

AN INDICATOR SYSTEM FOR EVALUATING ECOLOGICAL PERFORMANCE OF BUILDING PRODUCTS AND STRUCTURES

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Introduction

Cleaner Building Material Workgroup (TEAM) was established in 1999 in Budapest. Original members were the Hungarian Association of Building-biology, the St. Stephen University - Faculty of Ybl Miklós College - Labor 5, and the Independent Ecological Center (IEC).

The long-run aim of TEAM to introduce regular qualification of building materials from the point of view of building-ecology and building-biology in Hungary. To achieve this aim TEAM would like to work out a qualification method, which has a strong scientific background and is easy to adopt.

To find the adaptable method TEAM does research on international calculation and qualification methods and try work together with research institutes, ministries and trade-corporations.

Work of TEAM in the frame of CRISP in Hungary

In 2002-2003 some members of TEAM, working together other institutes and experts, in the administration frame of Npc for Quality Control and Innovation in Building (project leader: PhD. Gábor Tiderenczl), worked out a Hungarian National system of constructed related sustainability indicators connected to CRISP ("CRISP conform" system).

Hungarian CRISP system built up 12 group of indicators:

1. Healthy buildings and elements of the natural environment
2. Energy in buildings
3. Waste management and reuse
4. Durability, maintenance and adaptability
5. Urban environment
6. Building
7. Housing
8. Product
9. Construction process
10. Quality Assurance in construction; Diagnosticating and Renewing the Building Stock
11. Cultural Heritage and Aesthetical Quality in Architecture
12. Social and economic conditions of sustainable construction

Each indicator group consist different number of indicators of indicator systems. In our work we developed the 8th indicator group dealing with the sustainability indicators of building products and materials. Description of 8th indicator group is shown in the Table 1.

