Assessment Tools in Sustainable Construction

Where we are:
- Levels: Materials, Buildings, Housing and Industrial Estates, Urban Areas
- Ecology: Decoupling of global welfare and the use of natural resources
- Society: User adequate architecture
- Economy: Life cycle cost

ETH Zurich
- Science and technology university with an outstanding research record
- Study, research and work place of 18,000 people from 80 nations
- About 350 professors in 15 departments

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Structure

1. Overview over three (voluntary) different construction project assessment tools:
   a. SNARC
   b. SIA 112/1
   c. SB Tool
2. SB Tool methodology
3. Adaptation / Localisation

Documentation D 0200 “SNARC”

“Systematik zur Beurteilung der Nachhaltigkeit von Architekturprojekten für den Bereich Umwelt”
• Intended for the early planning phase (architectural contests)
• Systematic analysis of environmental aspects
• Three thematic focuses:
  – Site
  – Resources
  – Operability

➢ Rough guideline covering mostly environmental issues
Reference SIA 112/1 Nachhaltiges Bauen im Hochbau

• Addressing planner and client communication in order to pinpoint strategic sustainability goals
• Covers further aspects of sustainability
  a. Environment
  b. Society
  c. Economy

➢ Lacking indicators and benchmarks to evaluate or compare projects

SBTool

• Developed by members in more than 20 countries (iiSBE)
• Spreadsheet-based analysis software
• Allows adaptation to scope and region
• Covers 7 issues of sustainability:
  – Site selection and urban design
  – Energy and resources
  – Environmental load
  – Indoor environmental quality
  – Service quality
  – Social and economic aspects
  – Cultural aspects
SBTool - Features

• Number and text-based benchmarks can be defined
• Custom weightings
• Easy insertion of local criteria and/or language
• Modular in scope
  – Consideration of occupancy type
  – Phase (Pre-design, design, construction, etc.)
  – New and renovation projects
• Relative and absolute result outputs

➢ The SBTool allows a very high flexibility

SBTool - Modules

Source: International Initiative for a Sustainable Built Environment
### Master List of SBTool Parameters

**A Site Selection, Project Planning and Development**

<table>
<thead>
<tr>
<th>A1 Site Selection</th>
<th>P-Dsn</th>
<th>Des</th>
<th>C&amp;C</th>
<th>Ops</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1.1 Pre-development ecological value or sensitivity of land.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A1.2 Pre-development agricultural value of land.</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>A1.3 Vulnerability of land to flooding.</td>
<td></td>
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<tr>
<td>A1.4 Potential for development to contaminate nearby bodies of water.</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A1.5 Pre-development contamination status of land.</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A1.6 Proximity of site to public transportation.</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>A1.7 Distance between site and centres of employment or residential occupancies.</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A1.8 Proximity to commercial and cultural facilities.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**A2 Project Planning**

| A2.1 Feasibility of use of renewables. |     |     |     |     |
| A2.2 Use of Integrated Design Process. |     |     |     |     |
| A2.3 Potential environmental impact of development or re-development. |     |     |     |     |
| A2.4 Provision of surface water management system. |     |     |     |     |
| A2.5 Availability of potable water treatment system. |     |     |     |     |
| A2.6 Availability of a split grey / potable water system. |     |     |     |     |
| A2.7 Collection and recycling of solid wastes in the community or project. |     |     |     |     |
| A2.8 Composting and re-use of sludge in the community or project. |     |     |     |     |
| A2.9 Site orientation to maximize passive solar potential. |     |     |     |     |

**A3 Urban Design and Site Development**

| A3.1 Development density. |     |     |     |     |
| A3.2 Provision of mixed uses within the project. |     |     |     |     |
| A3.3 Encouragement of walking. |     |     |     |     |

**The full list of parameters is quite long...**

Source: International Initiative for a Sustainable Built Environment
**Structure and Scoring**

- **7 Issues** (Indoor Env. Quality)
  - Sum of weighted Issue scores
- **29 Categories** (Ventilation)
  - Sum of weighted Category scores within Issue
- **125 Criteria** (Ventilation effectiveness)
  - Sum of weighted Criteria scores within Category

Source: International Initiative for a Sustainable Built Environment

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**Design target scores for Megaplex project, Ottawa, Canada**

<table>
<thead>
<tr>
<th>Relative Performance Results</th>
<th>Project Information</th>
<th>Active Phase (set in Region file)</th>
<th>Design Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performed above the A line</td>
<td>This is a renovation project with a total gross area of 7000 m². It has an estimated lifespan of 75 years. It is located in Ottawa, Canada. The assessment is valid for the Design Phase.</td>
<td>116 = Acceptable Practice; 3 = Good Practice</td>
<td>116 = Acceptable Practice; 3 = Good Practice</td>
</tr>
<tr>
<td>Environmental Loadings</td>
<td>Assumed the space is Typical, and minimum criteria is 0.02 m³/s Person</td>
<td>116 = Acceptable Practice; 3 = Good Practice</td>
<td>116 = Acceptable Practice; 3 = Good Practice</td>
</tr>
<tr>
<td>Indoor Environmental Quality</td>
<td>The building is single storey, and has a number of active low-level parameters.</td>
<td>116 = Acceptable Practice; 3 = Good Practice</td>
<td>116 = Acceptable Practice; 3 = Good Practice</td>
</tr>
<tr>
<td>Service Quality</td>
<td>The building is single storey, and has a number of active low-level parameters.</td>
<td>116 = Acceptable Practice; 3 = Good Practice</td>
<td>116 = Acceptable Practice; 3 = Good Practice</td>
</tr>
<tr>
<td>Social and Economic Aspects</td>
<td>To see a full list of Issues, Categories and Criteria, go to the Issues worksheet.</td>
<td>116 = Acceptable Practice; 3 = Good Practice</td>
<td>116 = Acceptable Practice; 3 = Good Practice</td>
</tr>
<tr>
<td>Total weighted building score</td>
<td>Amortization rate for embodied energy of existing materials is set at 2%.</td>
<td>116 = Acceptable Practice; 3 = Good Practice</td>
<td>116 = Acceptable Practice; 3 = Good Practice</td>
</tr>
</tbody>
</table>

**Active Weights**

- A: 8%  
- B: 23%  
- C: 27%  
- D: 18%  
- E: 16%  
- F: 5%  
- G: 3%

**Total weighted building score**

3.1
Localization

- One feature of SBTool is its adaptability to specific needs (local and application)
- The Chair of Sustainable Construction is working on a localized version of the SBTool
  - Swiss conditions
  - Swiss norms
  - Language
  - Weighting system

Case study - Forum Chriesbach

EAWAG-facility “Forum Chriesbach”, Dübendorf

*Results will be presented in SB08 conference in Melbourne*

Images: Roger Frei, www.rogerfrei.com
The building

- Completed in June 2006
- Administrative and research building
- Strong focus on sustainability issues
- Best practice construction

Contacts & Info

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