

CO\(_2\) footprint of a typical multi-unit residential building over 60yrs (North America)

2015
Total = 35 Kg CO\(_2\)e/m\(^2\).yr

2050
Total = 10.5 Kg CO\(_2\)e/m\(^2\).yr

Emissions from operations

80%

20%

Emissions from construction & materials

75%

25%
A Policy Study on the Sustainable Use of Construction Materials
• Identify *policy drivers and levers* that will encourage construction industry members to choose the materials with the lowest possible life-cycle environmental impacts

Promoting sustainable building materials and the implications on the use of wood in buildings: a review of leading public policies in the UNECE region
• Overview of the current policy environment
• Evaluation of leading practices
• Commentary on effectiveness of such regimes as *solutions* for driving adoption of sustainable construction materials
POLICIES SHOULD LEVERAGE FACTORS OF
MAXIMUM INFLUENCE (28 IDENTIFIED)

<table>
<thead>
<tr>
<th>Category</th>
<th>Highly influential factors in the selection of construction materials</th>
</tr>
</thead>
</table>
| Physical            | • Climate
                     • Proximity of sources of raw materials |
| Economic & social   | • Availability of a qualified workforce |
| Cultural            | • Architectural typology |
| Financial           | • Cost of construction materials, land, transport and labour
                     • Presence of environmental taxes |
| Regulatory          | • Policies relating to natural resources management, environment,
                     urban planning energy and territorial development
                     • Regulations which may prohibit, restrict or require the use of certain materials.
                     • Policies which reduce material throughput, particularly of high impact materials.
                     • Policies of requirements or standards that enhance the diversion of end-of-life materials from landfill as well as the re-use of materials
                     • Policies promoting “end-of-waste” |
NUMBER OF FACTORS OF INFLUENCE ADDRESSED

More

Green building rating systems

Education and training policies

Market-based instruments

Building codes

Land use plans and zoning laws

Life-Cycle Assessment (LCA) of building materials, assemblies and structures

Product certification and labeling schemes

Sustainable procurement policies

Few

Benchmarking, data gathering, reporting and statistics
DEPTH TO WHICH OF FACTORS OF INFLUENCE ARE ADDRESSED

Increased reliance on metrics, data and statistics

- Green building rating systems
- Product certification and labeling schemes
- Land use plans, zoning laws & codes
- Sustainable procurement policies
- Market-based instruments
- Life-Cycle Assessment (LCA) of building materials, assemblies and structures

Less

More
SURVEY SUGGESTS MANY COUNTRIES HAVE POLICIES IN PLACE ALREADY

- 42% have at least one policy in effect today
- 15% have a policy in development for implementation within 2 years
- 43% no policy anticipated at this time

100 responses from 33 different countries in OECD & ECE regions
PRIMARY MOTIVATIONS FOR SUSTAINABLE CONSTRUCTION
MATERIALS POLICIES

- Support GHG emission reduction and climate change policies
- Reduce environmental impacts of construction materials
- Promote a local wood economy and culture
WOODBOX & WOOD DAYS
GERMANY & AUSTRIA

- Integrated public outreach programme lining wood and construction economies
- Builds awareness of the impacts of construction materials and benefits of using wood
- Promotes modern methods of construction (pre-fab, etc.)
- 15,000 visitors in five town centre locations (Milan, Brussels, Ljubljana, Bratislava, Klagenfurt)
- Plus full exhibition in Vienna
• Connects sustainability with social justice
• 70% Zurich residents voted in favour
• 2000W & 1 tonne CO₂ per person by 2050
• In-use & embodied energy/CO₂ impacts regulated
• **Requires LCA**
• Builds on extensive experience in low-carbon, design, construction and reporting
• Informs many other materials & resources policies
Clear measurable standards and targets

Cross-cutting mechanism promotes use of wood to reduce embodied energy / CO₂

Works hand in hand with 2000-Watt Society while increasing opportunities for local wood industry.

Project funding up to CHF300,000

+ 50% increase in the wood content from local forests in entire building stock (new buildings) by 2020
• Forests are publicly owned
• Can$2.4m annual budget for
  • Resolution of market barriers
  • Research & innovation
  • Education & skills development
  • Marketing, promotion & outreach
  • Policy development & implementation
• Facilitates the uptake of wood products in new and innovative situations
• Stimulates research into new techniques and technologies
• Develops small local markets as “shop-windows” of wood innovation for primary overseas markets.
• Procurement framework for construction materials
• Requires range of life-cycle criteria to be measured and met
• EPDs needed
• Potential to influence entire life-cycle of materials
• Steel reinforcing pilot – can be applied across all major materials
• Required by £14bn London Crossrail project
• Major project offers immediate economy of scale
CHAIN-ORIENTED WASTE POLICY
THE NETHERLANDS

• Highest landfill taxes in Europe @ €107.49 per tonne
• 95% recycling and recovery rate for C&D waste
• Combination of 13 discrete measures within an integrated plan
• Considers entire material chain, including all stages in product’s life cycle from raw material mining, production and use, to waste and possible recycling, as opposed to concentrating on “end-of-pipe” solution
• Focus on reducing overall environmental pressures
• Actively working towards a “circular economy”
# GETTING TO GRIPS WITH MATERIALS-BASED POLICIES

<table>
<thead>
<tr>
<th>Finding</th>
<th>Recommendation</th>
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<tbody>
<tr>
<td>There are many factors that influence the selection of construction materials</td>
<td>Green building rating systems supported by comprehensive education programs offer <strong>a way to lead industry towards adoption of LCA</strong></td>
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<tr>
<td>There are many levers available to address the environmental impacts of materials</td>
<td>An integrated cross-cutting approach to policy making can have <strong>multiplier effects</strong></td>
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![Life Cycle Assessment (LCA) stages](image)
SHIFTING TO DATA-CENTRIC PERFORMANCE BASED POLICIES

Prescriptive approach in place TODAY

- Use certain materials
- Impose bans on certain materials
- Stipulate quantities of certain materials types
- Favour materials with particular properties

SHIFT towards performance approach

- Integrated, cross-cutting performance based policies that address more than one life cycle stage
- Adoption of life cycle assessment (LCA) as the tool of choice in evaluating the environmental impacts of materials
ALTHOUGH THERE ARE FLAWS, LCA REMAINS THE TOOL OF CHOICE FOR THE DEVELOPED WORLD

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<td>Adequately supported, LCA offers a robust mechanism for managing,</td>
<td><strong>Substantial investment</strong> must be directed towards the development of data,</td>
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<td>reporting and enforcing use of low impact materials</td>
<td>tools and reporting frameworks</td>
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<tr>
<td>There are several LCA-based materials policies in effect today</td>
<td>An <strong>inventory of materials-oriented policy making best practices</strong> to provide</td>
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<td></td>
<td>examples of how LCA can be incorporated into the regulatory environment.</td>
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# RECOMMENDATIONS

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<td>LCA can be used to reinforce other policies such as building codes and sustainable procurement policies</td>
<td>Develop mechanisms to benchmark, gather statistics and show improvement over time</td>
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<td>Over time LCA will influence all stages in the materials life cycle</td>
<td>The construction materials market functions locally, nationally and internationally - metrics must be consistent at all these levels</td>
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BUILDING BLOCKS FOR CHANGE

• Publication in Summer 2015
• Reinforces the rationale for regulating construction materials
• Adds to a substantial body of research supporting LCA as the tool of choice for benchmarking and tracking of the environmental impacts of materials
• Both point to the need for international consistency in terms of methodology, terminology and reporting
• This need will be addressed by the SBCI Common Materials Metric
THANK YOU

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