Sustainability of construction materials and products – substances of concern and assessment tools

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Outline of presentation

- What is a sustainable construction product
- Construction Products Regulation
- Substances of interest
- LCA approach
- Challenges
What is a sustainable construction product?

- Different approaches of sustainability in EU member states
- Need for indicator(s) to use for quantifying sustainability
- In future harmonisation of indicators
Sustainable competitiveness is understood as capacity of the enterprises of the construction sector to achieve and to maintain the level of economic performance required by the market while at the same time pursuing sustainable development objectives. In other terms, this performance, which reflects the output of their economic activity, should also contribute to the realisation of objectives in terms of quality, social well being, employment, resource efficiency and respect for the environment.

(ref. Antonio Paparella, EU Commission, Enterprise & Industry, 2011)
Construction Products Regulation (305/2011)

• Full applicability 1 July 2013

Scope:
• Construction products/works including both buildings and civil engineering works (e.g. soil construction works, road construction, and construction of bridges

Aim:
• “market tool” to remove “barriers to trade”

Important elements:
• Definition of 7 basic working requirements
• Different national values – one test method
• CE marking as “information tool” to provide a harmonised information format
• CE marking mandatory in EU
Basic work requirements BWR 3 & 7 in force July 1, 2013

**BWR 3. Hygiene, health and the environment**

The construction works must be designed and built in such a way that they will, **throughout their life cycle**, not be a threat to the hygiene or health and safety of workers, occupants or neighbours, nor have an exceedingly high impact, over their entire life cycle, on the environmental quality or on the climate during their construction, use and demolition, in particular as a result of any of the following:

- the giving-off of toxic gas;
- the emissions of dangerous substances, volatile organic compounds (VOC), greenhouse gases or dangerous particles into indoor or outdoor air;
- the emission of dangerous radiation;
- the release of dangerous substances into ground water, marine waters, surface waters or soil;
- the release of dangerous substances into drinking water or substances which have an otherwise negative impact on drinking water;
- faulty discharge of waste water, emission of flue gases or faulty disposal of solid or liquid waste;
- dampness in parts of the construction works or on surfaces within the construction works.

**BWR 7. Sustainable use of natural resources**

The construction works must be designed, built and demolished in such a way that the use of natural resources is **sustainable** and in particular ensure the following:

- reuse or recyclability of the construction works, their materials and parts after demolition;
- durability of the construction works;
- use of environmentally compatible raw and secondary materials in the construction works.

NEW! focus on recycling, use of LCA!
So far, no national regulatory requirements for BWR 7 exist

Focus on health/env safety during whole life cycle! Clear link to release studies!
Substances of interest

Priority substances in EU regulations
- POP
- Reach/SVHC/CLP
- Directives: Waterframe work / Groundwater / Drinking water
- Ozon depleting
- Disposal: Landfill directive
  MineWaste directive

Future substances (materials) of concern
- Nano particles
- Anti-microbial agents
- PVC
- EU environmental targets
- “Raw material strategy”

National criteria
- National utilisation criteria and guidelines
- Phase-out (SWE)
# Specific substances in EU legislation

**exposure information, ban, impact**

<table>
<thead>
<tr>
<th>Regulation</th>
<th>Substances under concern</th>
<th>Focus</th>
<th>Relevance (example)</th>
</tr>
</thead>
<tbody>
<tr>
<td>REACH: SVHC (candidate list: 46 substances + 8 new) PBT, vPvB</td>
<td></td>
<td>Safety data requirement</td>
<td>Content &gt; 0.1 % (for PBT, vPvB), phthalates, As – and Co- compounds, chromates, organic solvents</td>
</tr>
<tr>
<td>POP (The Persistent organic pollutants regulation (756/2010)); UN-EP-convention</td>
<td>Limits for 10 substances (9 new), primary organics</td>
<td>Ban of use, recycling</td>
<td>Flame retardants (Bromated compounds)</td>
</tr>
<tr>
<td>Biocide Products directive (98/8/EC)</td>
<td>Annexes I, IA &amp; IB contain approved active substances</td>
<td>Only biocides containing approved active substances can be used</td>
<td>Boron, Ag, As, Cr, Cu</td>
</tr>
<tr>
<td>Water Framework Directive (2000/60/EC, Annex X of Decision N:o 2455/2001/EC)</td>
<td>A list of 33 priority substances or groups of substances</td>
<td>Actions to phasing out of discharges, emissions and losses to water</td>
<td>PAH</td>
</tr>
<tr>
<td>Groundwater directive (2006/118/EC)</td>
<td>Criteria for assessing groundwater chemical status (9 substances)</td>
<td>National limit/threshold values</td>
<td>ammonium, sulphate, chloride, metals (As, Cu, Pb, Hg, Ni, Sb, etc.)</td>
</tr>
<tr>
<td>Drinking water (98/83/EC)</td>
<td>Potentially dangerous chemical parameters listed</td>
<td>National guidelines</td>
<td></td>
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<tr>
<td>Proposal for soil directive</td>
<td>Prioritisation of polluted areas</td>
<td>National limit values</td>
<td>In Finland includes indoor air quality threshold values</td>
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</table>
How to express environmental impacts in LCA

- Climate change
- Acidification
- Eutrophication
- Stratospheric ozone depletion
- Photochemical ozone creation

Other indicators commonly included in LCA:
- Renewable and non-renewable primary energy
- Water consumption
- Waste for disposal
- Toxicity to ecosystems and humans
- Resource Depletion (e.g. minerals, scarce)
- Radioactivity
Elements of LCA

- Definition of scenario and boundary conditions
- Selection of illustrative functional parameter (e.g. kg)
- Environmental impact from different phases of the lifecycle of a construction product are calculated as load
Reporting of LCA data

- Environmental Product Declarations (EPD): approach for communicating LCA results according to a common format or rules (work done in CEN/TC 350)
- LCA + Product Category Rule (PCR) = EPD (ISO 14025, ISO 21930, EN 15804)
- The inclusion of recycling in the LCA-programmes need to be further checked
- Impact reported per functional unit
Determination of release: Method development

Comparison of two percolation tests

Test method A:
- Particle size 0-45 mm
- Percolation tests with 20 cm (diameter) columns for untreated material

Test method B:
- Percolation tests with 10 cm columns for crushed material (<10 mm)
- Comparison of results
Results from reclaimed concrete using percolation test
( Big column ø20 cm (0-45 mm) vs. standard column ø10 cm (<10 mm))

Need to harmonised test method!
Implementing sustainability targets - challenges

- Environmental Product Declarations are input for the environmental assessment of buildings (currently not including recycling)

- LCA and EPD important elements in Ecodesign analysis for safe product use and sustainable recycling/reuse solutions

- Products need to be designed for later recycling (however, contamination from use needs to be evaluated)

- Need for selective demolition including quality assurance control (PCB, asbestos, gypsum….)

- Technical standards need to fit characteristic of recycling materials
Sustainable construction products and materials for renovation (EU-Eracobuild-project)

Scientific and technological outcome

- development of new assessment and decision making tools for the evaluation of environmental sustainability of construction products and materials in renovation.
- verification of the applicability of the developed methodology on selected construction products.

Additional information

- The project is part of a consortium under “2010 Eracobuild on Sustainable Renovation”
- Co-operation: VTT (Finland) - coordinator, SGI (Sweden), IVL (Sweden), DHI (Denmark), Statens Byggeforskningsinstitut (Denmark) & DTU (Denmark)
- Companies involved: Finnish and Swedish construction companies and Finnish Road Administrator
- Duration of the project: 09/2010-12/2012

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VTT creates business from technology