Description of indicator					
Name	Evaluating ecological performance of building products and structures				
Descriptipn and aims with keywords	The indicator system evaluate the ecological performance of building products and structures . It summerize the results of 12 indicator.				
Stucture of indicator system	Evaluating ecological performance of building products and structures R8-1				
	Local attainability 18-1/1				
	Global attainability 18-1/2				
	CO ₂ eq emission – production p. 18-1/3				
	SO ₂ eq emission – production p. 18-1/4				
	Primer energy content of product/structure 18-1/5				
	Energy use of product/structure (operation) 18-1/6				
	Toxic material emission – building p. 18-1/7				
	Toxic material emission – operation p. 18-1/8				
	Toxic material emission – disposal p. 18-1/9				
	Rate of renewable energy content 18-1/10				
	Primer, not renewable energy content 18-1/11				
	Renewable capacity of product/structure 18-1/12				
Overall issues	<input checked="" type="checkbox"/> DIAGNOSTIC <input type="checkbox"/> MONITORING <input checked="" type="checkbox"/> EVALUATION <input checked="" type="checkbox"/> PLANNING <input type="checkbox"/> OTHER:.....				
Unit	„kv“ number, to evaluate the environmental load (kv = qualitative, or environmental from the Hungarian terminology)				
Method of measuring/evaluation	<input type="checkbox"/> OBSERVATION <input checked="" type="checkbox"/> EXPERIMENTAL MEASURING <input type="checkbox"/> CALCULATION / SIMULATION <input type="checkbox"/> STATISTICAL INTERFERENCE <input checked="" type="checkbox"/> EXPERT EVALUATION / ESTIMATION <input type="checkbox"/> OTHER:				
Related indicator groups (acc. to Hungarian system)	<input checked="" type="checkbox"/> 1. Healthy buildings and elements of the natural environment <input checked="" type="checkbox"/> 2. Energy in buildings <input checked="" type="checkbox"/> 3. Waste management and reuse <input type="checkbox"/> 4. Durability, maintenance and adaptability <input type="checkbox"/> 5. Urban environment <input type="checkbox"/> 6. Building <input type="checkbox"/> 7. Housing <input checked="" type="checkbox"/> 8. Product <input checked="" type="checkbox"/> 9. Construction process <input type="checkbox"/> 10. Quality Assurance in construction; Diagnosticating and Renewing the Building Stock <input type="checkbox"/> 11. Cultural Heritage and Aesthetical Quality in Architecture <input type="checkbox"/> 12. Social and economic conditions of sustainable construction				
Sustainable Development issues (acc. to CRISP)	<table border="0"> <tr> <td><input checked="" type="checkbox"/> ENVIRONMENTAL <input checked="" type="checkbox"/> Resources <input type="checkbox"/> Living environment <input checked="" type="checkbox"/> Energy <input checked="" type="checkbox"/> Contamination, waste <input type="checkbox"/> Use of land <input type="checkbox"/> Other:.....</td> <td><input checked="" type="checkbox"/> ECONOMIC <input type="checkbox"/> Economic growth / financing <input checked="" type="checkbox"/> Producing / consumption <input type="checkbox"/> Service <input type="checkbox"/> Other:.....</td> <td><input checked="" type="checkbox"/> SOCIAL <input type="checkbox"/> Accessibility <input type="checkbox"/> Safe <input checked="" type="checkbox"/> Health / comfort <input type="checkbox"/> Social, economica welfare <input type="checkbox"/> Community / human resource <input type="checkbox"/> Other:.....</td> <td><input checked="" type="checkbox"/> INSTITUTIONAL <input checked="" type="checkbox"/> Controlling <input type="checkbox"/> Judicatory <input type="checkbox"/> Ethic <input type="checkbox"/> Other:.....</td> </tr> </table>	<input checked="" type="checkbox"/> ENVIRONMENTAL <input checked="" type="checkbox"/> Resources <input type="checkbox"/> Living environment <input checked="" type="checkbox"/> Energy <input checked="" type="checkbox"/> Contamination, waste <input type="checkbox"/> Use of land <input type="checkbox"/> Other:.....	<input checked="" type="checkbox"/> ECONOMIC <input type="checkbox"/> Economic growth / financing <input checked="" type="checkbox"/> Producing / consumption <input type="checkbox"/> Service <input type="checkbox"/> Other:.....	<input checked="" type="checkbox"/> SOCIAL <input type="checkbox"/> Accessibility <input type="checkbox"/> Safe <input checked="" type="checkbox"/> Health / comfort <input type="checkbox"/> Social, economica welfare <input type="checkbox"/> Community / human resource <input type="checkbox"/> Other:.....	<input checked="" type="checkbox"/> INSTITUTIONAL <input checked="" type="checkbox"/> Controlling <input type="checkbox"/> Judicatory <input type="checkbox"/> Ethic <input type="checkbox"/> Other:.....
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Construction categories (acc. to CRISP)	<input type="checkbox"/> Urban environment <input type="checkbox"/> Infrastructure <input type="checkbox"/> Building <input checked="" type="checkbox"/> Product <input type="checkbox"/> Construction process				
Use of indicator, other information					
Connecting indicator systems:					

References	<p>- Genossenschafts Information Baubiologie: BauBioDataBank</p> <p>- Research report called „Cleaner Building Material in Hungary!” to the Ministry of Environment (Projektleader: Medgyasszay Péter; Members of research group: Cservény Ferenc, Dr. Józsa Zsuzsanna, Dr. Lányi Erzsébet, Medgyasszay Péter, Novák Ágnes, Tiderenczi Gábor)</p>	
Other information / comments:	<p>The condition of application is, that from product dates structure database has to made, where each construction layer depending on its mass and localization can influence the result of evaluation. Each indicator of the system is evaluated by „kv” number, and the mathematical medium of „kv” numbers give the summarized evaluation of structures.</p> <p>Meaning of „kv” numbers: 3: highly recommended; 2: recommended; 1: not recommended 0: neglected; n.j.: not characteristic; n.a.: no data available</p> <p>Depending on different structure types it is necessary to weighted the results of some indicators in the indicator system, which need further research.</p>	
Attached details	<input type="checkbox"/> Further information	
Other comments of experts		
Suggested by		
Name: Péter Medgyasszay	Date: 2003. 01. 25.	Contact (@ v.☎): megyo@foek.hu

Table 1.
Description of 8th indicator group.

Our indicator system consist 12 indicators, with the similar description. Description of I8-1/5 indicator (Primer energy content of product/structure) is shown in the Table 2.

Description of indicator	
Name	Primer energy content of product/structure / Evaluating ecological performance of building products and structures
Description and aims with keywords	The indicator shows the non renewable energy need of production of products and structures, its aim to reduce the energy consumption .
Unit	„kv“ number, to evaluate the environmental load (kv = qualitative, or environmental from the Hungarian terminology); based on primer energy content (kWh/m ² a)
Method of measuring/evaluation	<input type="checkbox"/> OBSERVATION <input type="checkbox"/> EXPERIMENTAL MEASURING <input type="checkbox"/> CALCULATION / SIMULATION <input type="checkbox"/> STATISTICAL INTERFERENCE <input checked="" type="checkbox"/> EXPERT EVALUATION / ESTIMATION <input type="checkbox"/> OTHER:
Related indicator groups (acc. to Hungarian system)	<input type="checkbox"/> 1. Healthy buildings and elements of the natural environment <input checked="" type="checkbox"/> 2. Energy in buildings <input type="checkbox"/> 3. Waste management and reuse <input type="checkbox"/> 4. Durability, maintenance and adaptability <input type="checkbox"/> 5. Urban environment <input type="checkbox"/> 6. Building <input type="checkbox"/> 7. Housing <input checked="" type="checkbox"/> 8. Product <input type="checkbox"/> 9. Construction process <input type="checkbox"/> 10. Quality Assurance in construction; Diagnosticating and Renewing the Building Stock <input type="checkbox"/> 11. Cultural Heritage and Aesthetical Quality in Architecture

	<input type="checkbox"/> 12. Social and economic conditions of sustainable construction													
Sustainable Development issues (acc. to CRISP)	<input checked="" type="checkbox"/> ENVIRONMENTAL <input checked="" type="checkbox"/> Resources <input type="checkbox"/> Living environment <input checked="" type="checkbox"/> Energy <input checked="" type="checkbox"/> Contamination, waste <input type="checkbox"/> Use of land <input type="checkbox"/> Other:.....	<input checked="" type="checkbox"/> ECONOMIC <input checked="" type="checkbox"/> Economic growth / financing <input type="checkbox"/> Producing / consumption <input type="checkbox"/> Service <input type="checkbox"/> Other:.....	<input type="checkbox"/> SOCIAL <input type="checkbox"/> Accessibility <input type="checkbox"/> Safe <input type="checkbox"/> Health / comfort <input type="checkbox"/> Social, economical welfare <input type="checkbox"/> Community / human resource <input type="checkbox"/> Other:.....	<input checked="" type="checkbox"/> INSTITUTIONAL <input checked="" type="checkbox"/> Controlling <input type="checkbox"/> Judicatory <input type="checkbox"/> Ethic <input type="checkbox"/> Other:.....										
Construction categories (acc. to CRISP)	<input type="checkbox"/> Urban environment <input type="checkbox"/> Infrastructure <input type="checkbox"/> Building <input checked="" type="checkbox"/> Product <input type="checkbox"/> Construction process													
Use of indicator, other information														
Connecting indicator systems:														
References	see indicator system R8 –1													
Other information / comments:	<p>The method of evaluation: From the available information (international database, statistics, reports of factories, etc.) has to summarize 1 m² productional energy demand of structures, and has to divide with the technical lifetime.</p>													
	<table border="1"> <thead> <tr> <th style="color: #000080;">kv number</th> <th style="color: #000080;">Primer energy content (kWh/m²a)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">0 - 4,99</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">5,00 - 9,99</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">10,00 - 19,99</td> </tr> <tr> <td style="text-align: center;">0</td> <td style="text-align: center;">20,00-</td> </tr> </tbody> </table>				kv number	Primer energy content (kWh/m ² a)	3	0 - 4,99	2	5,00 - 9,99	1	10,00 - 19,99	0	20,00-
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Table 2.

Description of indicator named I8-1/5 about Primer energy content of product/structure.

Summary

- 1) The indicator system has a very strong scientific background both international and national level, so worth to further develop.
- 2) There is a lack of national dates of environment and health load of production and operation of buildings, so further research needed in the mentioned fields.